



Tackling an Urban Chameleon via Digital Graffiti Archaeology

Geert Verhoeven | *project coordinator*
projectindigo.eu

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





GRAFFITI

diverse creations

iconic



GRAFFITI

diverse creations

iconic



multi-
faceted

GRAFFITI

diverse creations

art <> vandalism

graphical <> textual

socio-political criticism <> entertaining

legal <> illegal

tangible <> intangible



**multi-
faceted**

GRAFFITI

diverse creations

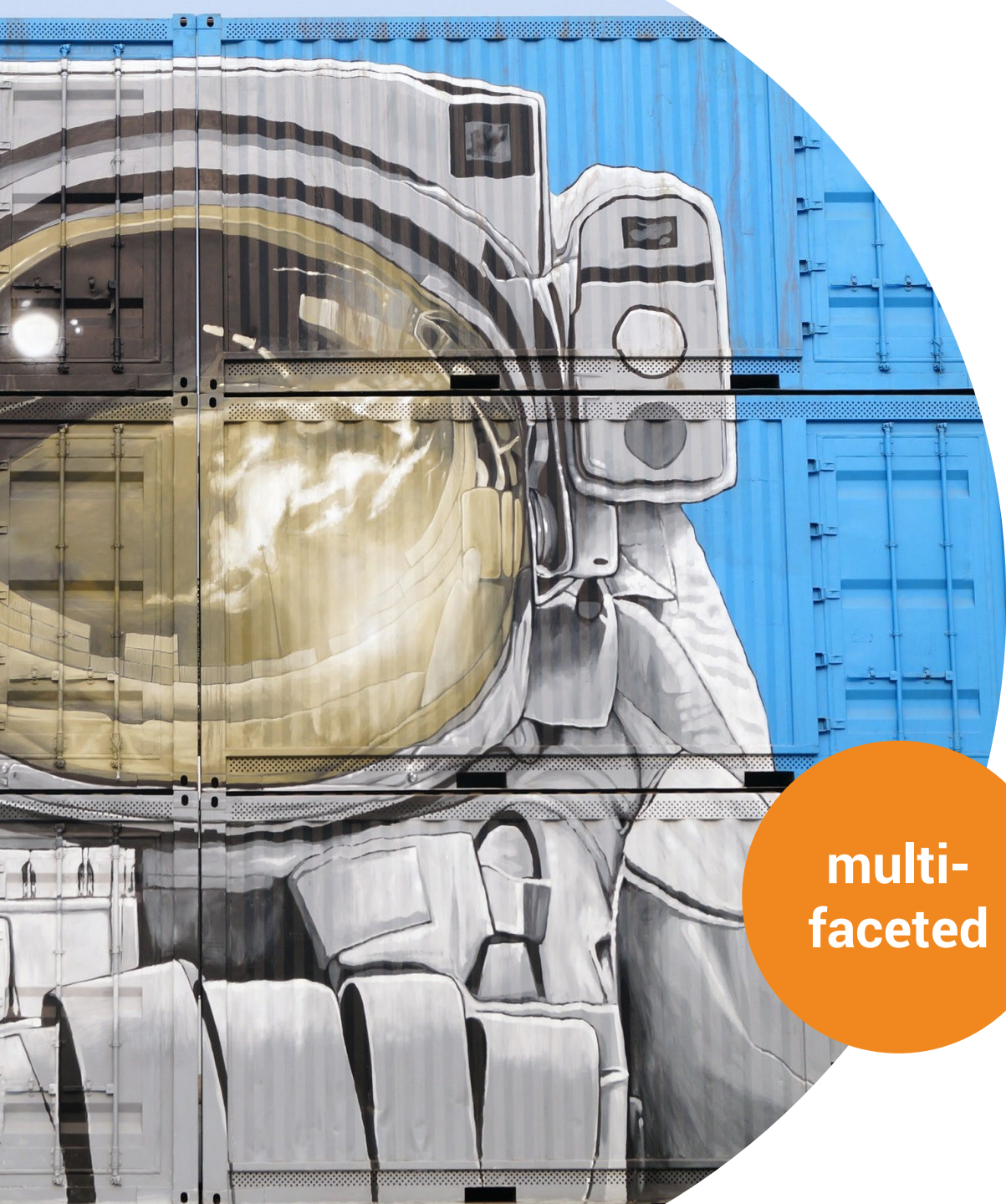
art <> vandalism

graphical <> textual

socio-political criticism <> entertaining

legal <> illegal

tangible <> intangible



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GRAFFITI

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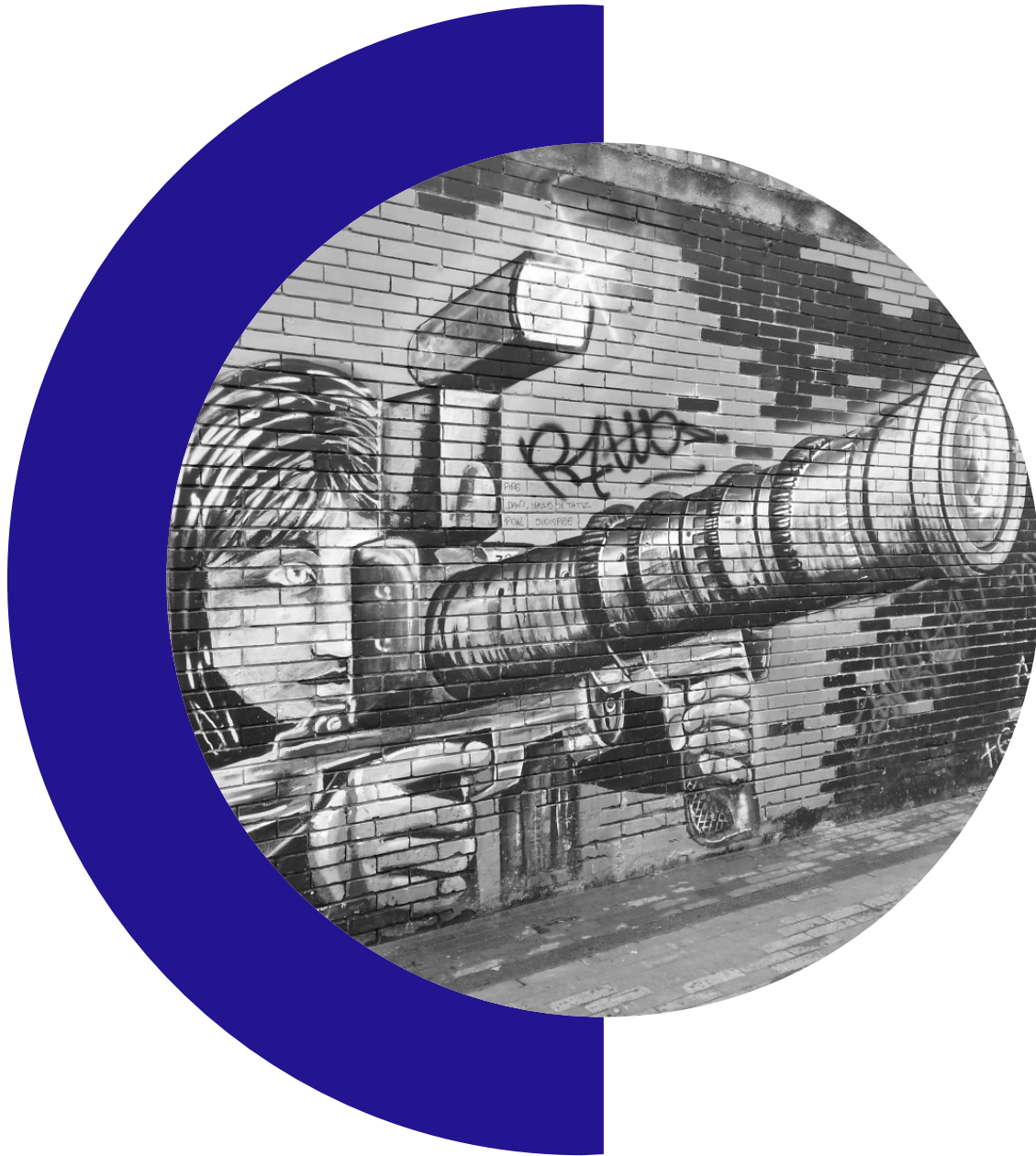
art <> vandalism

graphical <> textual

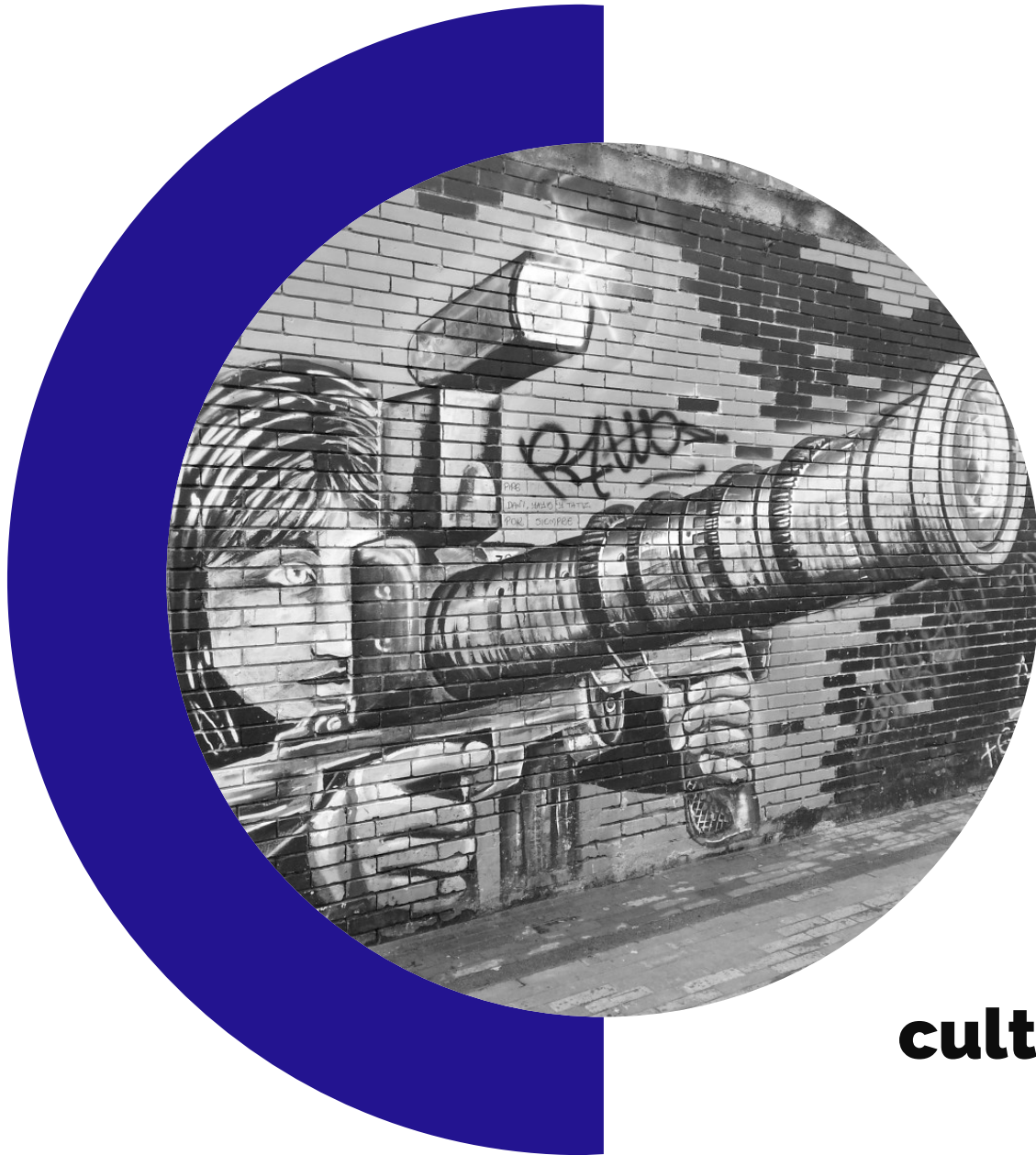
socio-political criticism <> entertaining

legal <> illegal

tangible <> intangible



graffiti are
unique
complex
short-lived
socially relevant



graffiti are
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complex
short-lived
socially relevant
cultural heritage

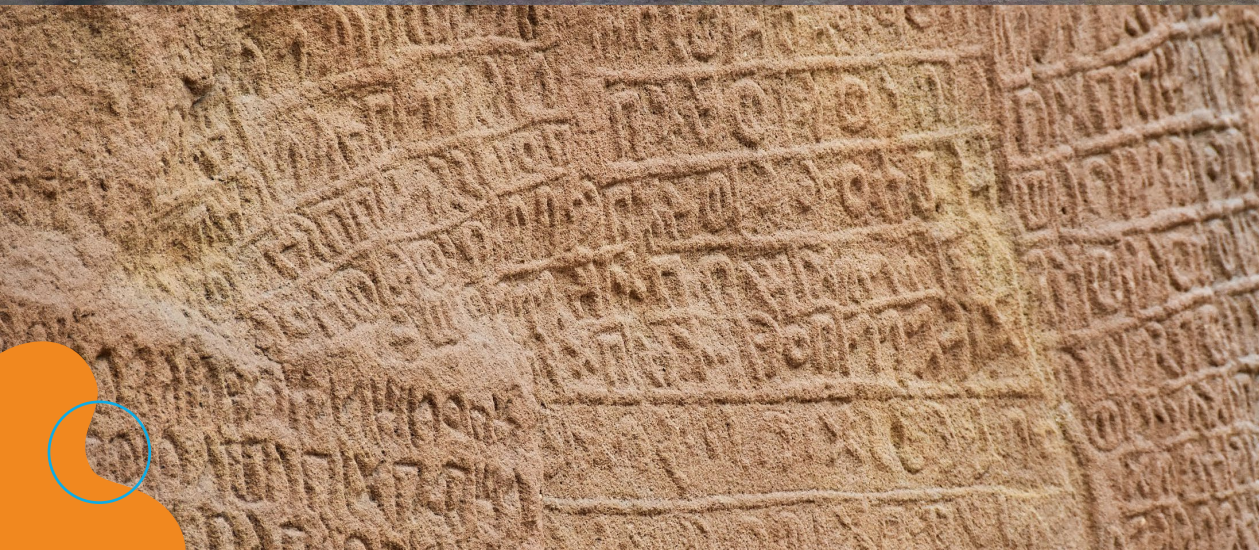
ARTISTIC merit

ARTISTIC merit

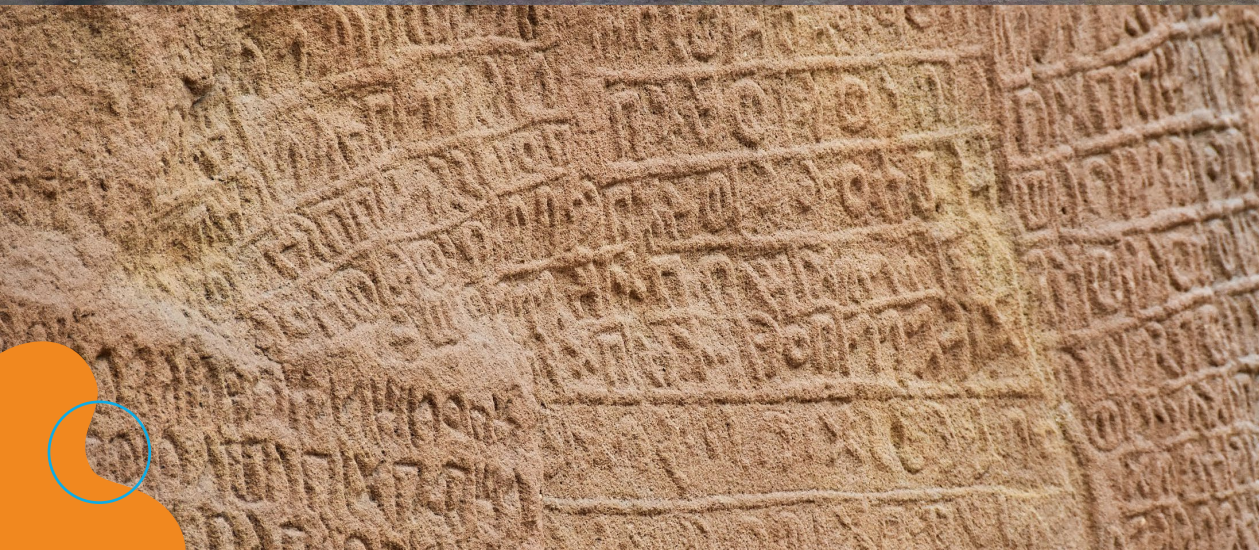


Marcel Duchamp
Fountain (1917)

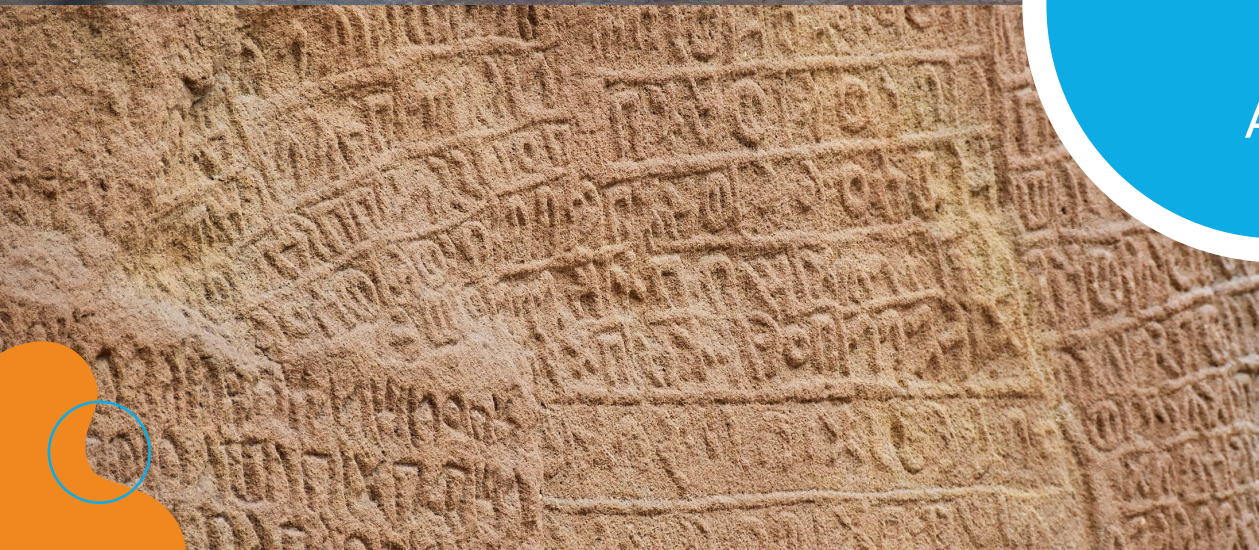
ARTISTIC merit



ARTISTIC merit



ARTISTIC merit



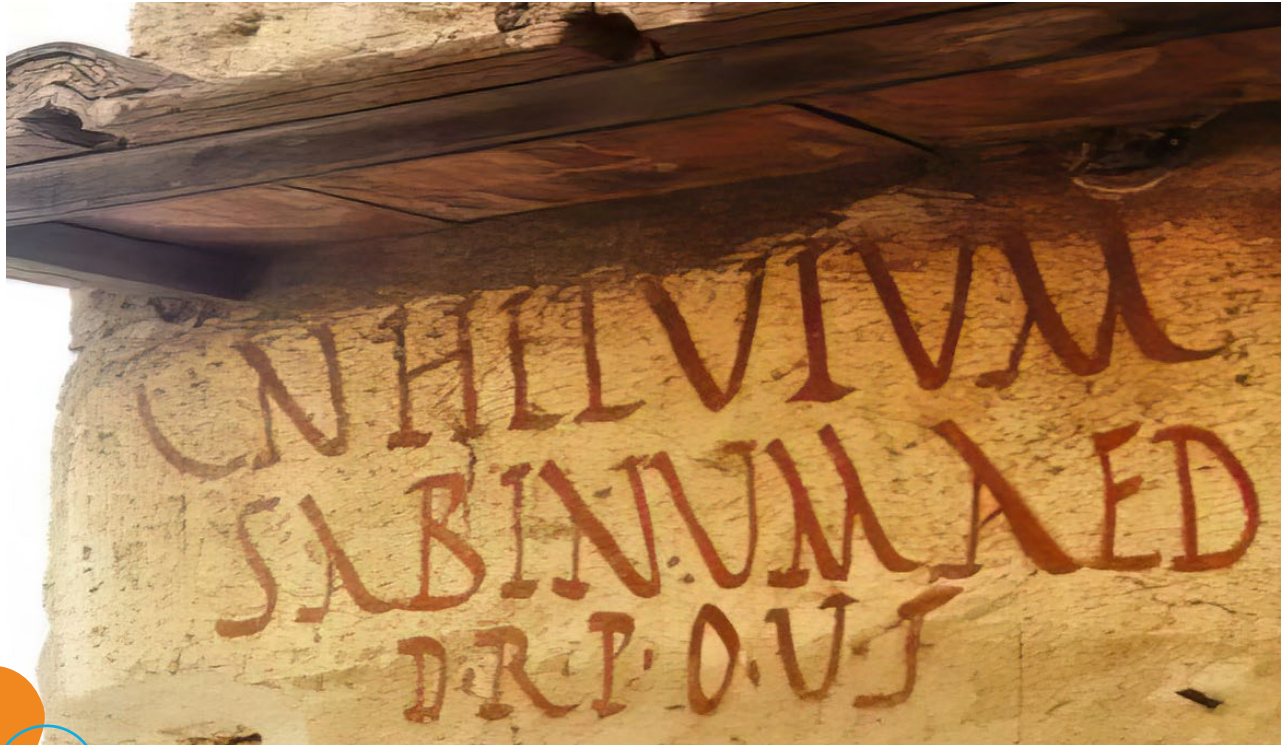
Cultural
heritage
≠
Art



HISTORICAL | POLITICAL **relevance**

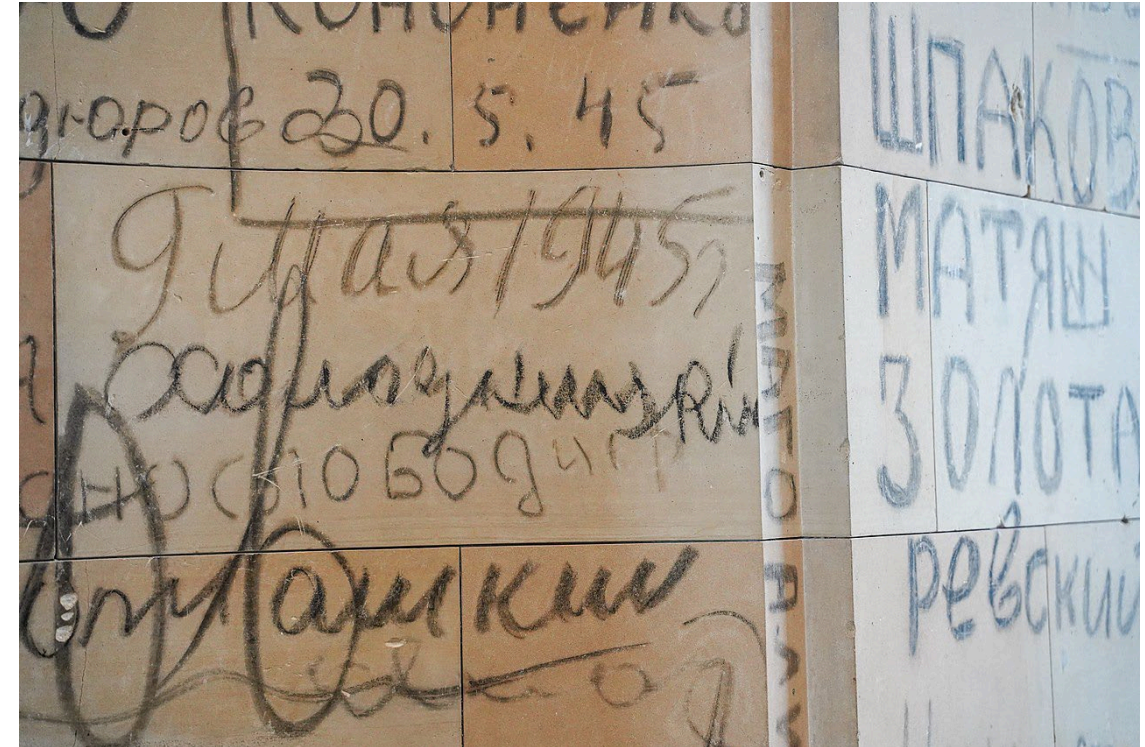
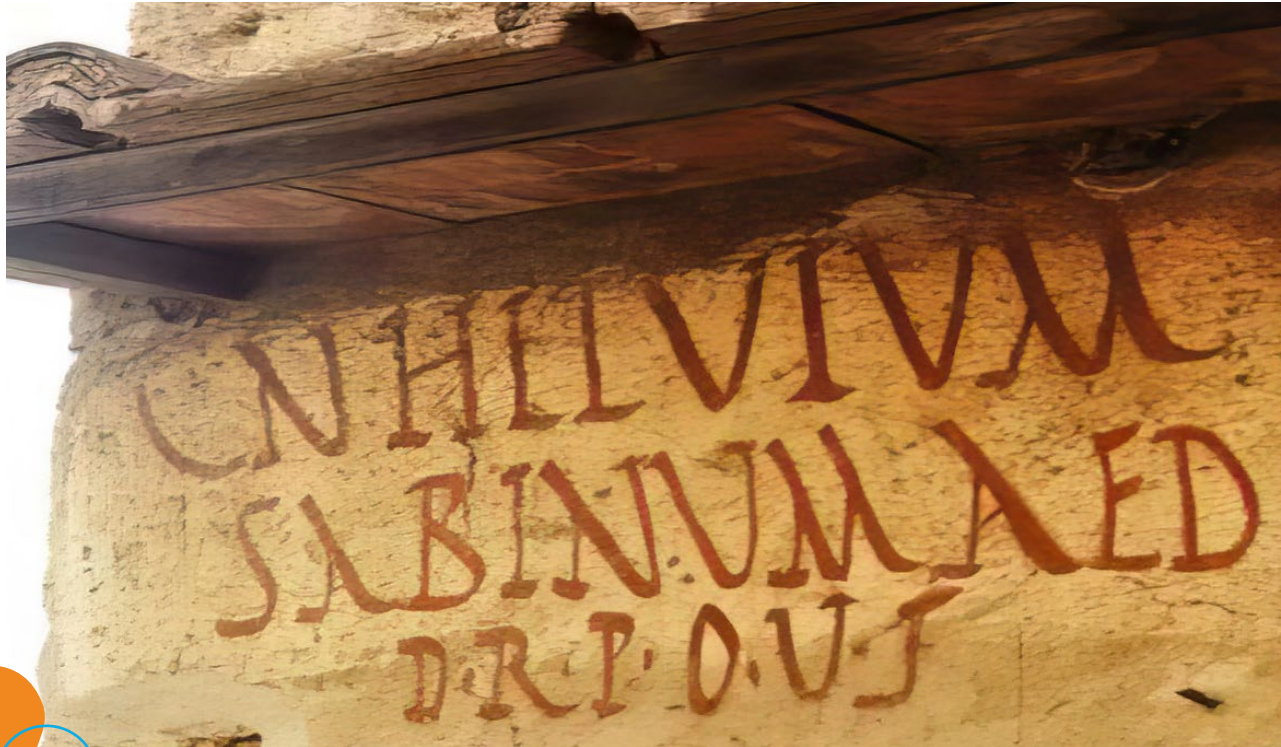
HISTORICAL | POLITICAL

relevance



HISTORICAL | POLITICAL

relevance

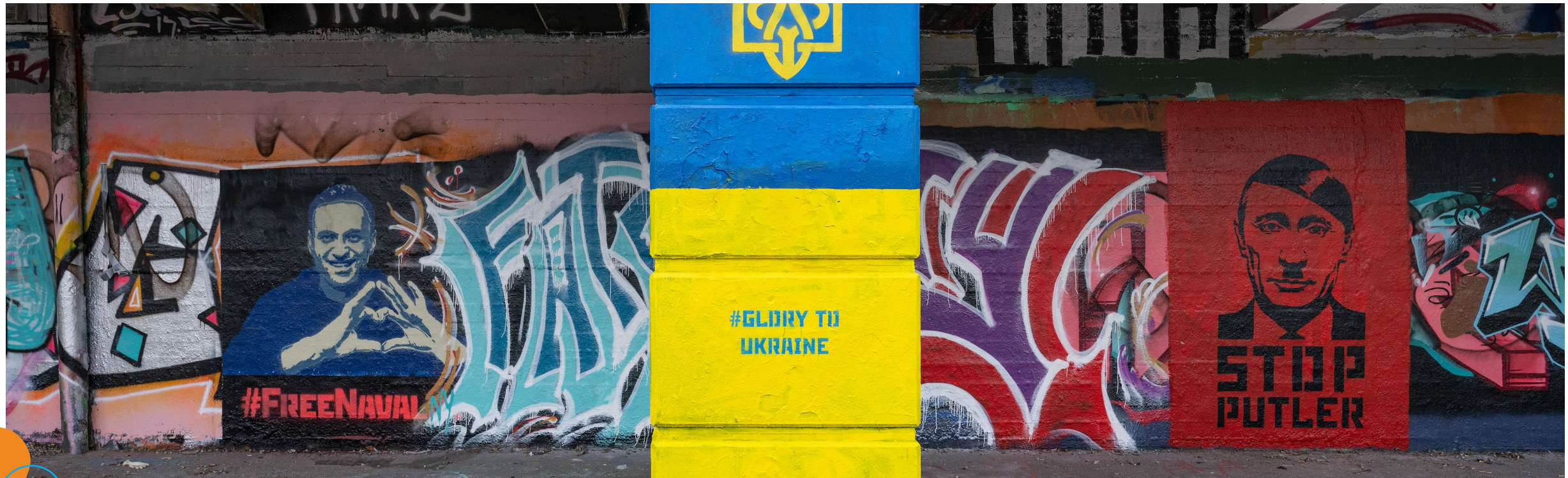


HISTORICAL | POLITICAL relevance



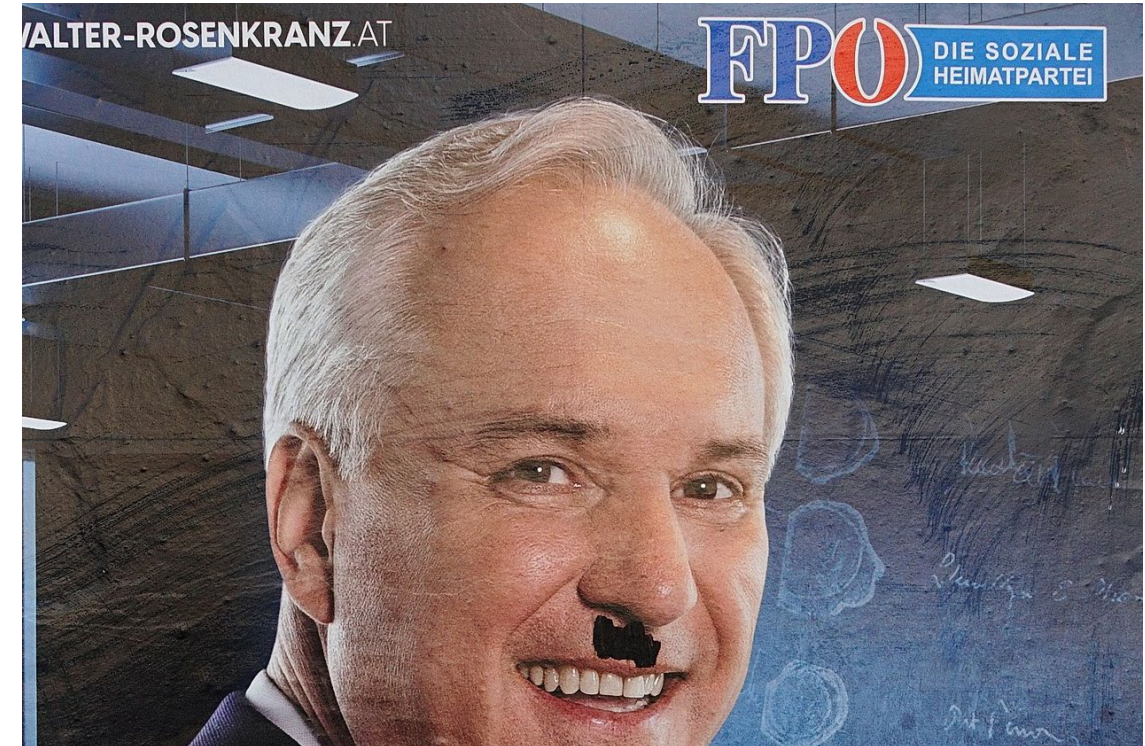
HISTORICAL | POLITICAL

relevance



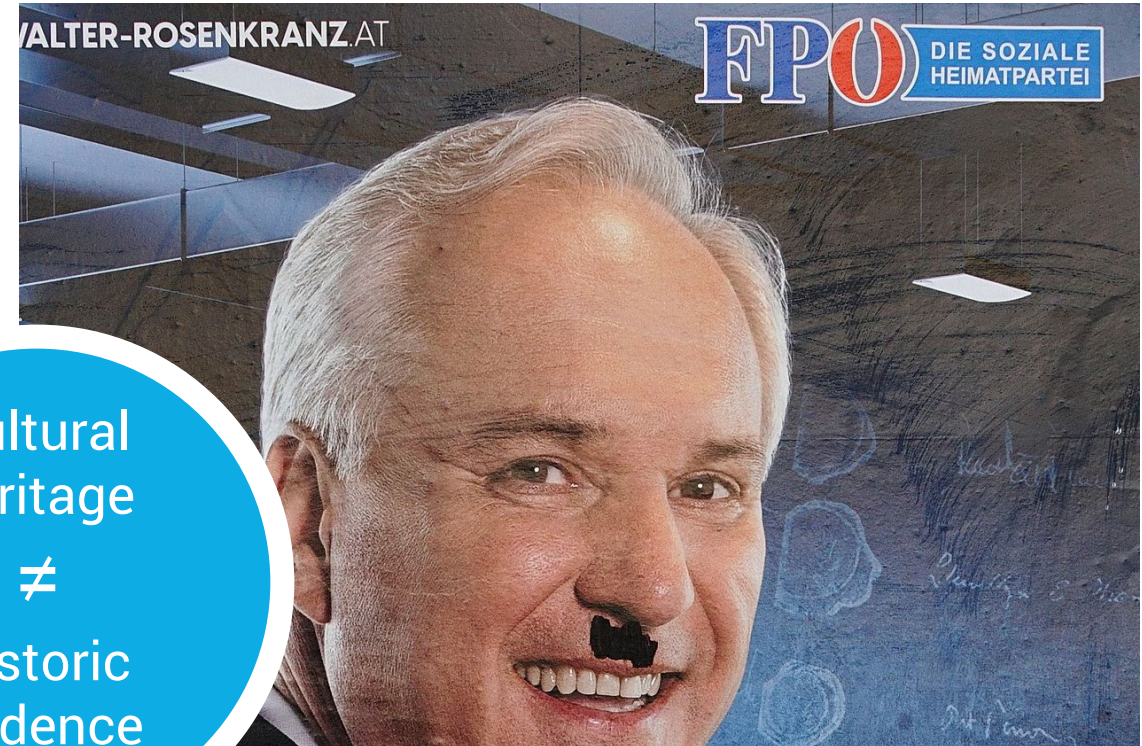
HISTORICAL | POLITICAL

relevance



HISTORICAL | POLITICAL

relevance

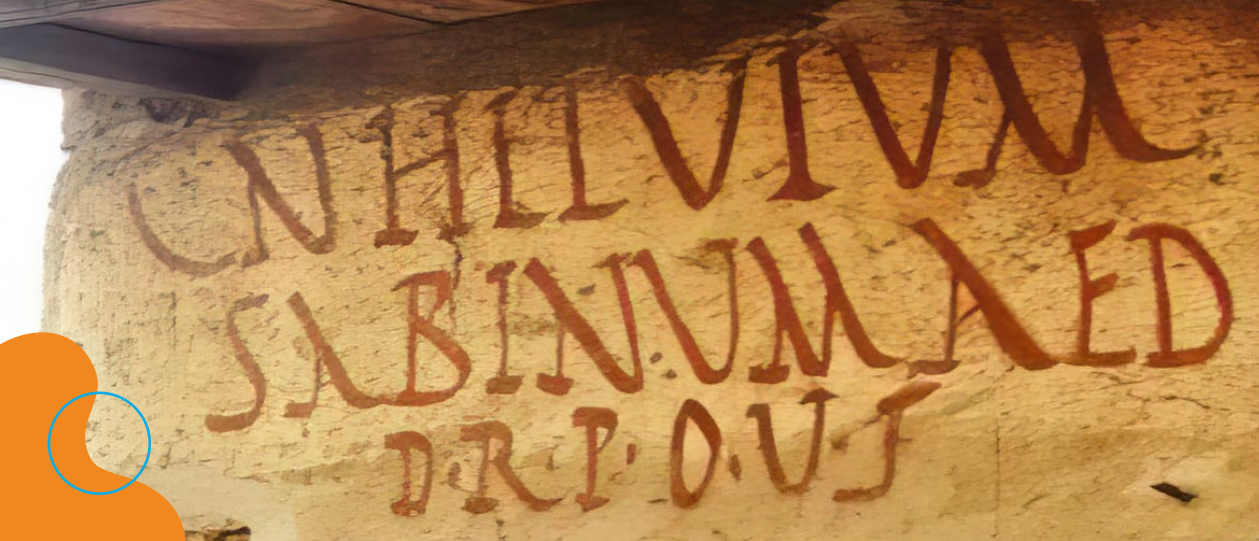


Cultural
heritage

≠

Historic
evidence

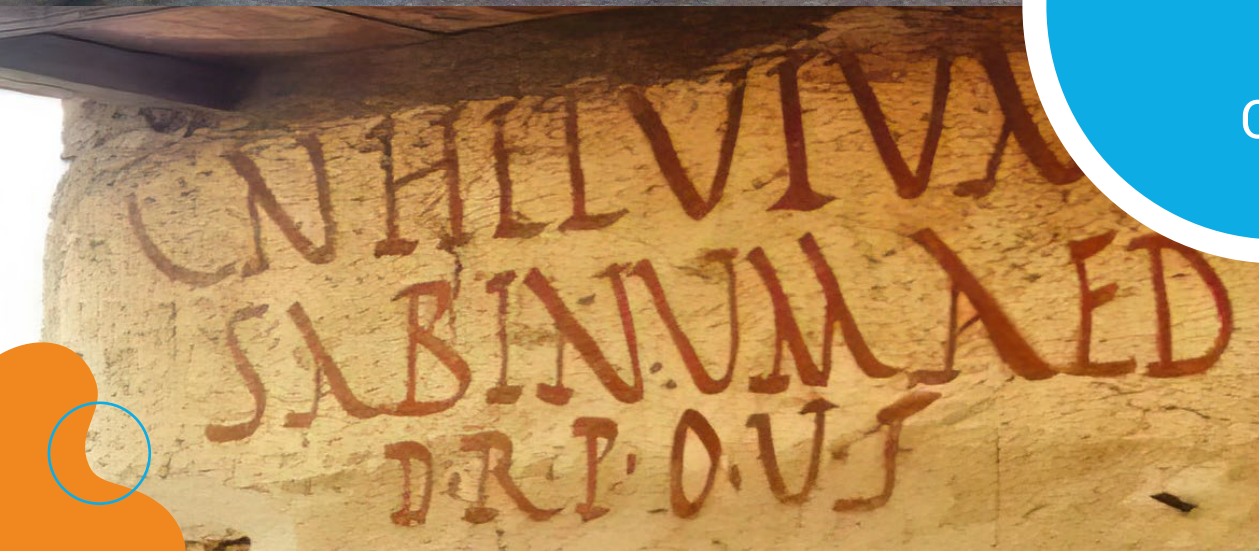
ANCIENT | contemporary



ANCIENT | contemporary



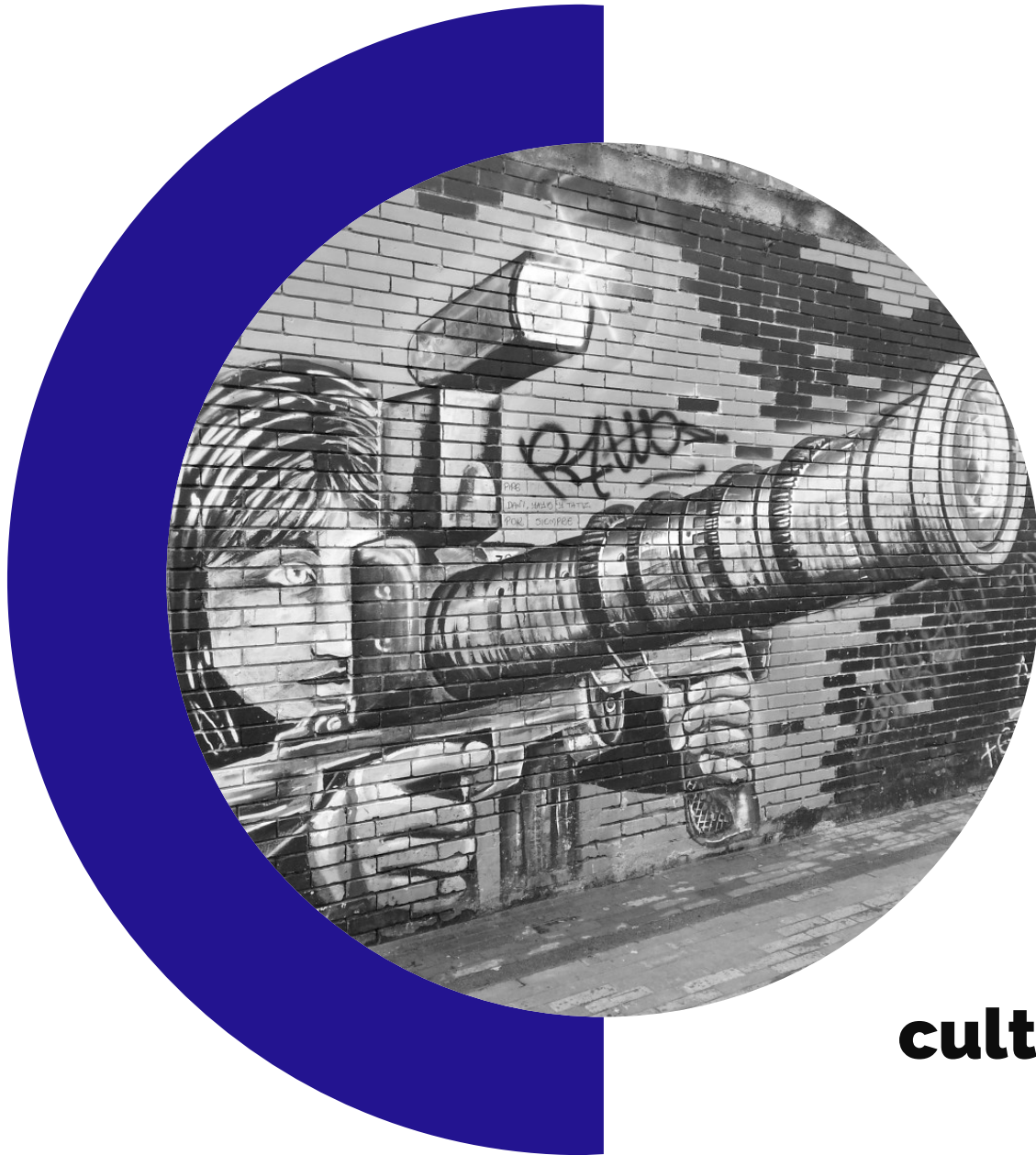
Cultural
heritage
=
Old











graffiti are
unique
complex
short-lived
socially relevant
cultural heritage



NEEDING academic rigour

"For as long as we are imprecise about the artworks we are discussing, our research will be rightfully seen as lacking scholarly rigor."

de la Iglesia 2015





RECORDING

random
partial
inaccurate

NEEDING academic rigour

*"For as long as we are imprecise
about the artworks we are discussing,
our research will be rightfully seen as
lacking scholarly rigor. "*

de la Iglesia 2015





RECORDING

random
partial
inaccurate

DISSEMINATION

unstandardised
limited interaction
closed access

NEEDING academic rigour

*"For as long as we are imprecise
about the artworks we are discussing,
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lacking scholarly rigor."*

de la Iglesia 2015





RECORDING

random
partial
inaccurate

DISSEMINATION

unstandardised
limited interaction
closed access

ANALYSIS

descriptive
fragmentary
biased

NEEDING academic rigour

*"For as long as we are imprecise
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de la Iglesia 2015





RECORDING

random
partial
inaccurate

DISSEMINATION

unstandardised
limited interaction
closed access

ANALYSIS

descriptive
fragmentary
biased

SYNERGY

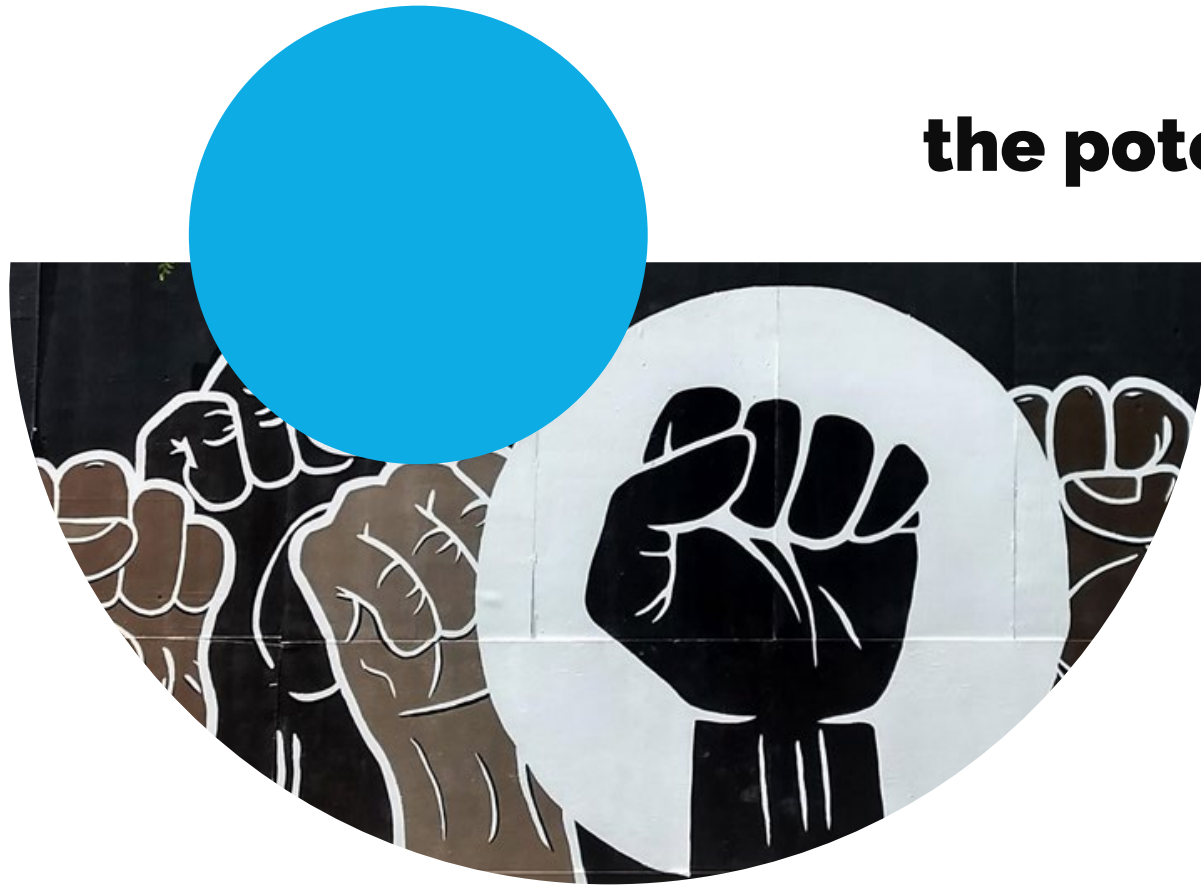
one-sided
partial know-how
limited output



NEEDING academic rigour

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our research will be rightfully seen as
lacking scholarly rigor."*

de la Iglesia 2015



**the potential
of graffiti
to understand
society
is under-exploited**

In
di
g
o



Inventory and
disseminate
graffiti along the
d **O** naukanal

Inventory and
disseminate
graffiti along the
donaukanal

WHAT



Inventory and
disseminate **WHAT**
graffiti along the
donaucanal **WHERE**

Inventory and
disseminate
graffiti along the
dock canal

WHAT

WHERE

digitally preserve
and
analyse

WHY

Inventory and
disseminate
graffiti along the
donaukanal

WHAT

WHERE

digitally preserve
and
analyse

WHY

WHO



Inventory and
disseminate
graffiti along the
donauskanal

WHAT

WHERE

digitally preserve
and
analyse

WHY



WHO

Heritage Science Austria programme | € 580 k | 2 years

Inventory and
disseminate
graffiti along the
Danube canal

? HOW ?

WHAT

WHERE

digitally preserve
and
analyse

WHY

WHO



Heritage Science Austria programme | € 580 k | 2 years

5
research
pillars

INDIGO approach

INDIGO approach

5
research
pillars



INDIGO approach

5
research
pillars

creation



acquisition



INDIGO approach

5
research
pillars

creation



acquisition



processing



INDIGO approach

5
research
pillars

creation



acquisition



processing

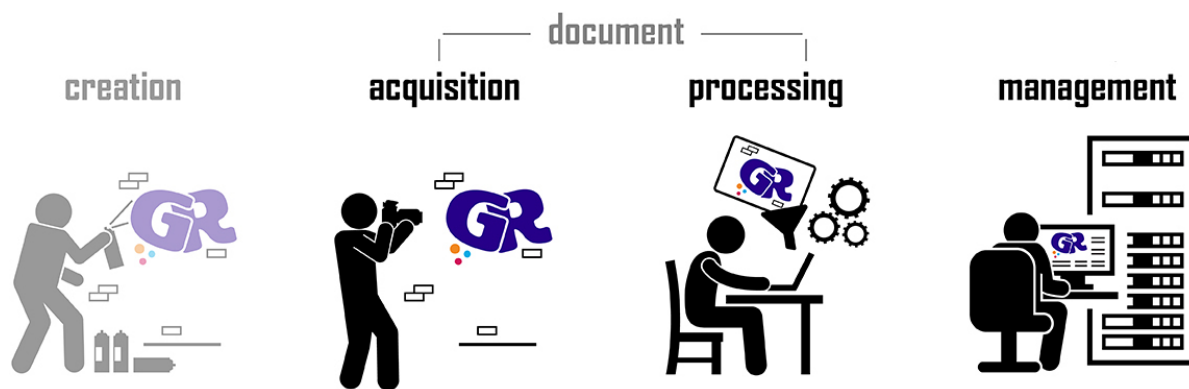


management



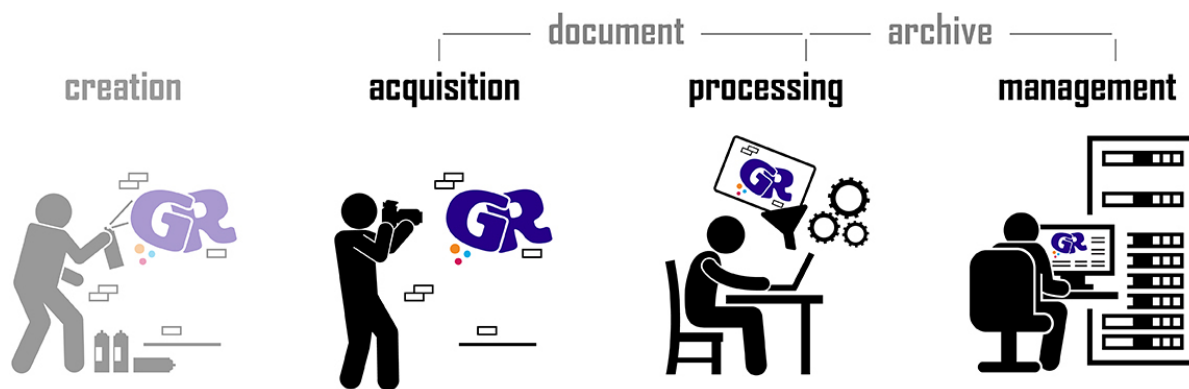
INDIGO approach

5
research
pillars



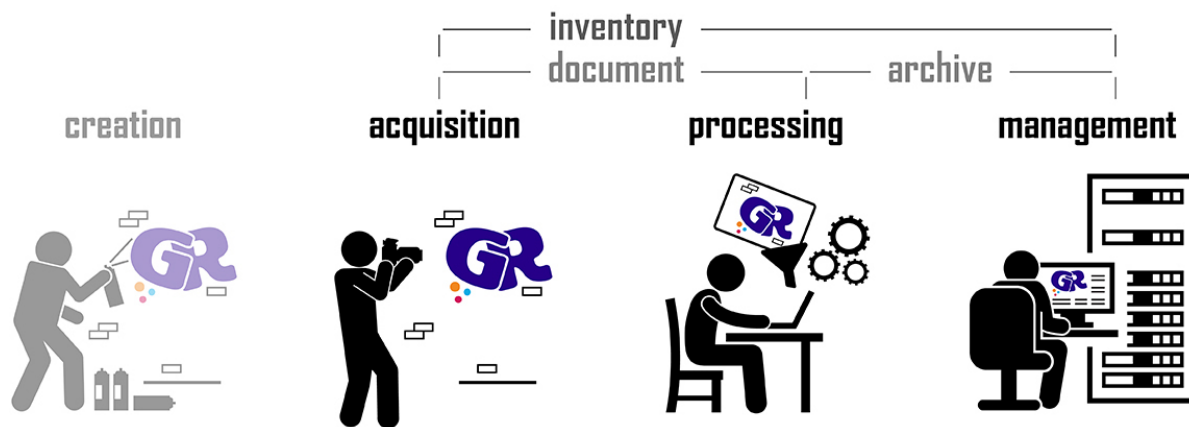
INDIGO approach

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research
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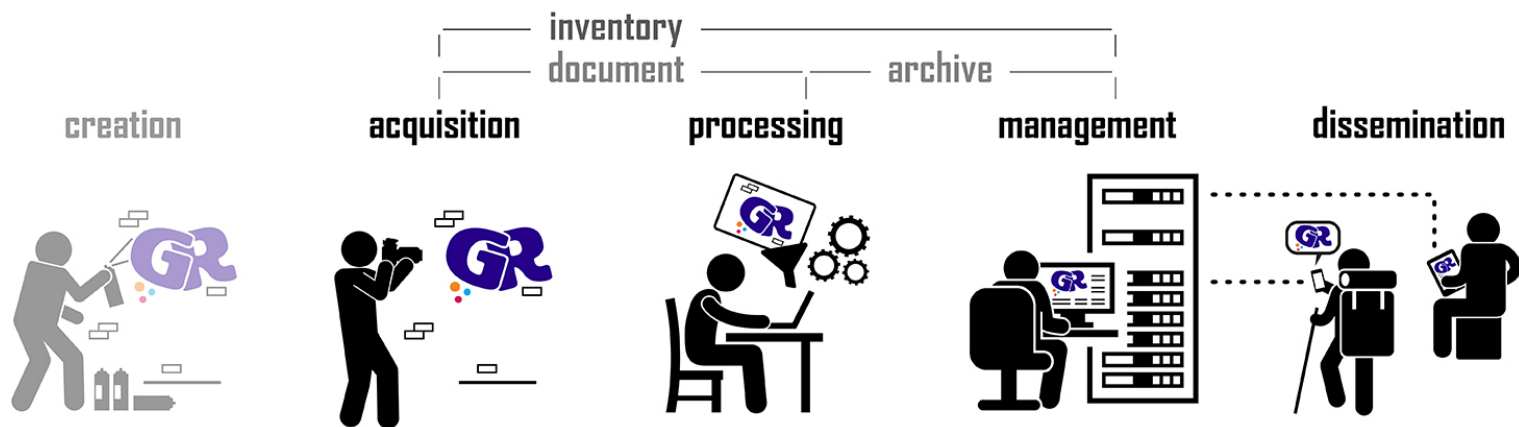
5
research
pillars

INDIGO approach



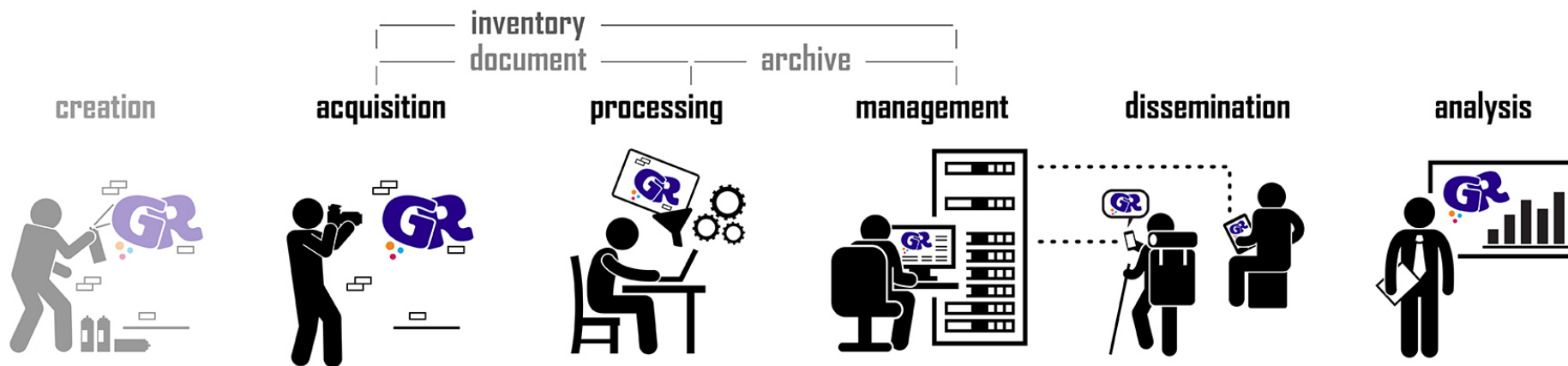
INDIGO approach

5
research
pillars



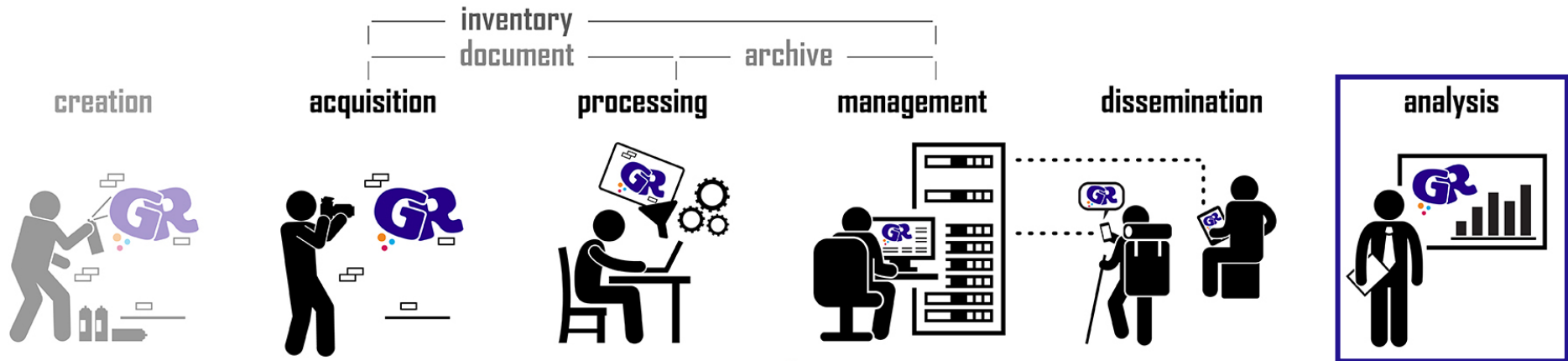
INDIGO approach

5
research
pillars



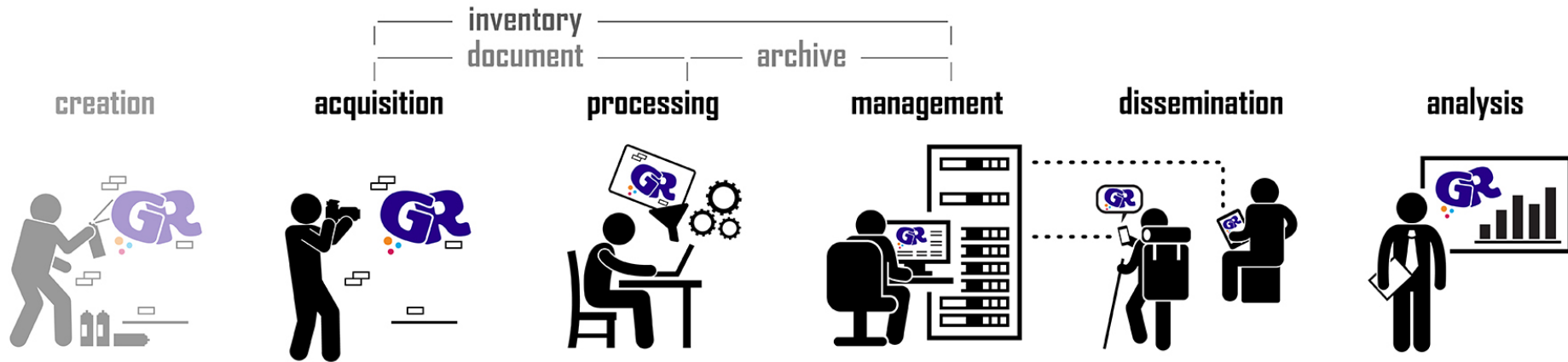
POTENTIAL questions

5 research pillars



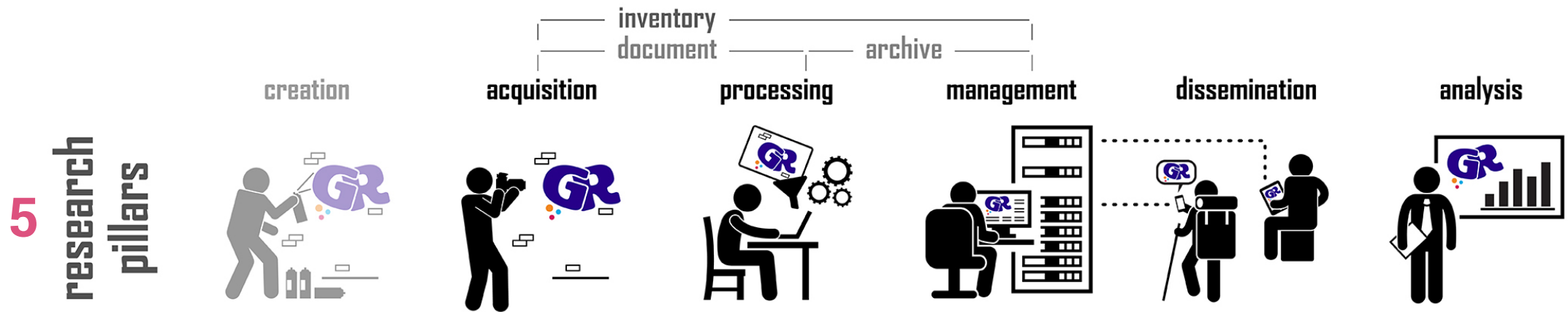
POTENTIAL questions

5 research pillars



When and where do political graffiti typically appear ?

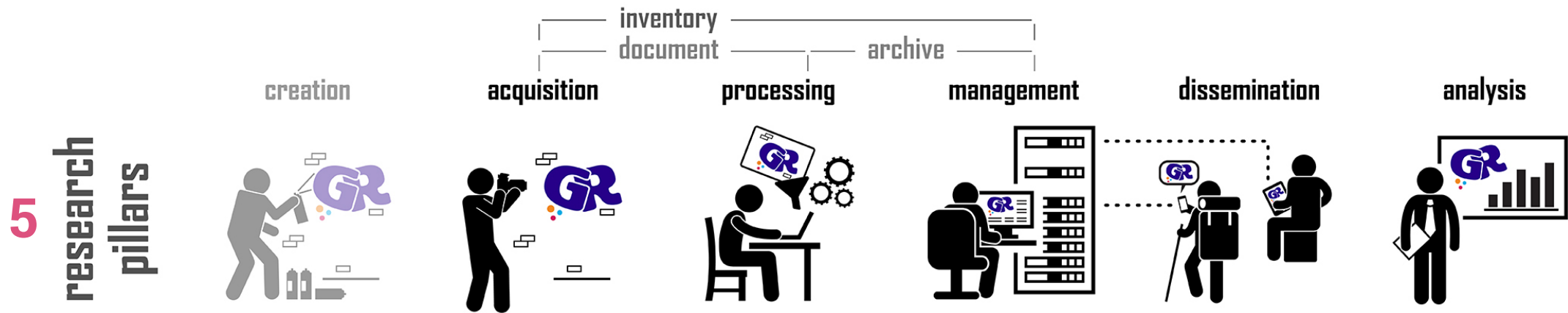
POTENTIAL questions



When and where do political graffiti typically appear ?

What are the main styles and colours of those graffiti, and how long do they – on average – stay visible before they are (partly or entirely) covered ?

POTENTIAL questions



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What type of graffiti commonly covers political messages ?

POTENTIAL questions

GRAFFITI *LOCATION*

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GRAFFITI *TEMPORALITY*

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GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

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GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

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GRAFFITI **archaeology**

GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

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GRAFFITI archaeology

ARTEFACT

LOCATION

TEMPORALITY

TERMINOLOGY

CHARACTERISATION

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SOME results

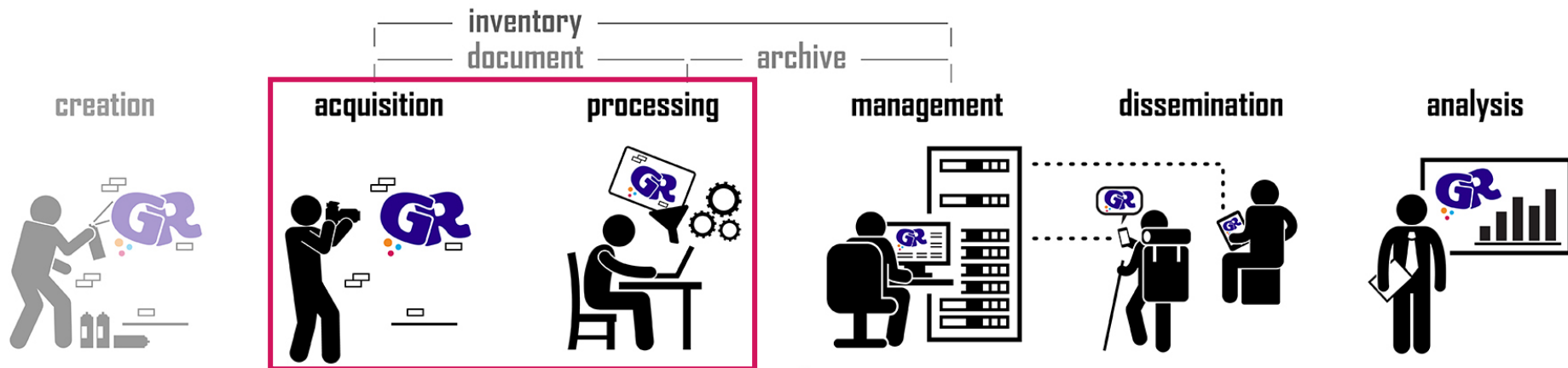
GRAFFITI *LOCATION*

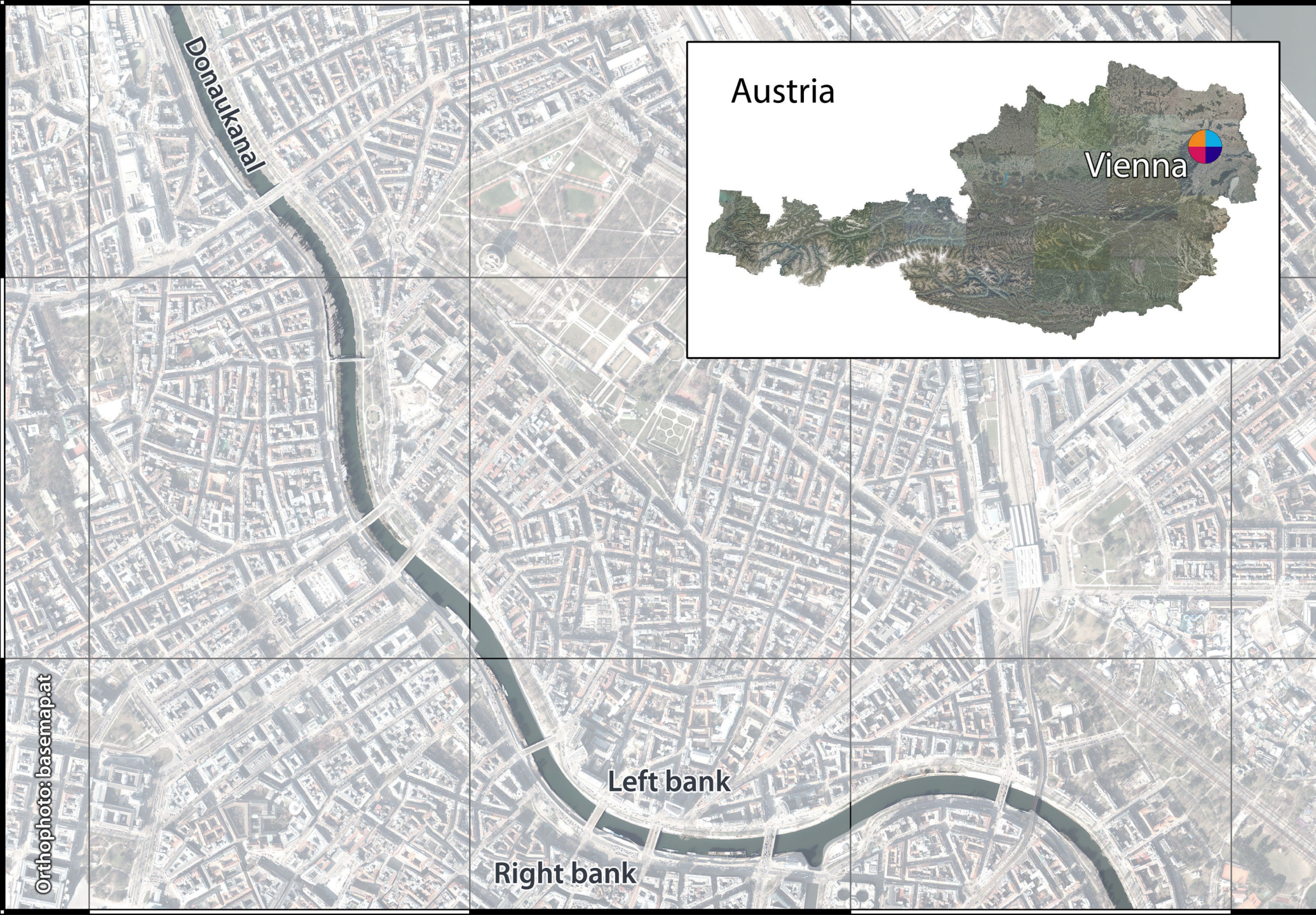
GRAFFITI *TEMPORALITY*

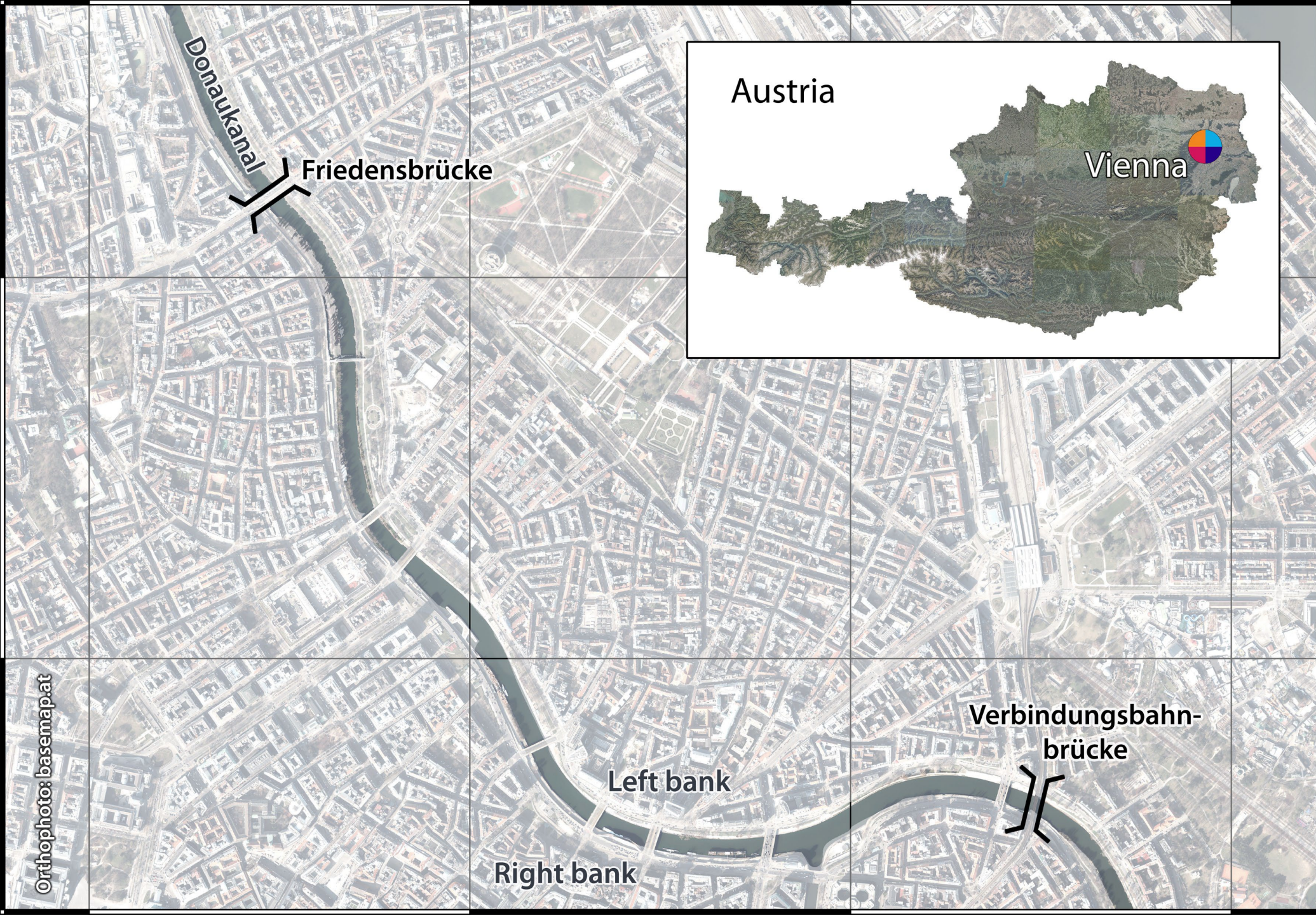
GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars







Orthophoto: basemap.at

Austria

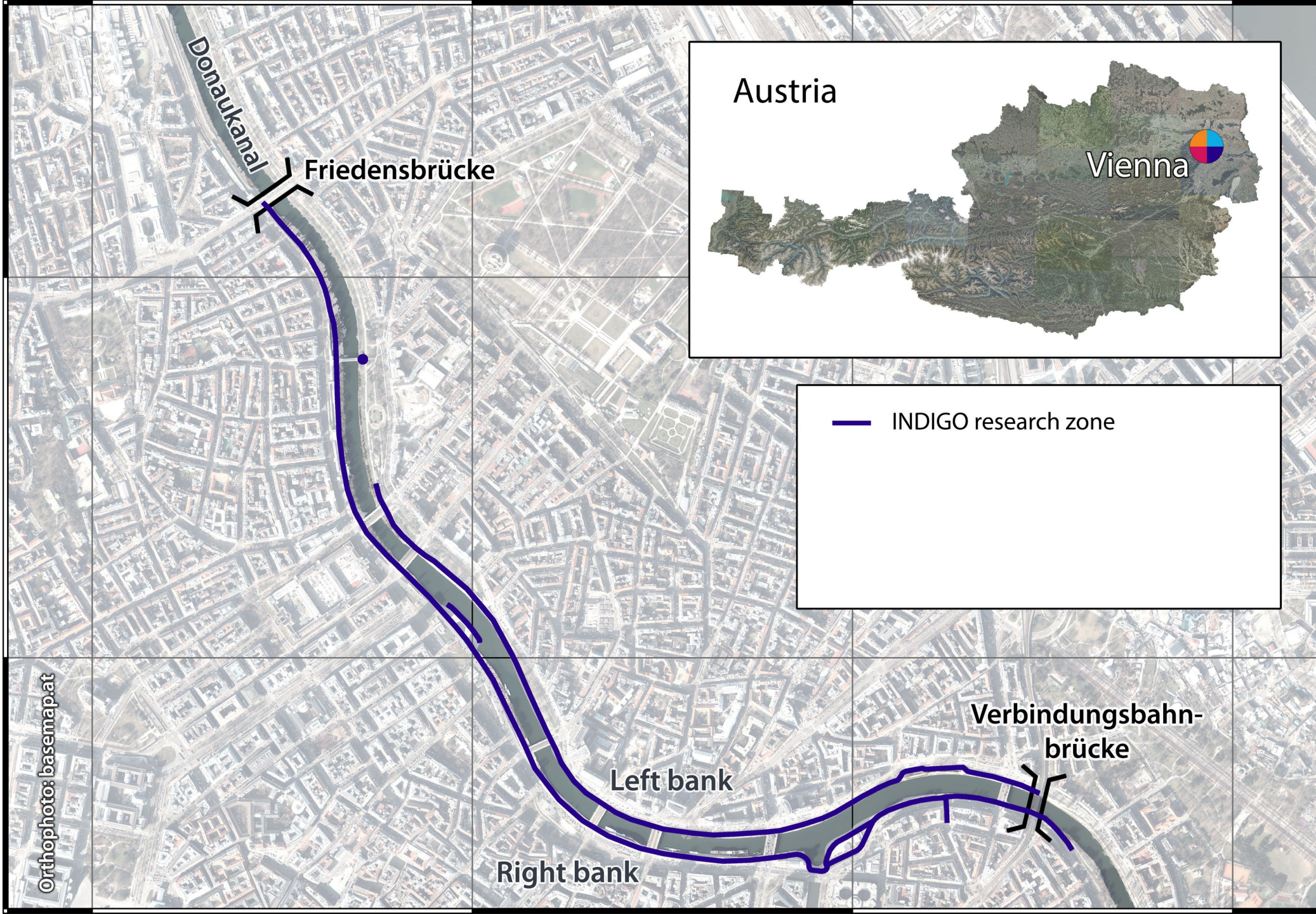
Vienna

Left bank

Right bank

Verbindungsbahn-
brücke

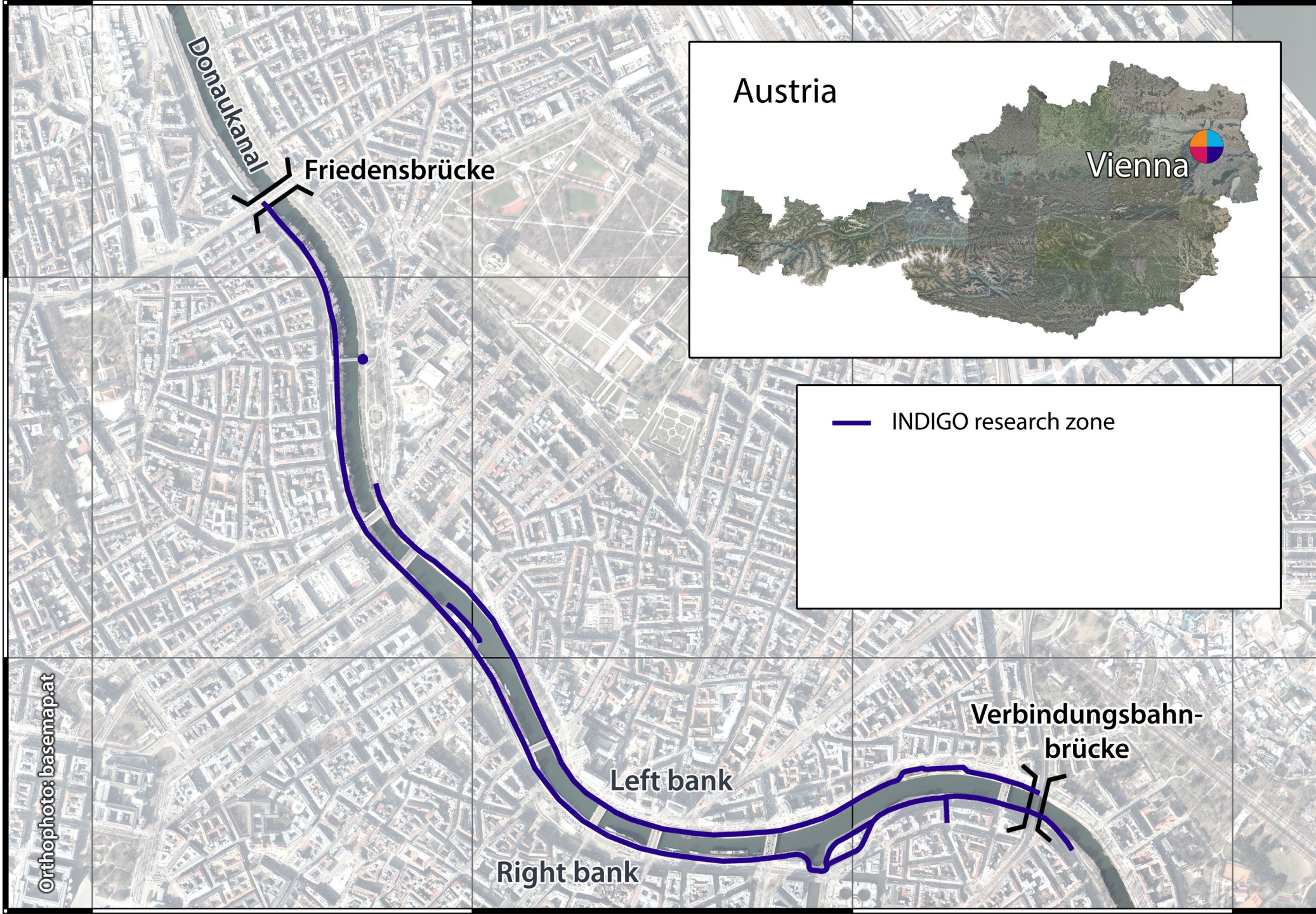
STRETCH
3.3 km



STRETCH

3.3 km

LEFT RIGHT



Austria

Vienna

— INDIGO research zone

Left bank

Right bank

Verbindungsbahn-
brücke

Orthophoto: basemap.at

STRETCH

3.3 km

LEFT RIGHT



STRETCH

3.3 km

LEFT UP
RIGHT UP

DOWN DOWN



STRETCH

3.3 km

LEFT

UP

3.2 km

DOWN

RIGHT

UP

5.3 km

DOWN

Orthophoto: basemap.at

Donaukanal

Friedensbrücke

Left bank

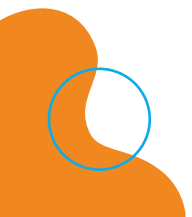
Right bank

Verbindungsbahn-
brücke

Austria

Vienna

— INDIGO research zone



STRETCH

3.3 km

LEFT

UP

3.2 km

DOWN

2.1 km

RIGHT

UP

5.3 km

DOWN

2.3 km

Orthophoto: basemap.at

Donaukanal

Friedensbrücke

Left bank

Right bank

Verbindungsbahn-
brücke

Austria

Vienna

— INDIGO research zone

STRETCH

3.3 km

LEFT RIGHT

UP UP

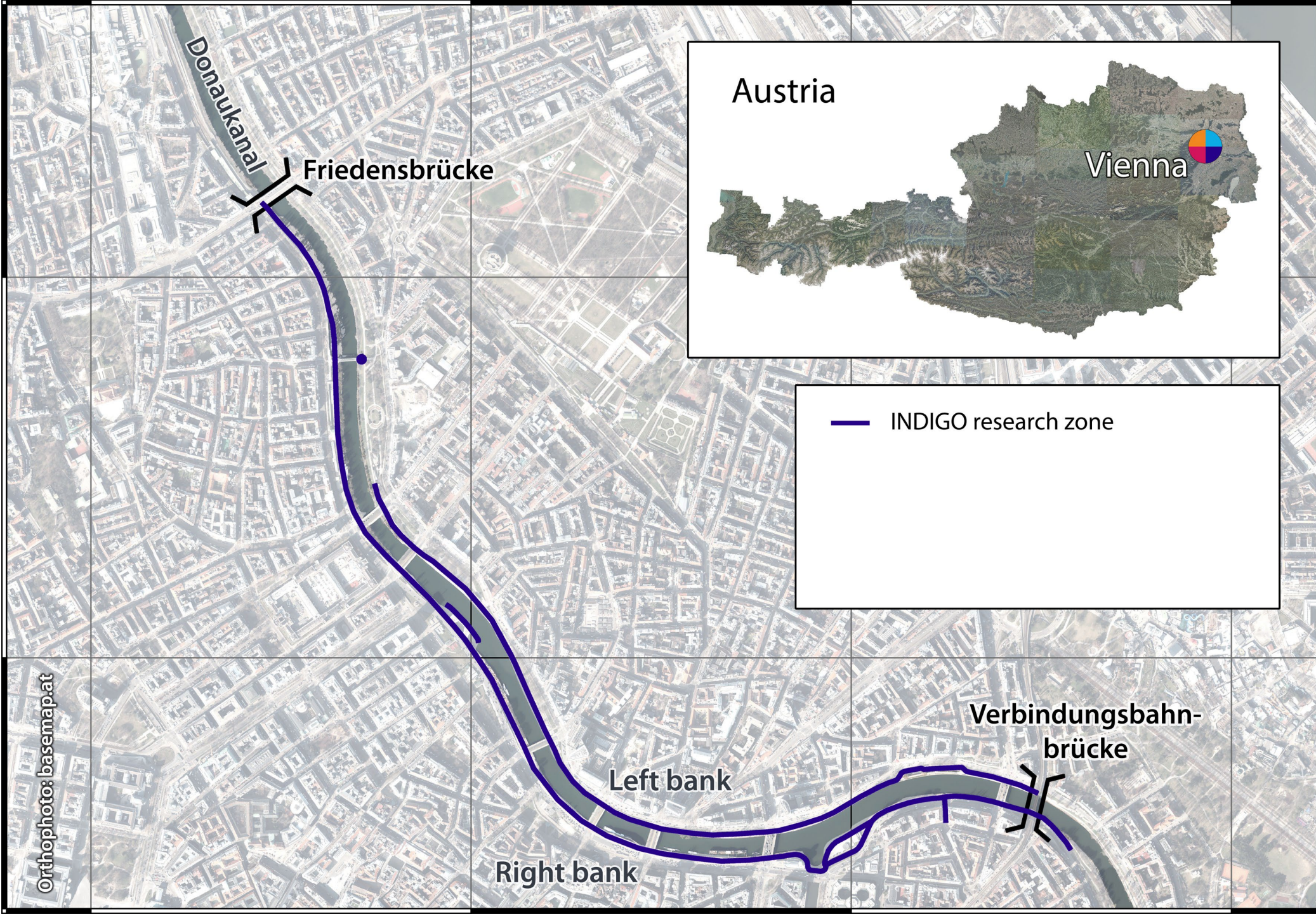
3.2 km 5.3 km

DOWN DOWN

2.1 km 2.3 km

MONITORED SURFACES

12.9 km



MONITORED SURFACES

12.9 km

Orthophoto: basemap.at

Donaukanal

Friedensbrücke

Austria

Vienna

— INDIGO research zone

— Legal graffiti surfaces (*Wienerwand*)

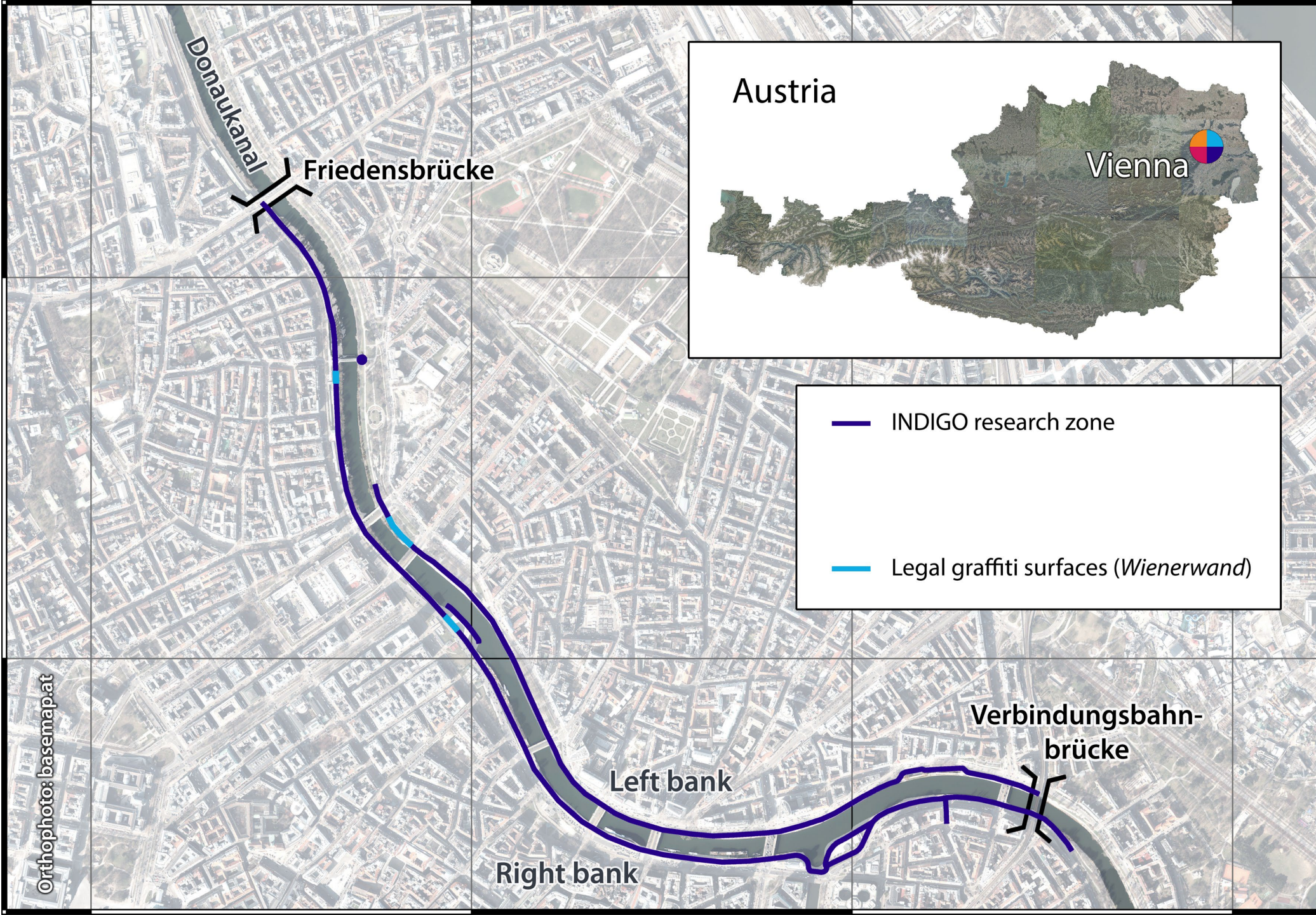
Left bank

Right bank

Verbindungsbahn-
brücke

**LEGAL
SURFACES**
0.3 km

**MONITORED
SURFACES**
12.9 km



**TOTAL
COVERAGE**

14.0 km

**LEGAL
SURFACES**

0.3 km

**MONITORED
SURFACES**

12.9 km

Orthophoto: basemap.at

Donaukanal

Friedensbrücke

Left bank

Right bank

Verbindungs-
bahn-
brücke

Austria

Vienna

- INDIGO research zone
- Total photographic coverage
- Legal graffiti surfaces (*Wienerwand*)

**TOTAL
COVERAGE**

14.0 km

**LEGAL
SURFACES**

0.3 km

**MONITORED
SURFACES**

12.9 km

Orthophoto: basemap.at

Donaukanal

Friedensbrücke

Left bank

Right bank

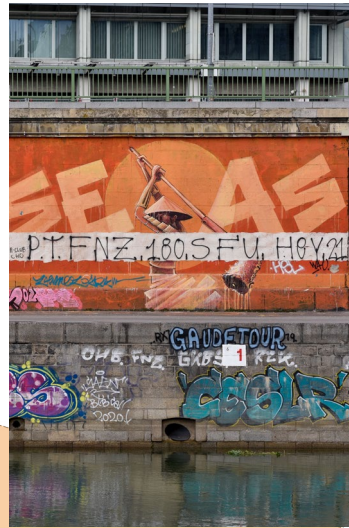
Verbindungsbahn-
brücke

Austria

Vienna

— Total photographic coverage

TOTAL coverage



Date	Camera	Lens	Mean GSD	Acquisition time	Image count
30/09/2021	Nikon D750	Nikon AF-S	3.6 mm	3 h 45 min	2065
01/10/2021	(24.2 MP $p = 5.95 \mu\text{m}$)	NIKKOR 85mm 1:1.8 G @ $f/5.6$		3 h 20 min	2544



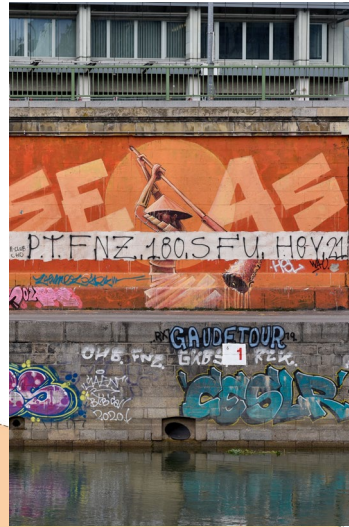
TOTAL coverage



Date	Camera	Lens	Mean GSD	Acquisition time	Image count
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26/10/2021	Nikon Z 7II (45.4 MP $p = 4.33 \mu\text{m}$)	Nikon NIKKOR Z 20mm f/1.8 S @f/5.6	0.9 mm	7 h	6042
27/10/2021				7 h 45 min	6591
28/10/2021				3 h 40 min	2856
29/10/2021				7 h	6608

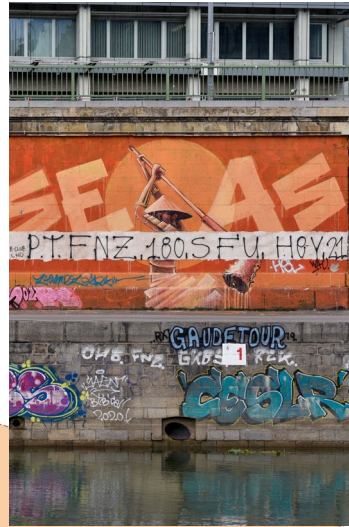
TOTAL coverage



Date	Camera	Lens	Mean GSD	Acquisition time	Image count
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Total				32 h 30 min	26706



TOTAL coverage

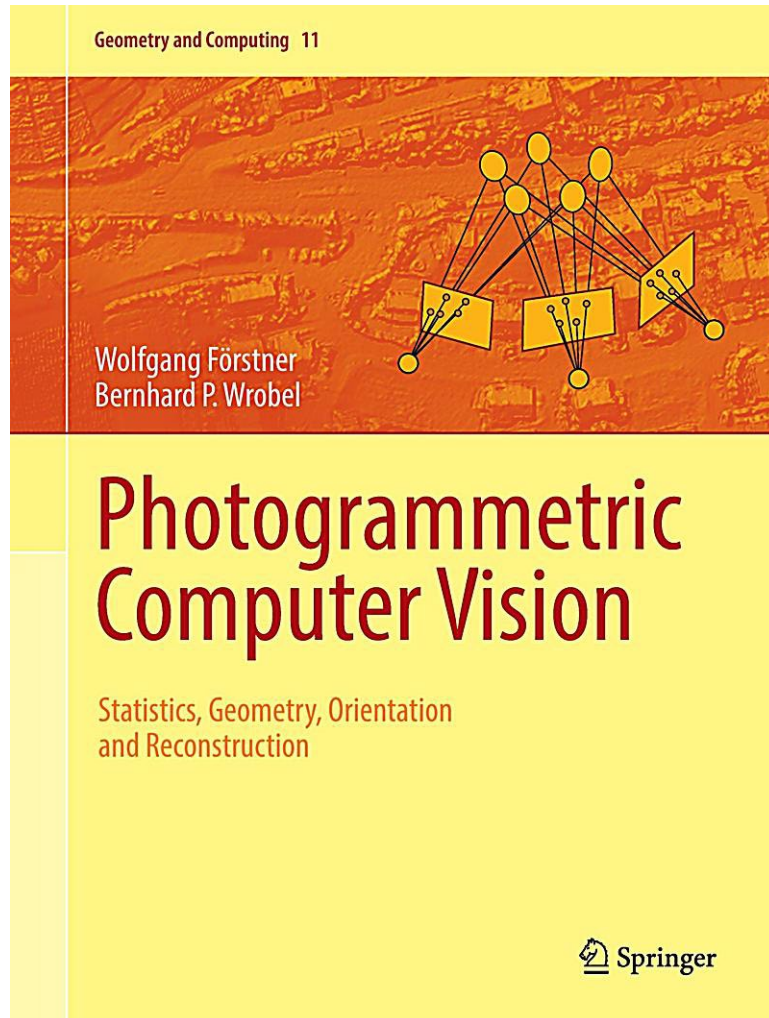


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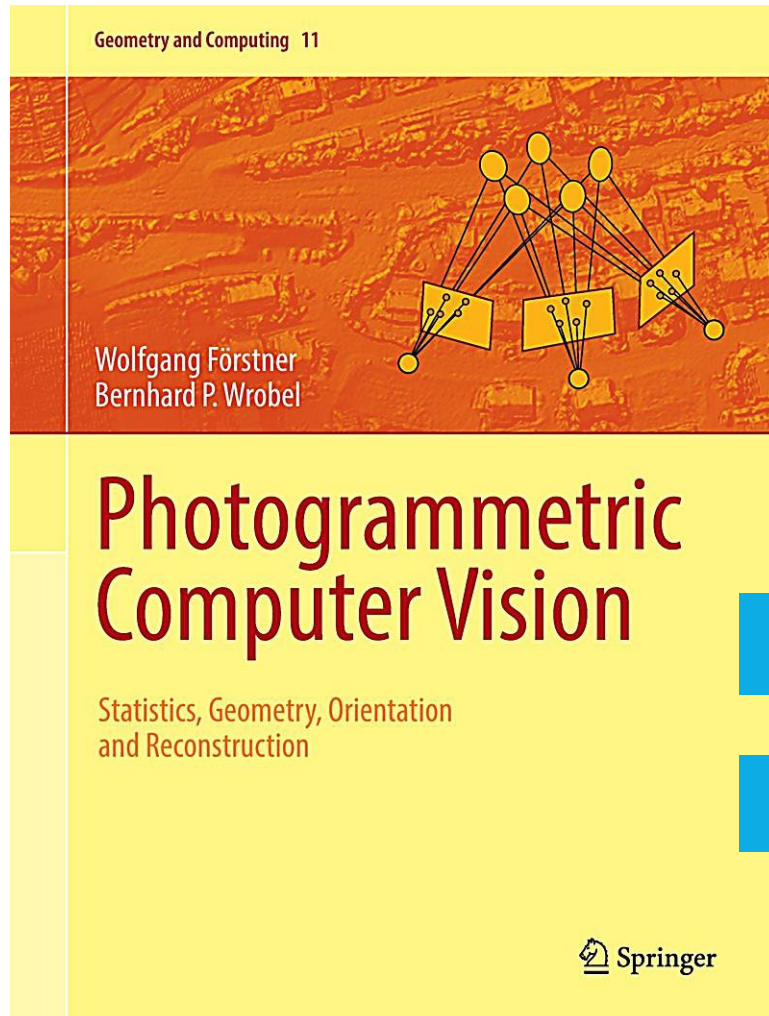
processing



PHOTOGRAMMETRIC computer vision



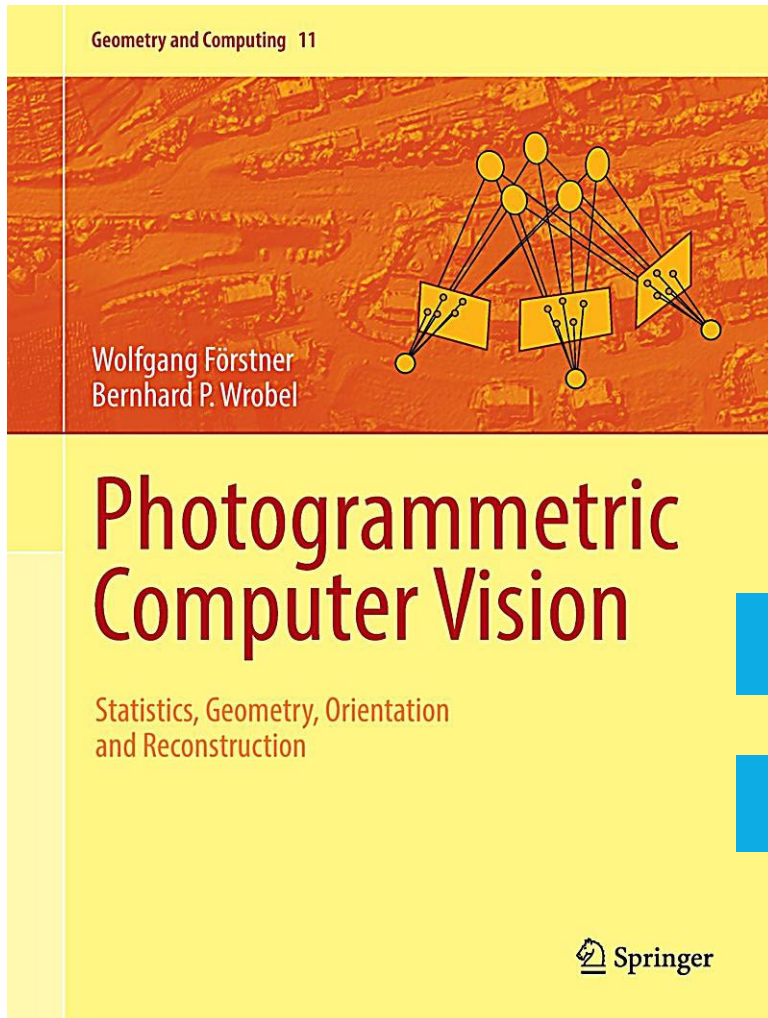
PHOTOGRAMMETRIC computer vision



Structure from Motion

Multi-View Stereo

PHOTOGRAMMETRIC computer vision

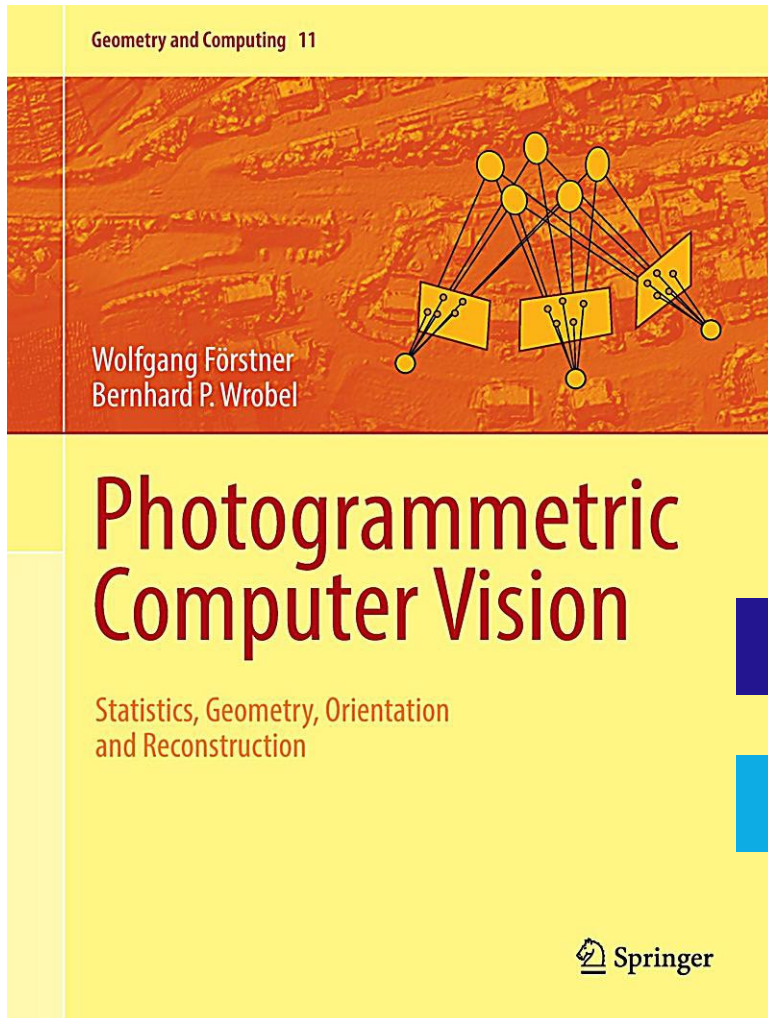


 **Metashape**

Structure from Motion

Multi-View Stereo

PHOTOGRAMMETRIC **computer vision**



 **Metashape**

Structure from Motion

Multi-View Stereo

STRUCTURE from motion



STRUCTURE from motion



DETECT *FEATURES*

STRUCTURE from motion



DETECT *FEATURES*

STRUCTURE from motion



DETECT *FEATURES*

STRUCTURE from motion

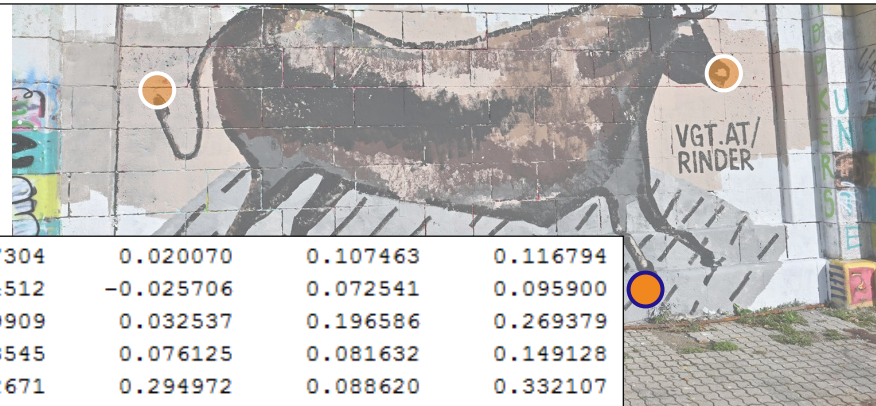


DESCRIBE *FEATURES*

STRUCTURE from motion



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-0.028680	-0.054708	0.122665	0.153017	0.028871	-0.012555	0.095984	0.088053
0.015120	0.027794	0.116166	0.107026	0.027754	0.077151	0.281207	0.426664
-0.084432	0.037411	0.258167	0.278575	0.031956	0.001815	0.108572	0.100973
0.044885	-0.009998	0.117392	0.116673	0.051583	-0.056531	0.278835	0.255680
-0.062802	0.094772	0.227900	0.241899	0.009492	0.058900	0.122209	0.134463
0.011744	-0.015147	0.049275	0.063480	0.040967	-0.047647	0.116258	0.123337
-0.028446	-0.028242	0.145872	0.128276	-0.000557	-0.013686	0.074246	0.073226



-0.023005	-0.007396	0.067406	0.070548	-0.047304	0.020070	0.107463	0.116794
-0.002762	0.007330	0.205253	0.144043	0.034512	-0.025706	0.072541	0.095900
-0.053031	0.025935	0.117892	0.117847	-0.059909	0.032537	0.196586	0.269379
-0.021751	0.058599	0.207912	0.277615	0.023545	0.076125	0.081632	0.149128
0.022910	0.144103	0.068890	0.186169	-0.012671	0.294972	0.088620	0.332107
0.032126	0.311892	0.112505	0.371900	0.014572	0.152932	0.050433	0.177491
0.003959	0.017503	0.011449	0.025512	0.001314	0.007357	0.017403	0.023415
-0.000710	0.003055	0.019640	0.025681	-0.002357	-0.002299	0.010456	0.010393

DESCRIBE *FEATURES*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion



MATCH *DESCRIPTORS*

STRUCTURE from motion

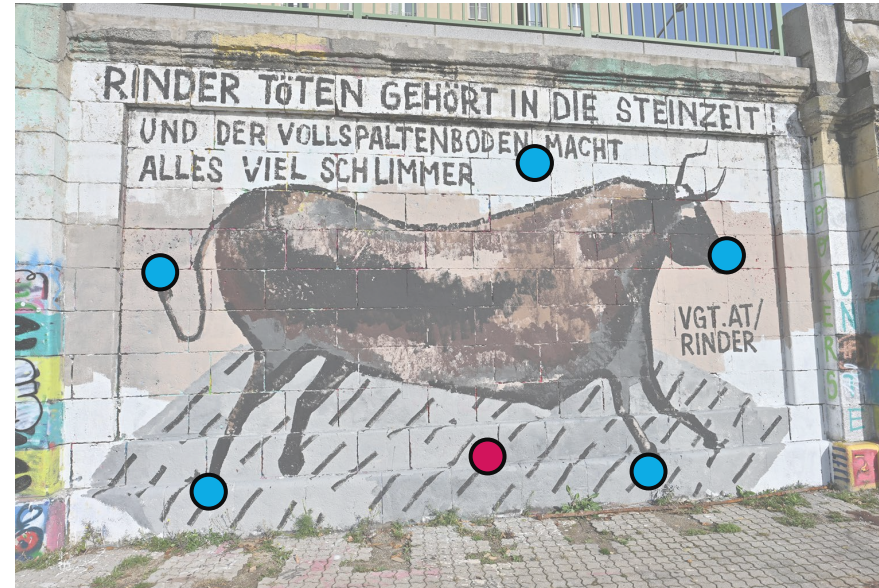


MATCH *DESCRIPTORS*

STRUCTURE from motion



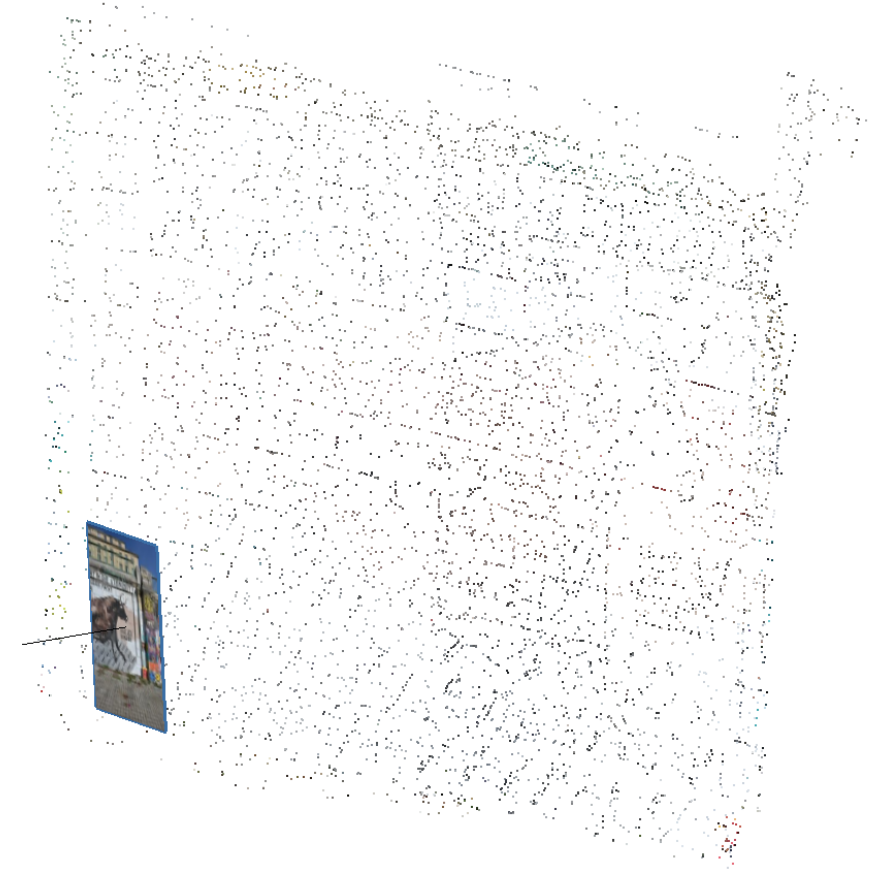
TIE POINTS



STRUCTURE from motion



TIE POINTS



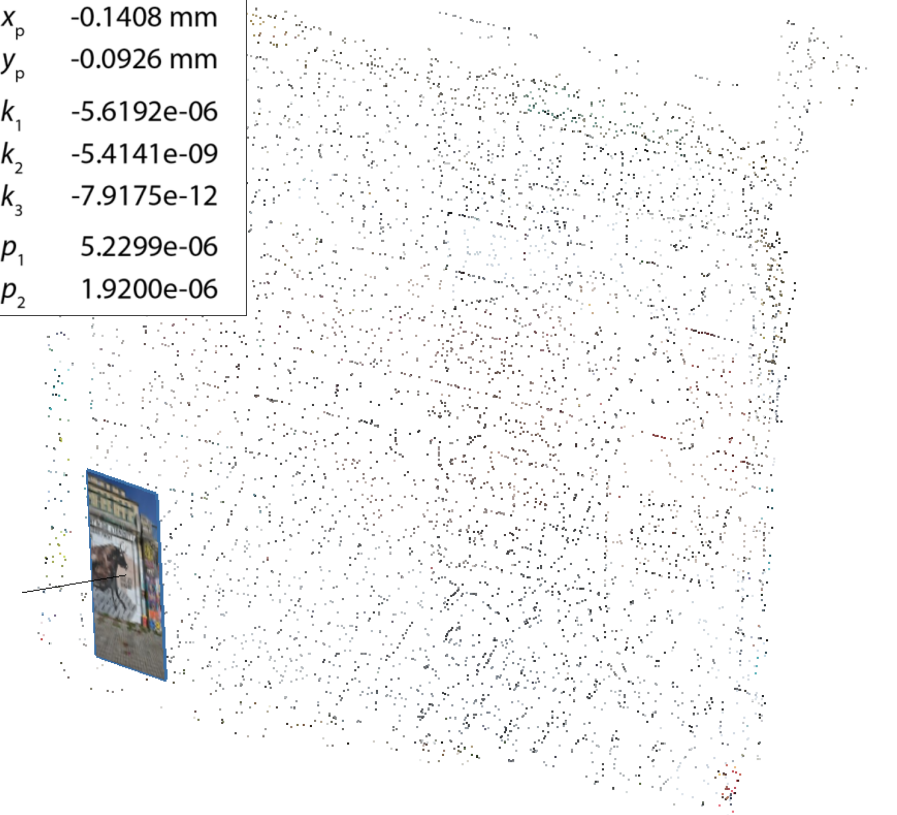
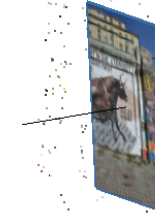
ESTIMATE *CAMERA EXTERIOR ORIENTATION*

STRUCTURE **from motion**



TIE POINTS

principal distance	c	20.1546 mm
principal point location	x_p	-0.1408 mm
	y_p	-0.0926 mm
radial distortion parameters	k_1	-5.6192e-06
	k_2	-5.4141e-09
	k_3	-7.9175e-12
decentring distortion parameters	p_1	5.2299e-06
	p_2	1.9200e-06



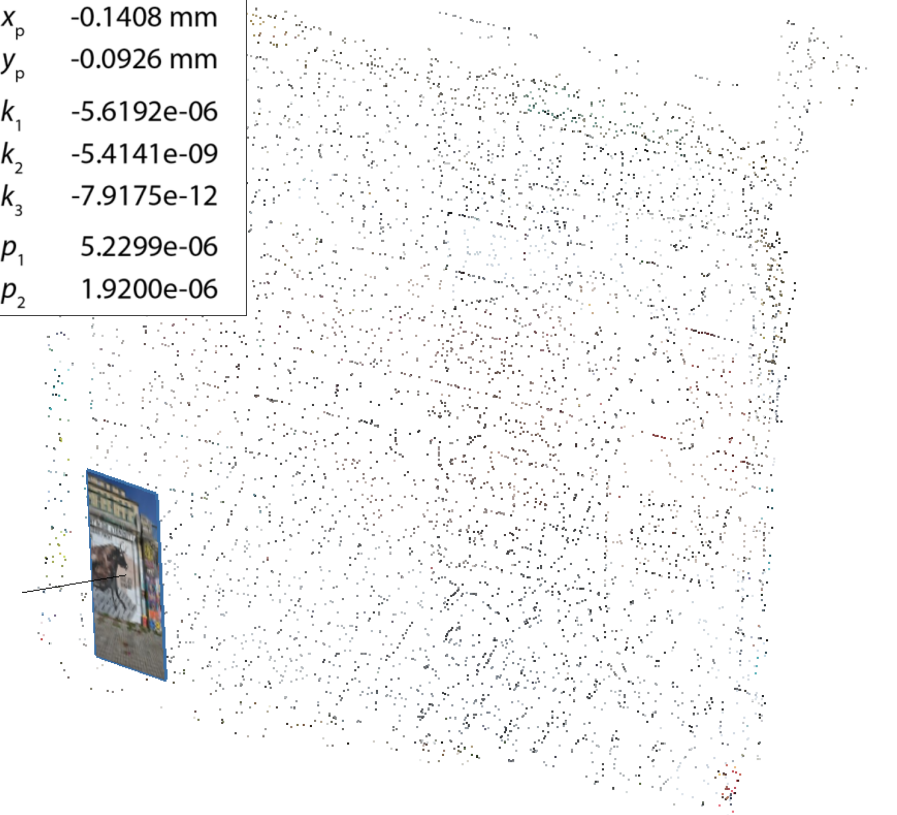
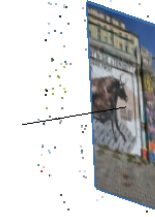
ESTIMATE **CAMERA EXTERIOR ORIENTATION**
ESTIMATE **CAMERA INTERIOR ORIENTATION**

STRUCTURE **from motion**



TIE POINTS

principal distance	c	20.1546 mm
principal point location	x_p	-0.1408 mm
	y_p	-0.0926 mm
radial distortion parameters	k_1	-5.6192e-06
	k_2	-5.4141e-09
	k_3	-7.9175e-12
decentring distortion parameters	p_1	5.2299e-06
	p_2	1.9200e-06



3D POINTS

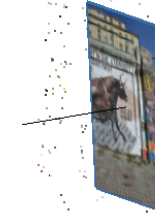
ESTIMATE **CAMERA EXTERIOR ORIENTATION**
ESTIMATE **CAMERA INTERIOR ORIENTATION**

STRUCTURE **from motion**



TIE POINTS

principal distance	c	20.1546 mm
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radial distortion parameters	k_1	-5.6192e-06
	k_2	-5.4141e-09
	k_3	-7.9175e-12
decentring distortion parameters	p_1	5.2299e-06
	p_2	1.9200e-06



STRUCTURE

3D POINTS

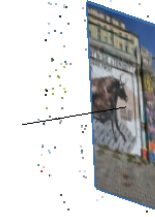
ESTIMATE **CAMERA EXTERIOR ORIENTATION**
ESTIMATE **CAMERA INTERIOR ORIENTATION**

STRUCTURE and from motion



TIE POINTS

principal distance	c	20.1546 mm
principal point location	x_p	-0.1408 mm
	y_p	-0.0926 mm
radial distortion parameters	k_1	-5.6192e-06
	k_2	-5.4141e-09
	k_3	-7.9175e-12
decentring distortion parameters	p_1	5.2299e-06
	p_2	1.9200e-06



STRUCTURE

3D POINTS

ESTIMATE *CAMERA EXTERIOR ORIENTATION*
ESTIMATE *CAMERA INTERIOR ORIENTATION*

STRUCTURE from motion

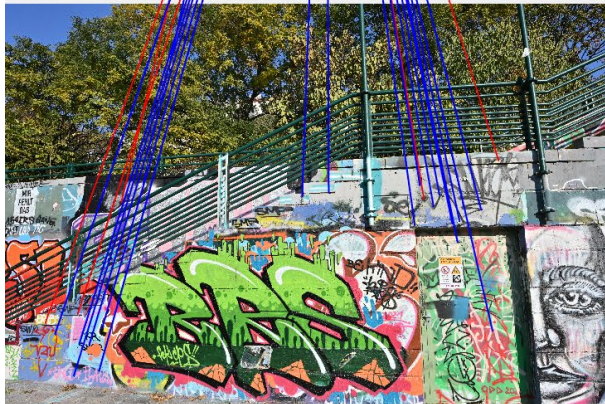
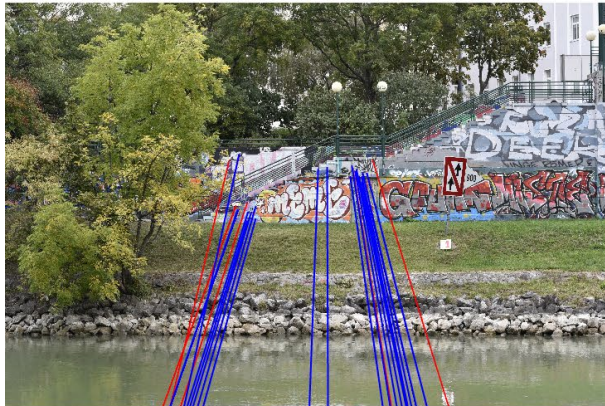


CAMERA EXTERIOR ORIENTATION
CAMERA INTERIOR ORIENTATION

3D POINTS

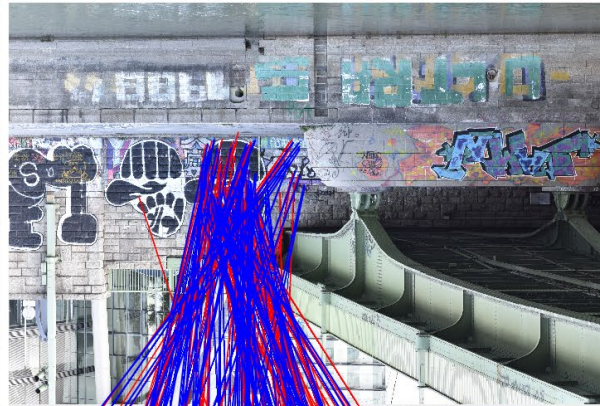
CAMERA orientation

Nikon D750 + 85 mm
30-09-2021



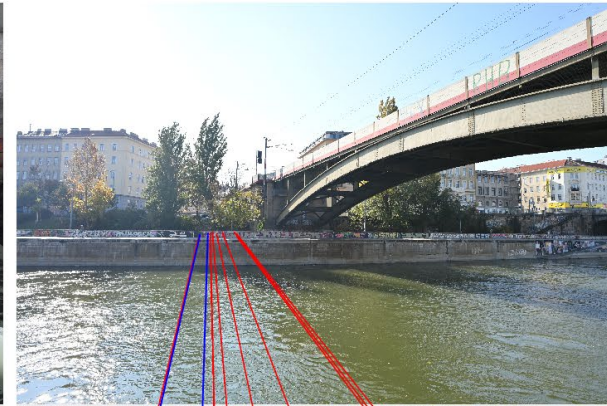
Nikon Z7 II + 20 mm
29-10-2021

Nikon D750 + 85 mm
30-09-2021



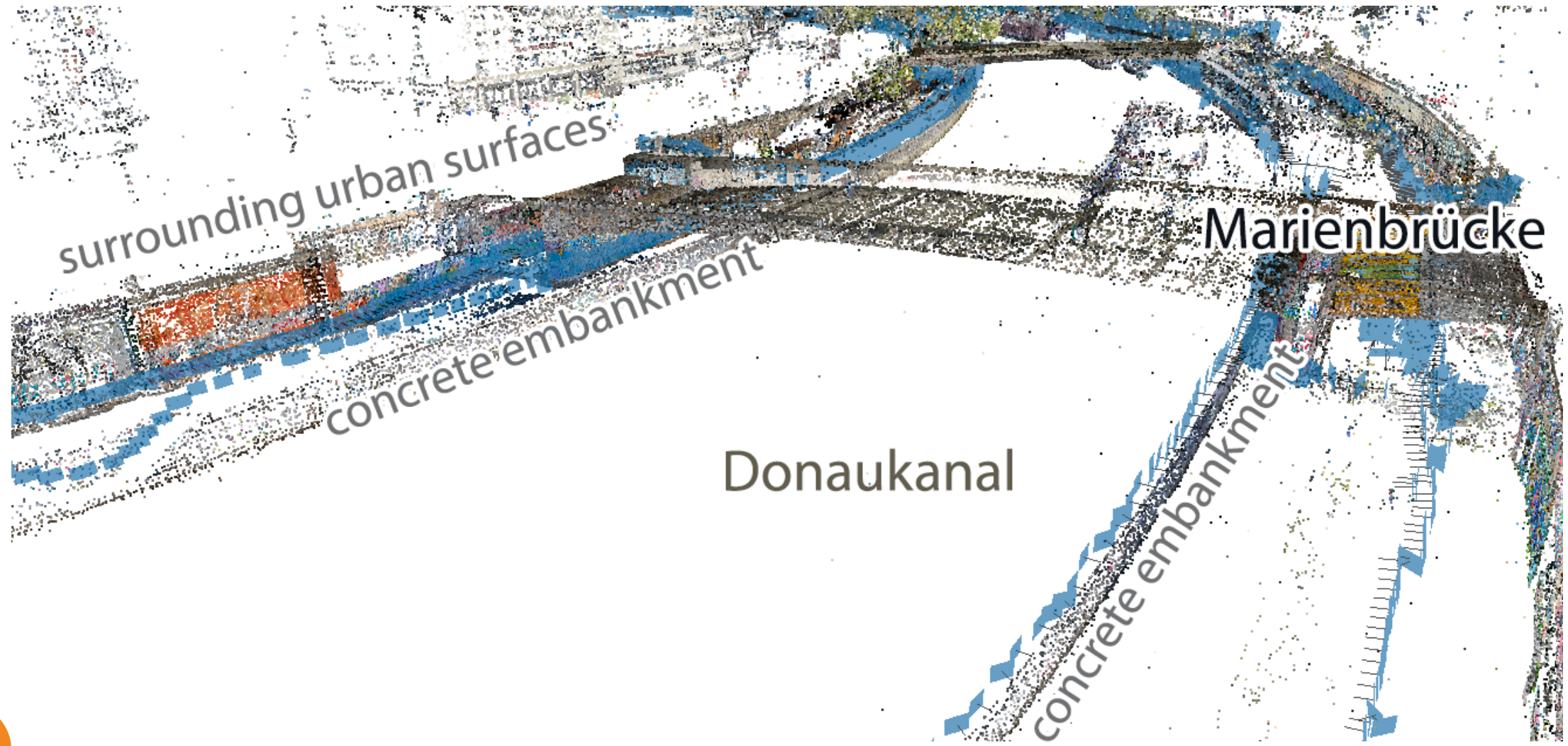
Nikon D750 + 85 mm
01-10-2021

Nikon Z7 II + 20 mm
28-10-2021

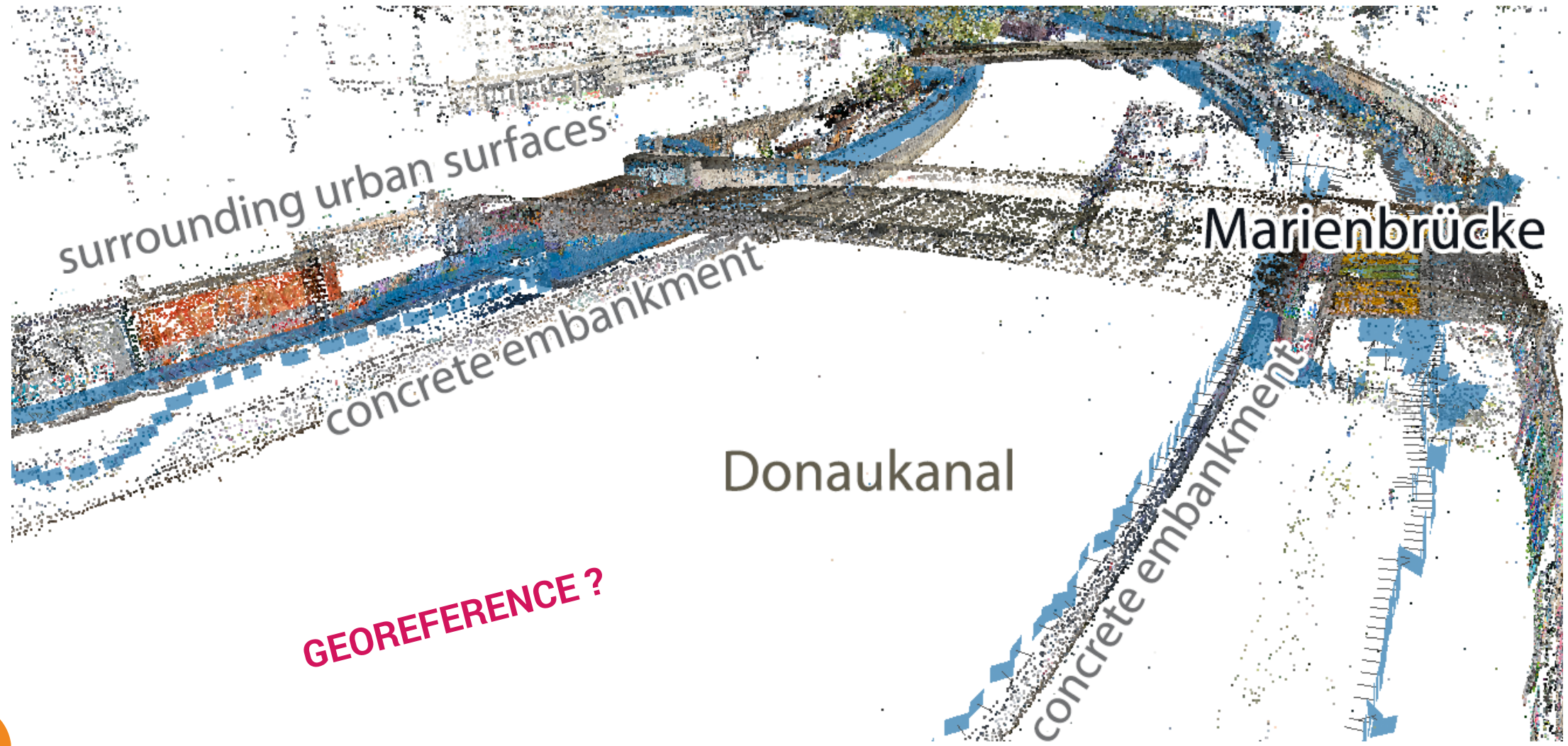


Nikon Z7 II + 20 mm
26-10-2021

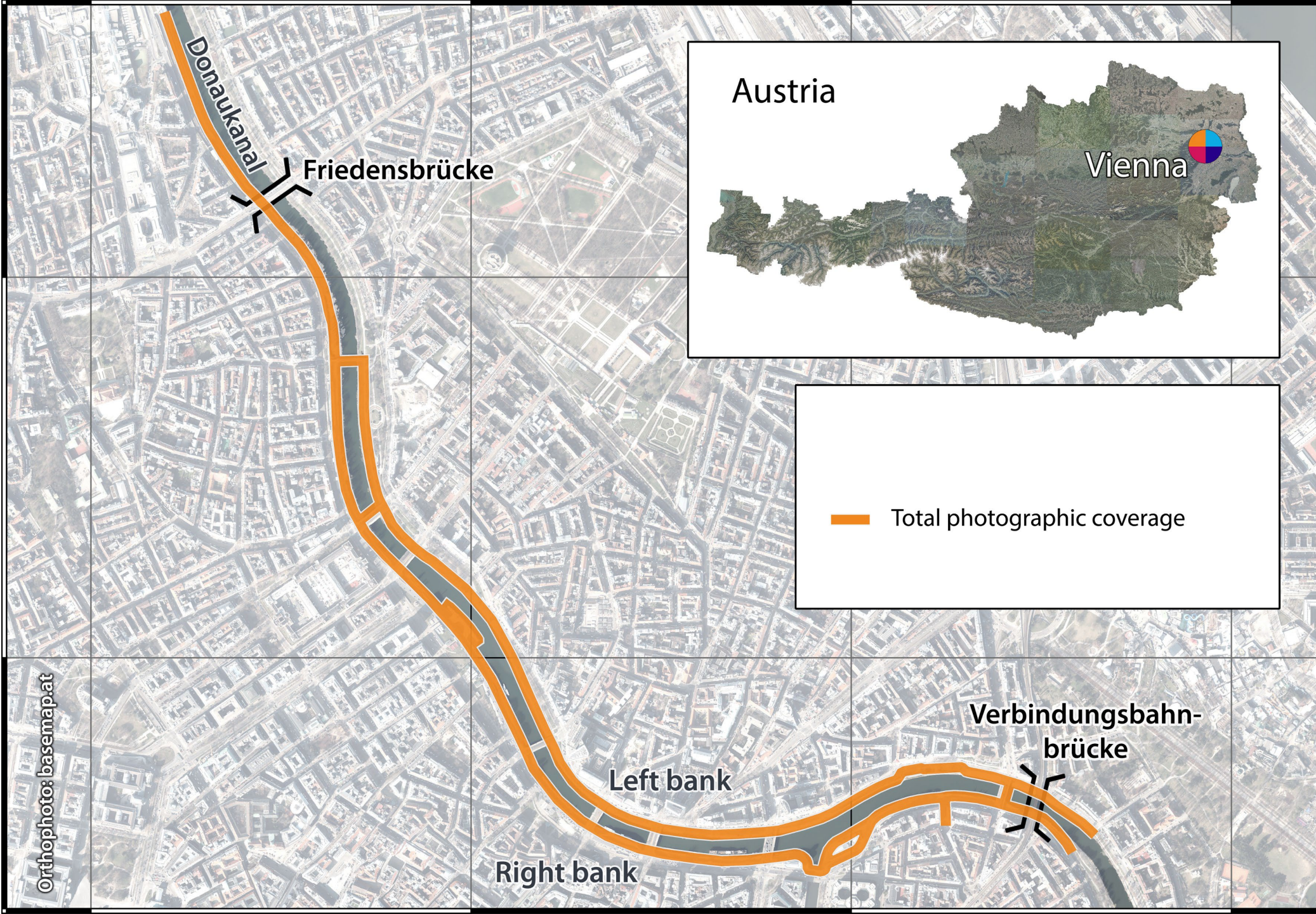
CAMERA orientation



CAMERA orientation



**TOTAL
COVERAGE**
14.0 km



**TOTAL
COVERAGE**

14.0 km

**TOTAL STATION
POSITIONS**

21

Orthophoto: basemap.at

Donaukanal

Friedensbrücke

Austria

Vienna

- ▲ Total station position
- Total photographic coverage

Left bank

Right bank

Verbindungsbahn-
brücke

**TOTAL
COVERAGE**

14.0 km

**TOTAL STATION
POSITIONS**

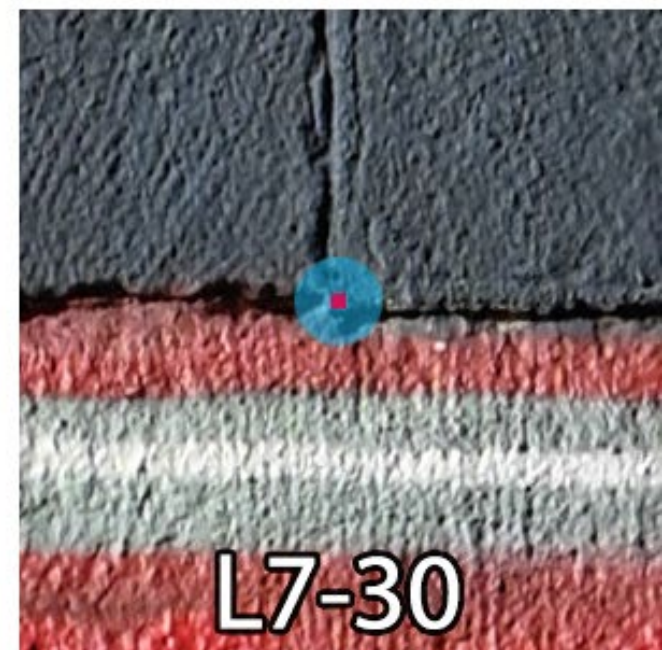
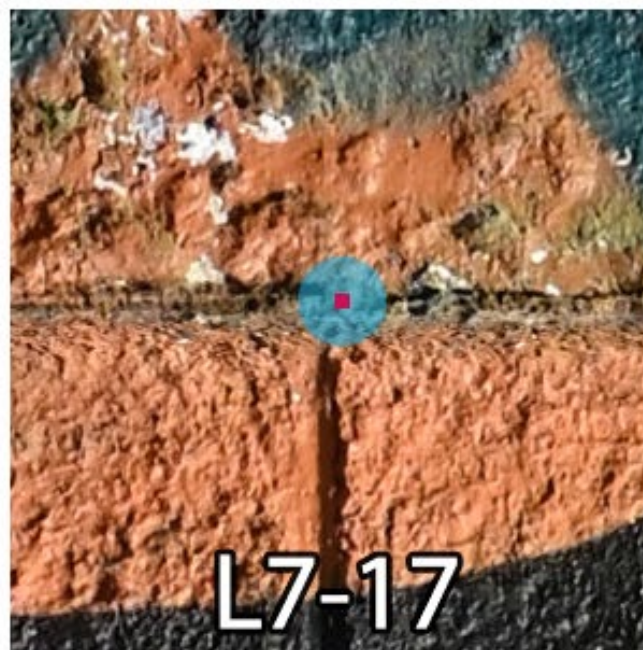
21



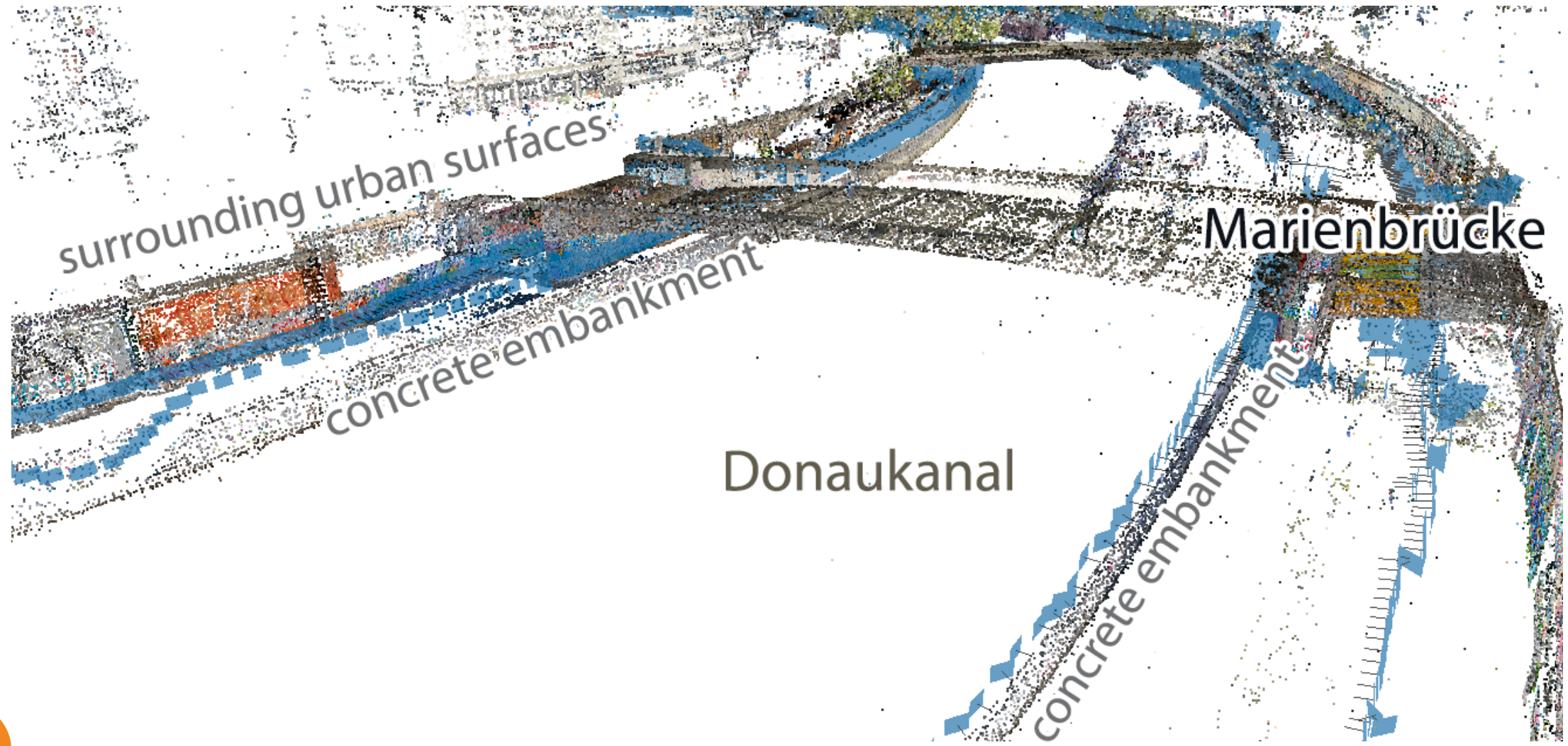
**TOTAL
COVERAGE**
14.0 km

**TOTAL STATION
POSITIONS**
21

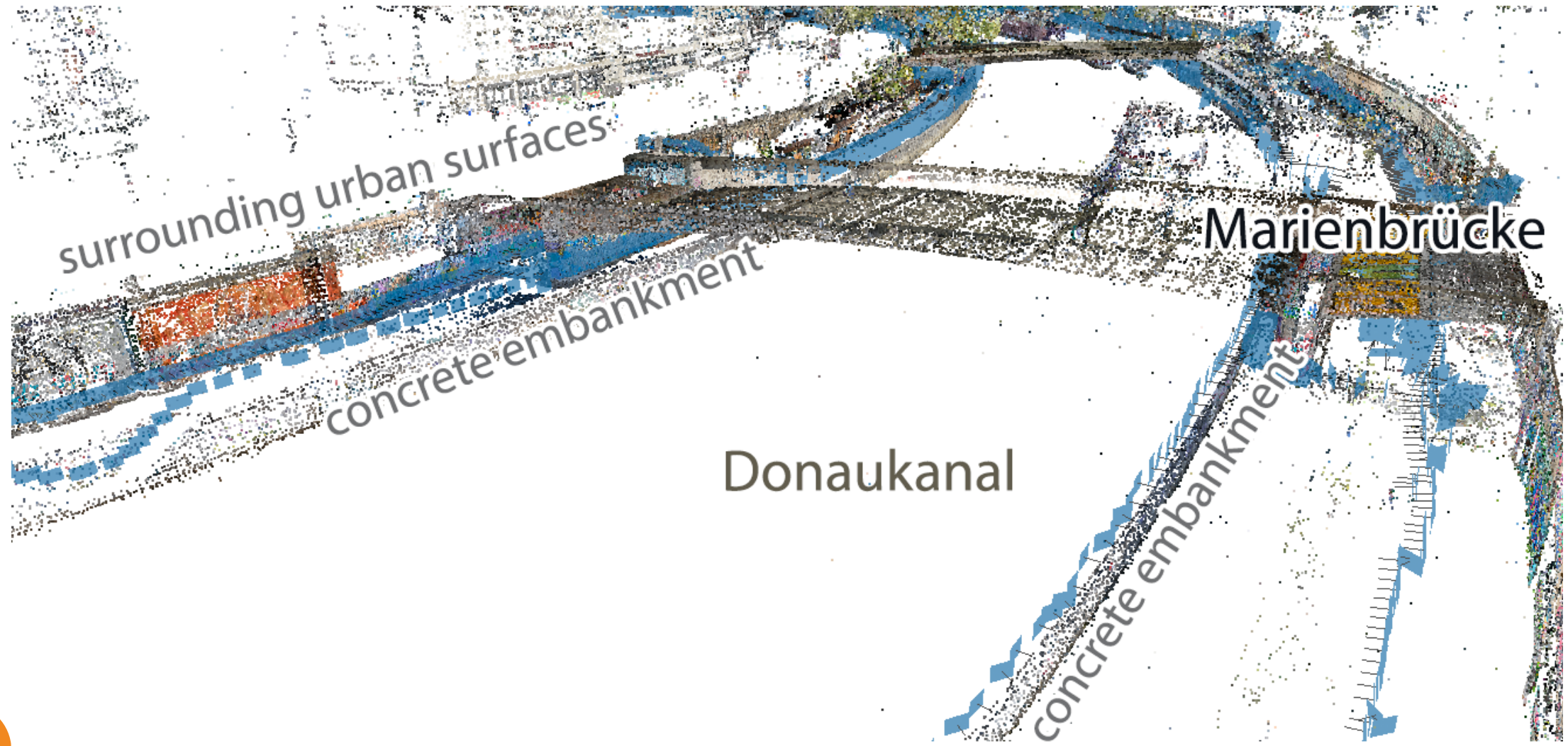
**GRAFFITI-SCAPE
POINTS**
624



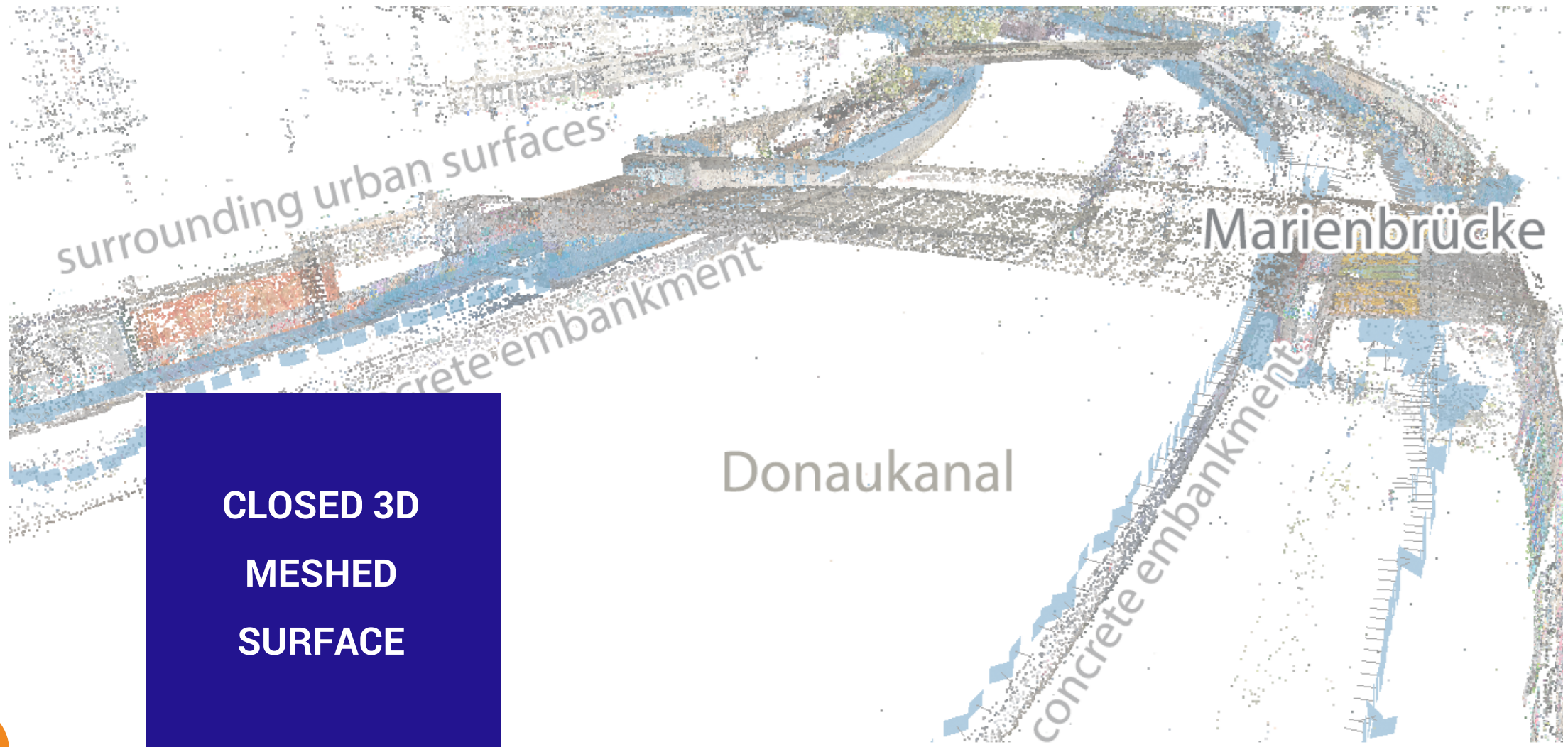
CAMERA orientation



THREE purposes

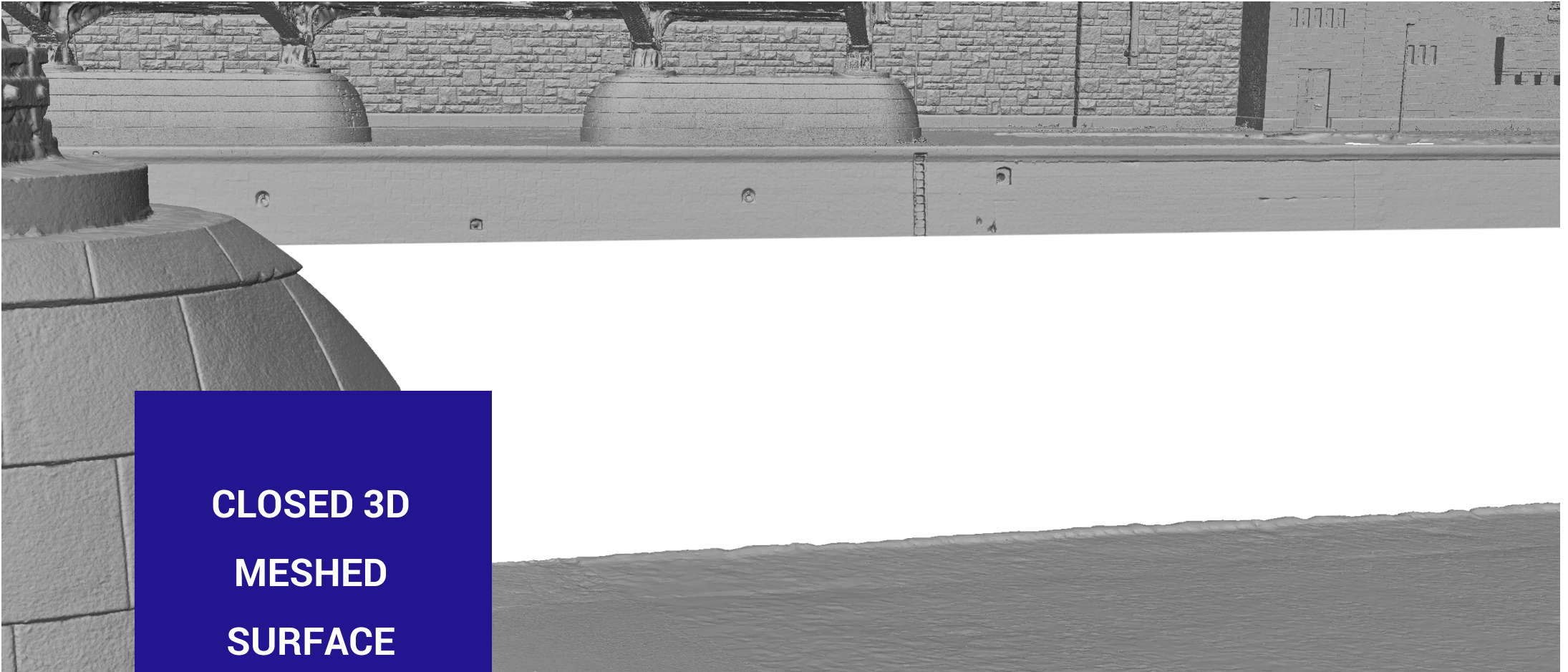


THREE purposes

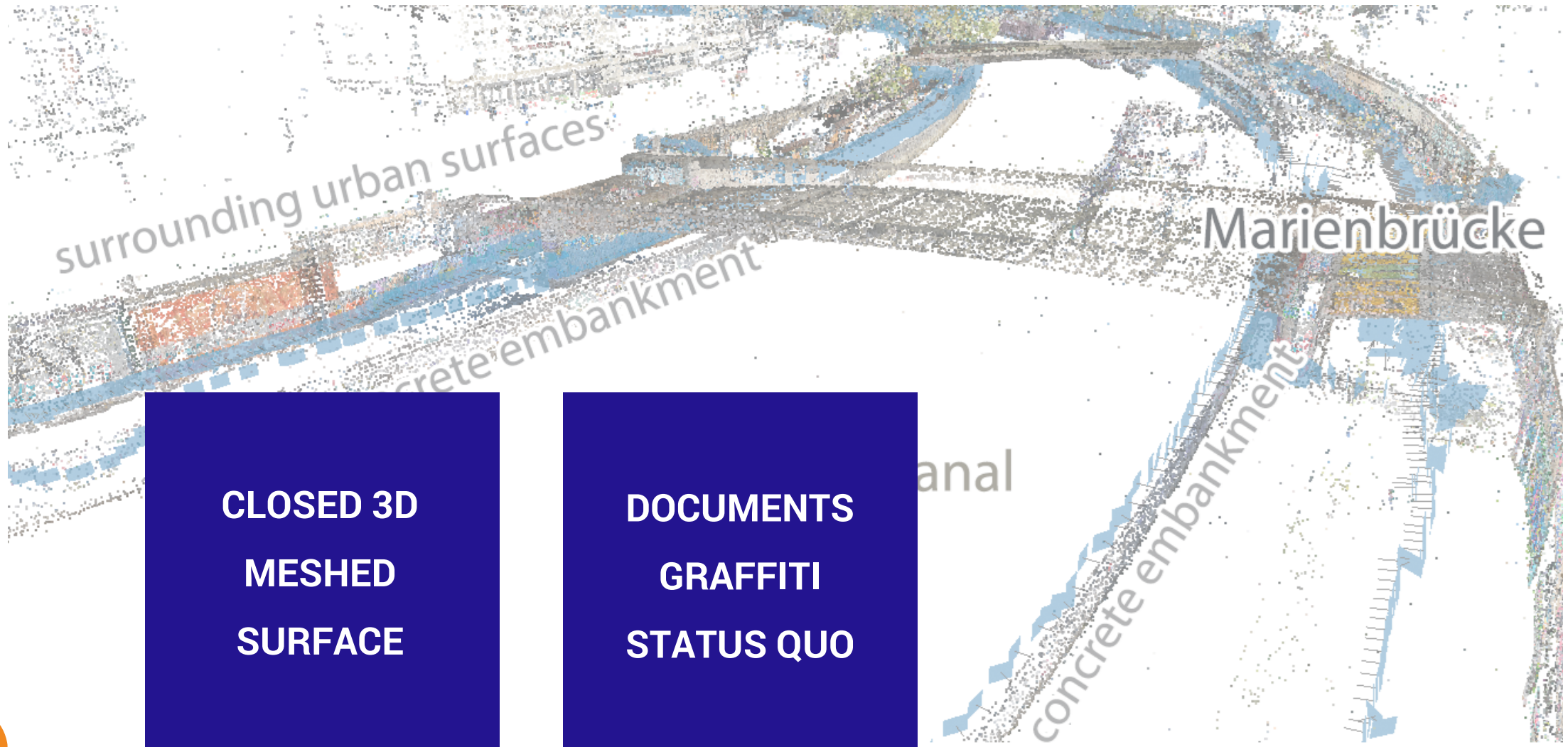


CLOSED 3D
MESHED
SURFACE

THREE purposes



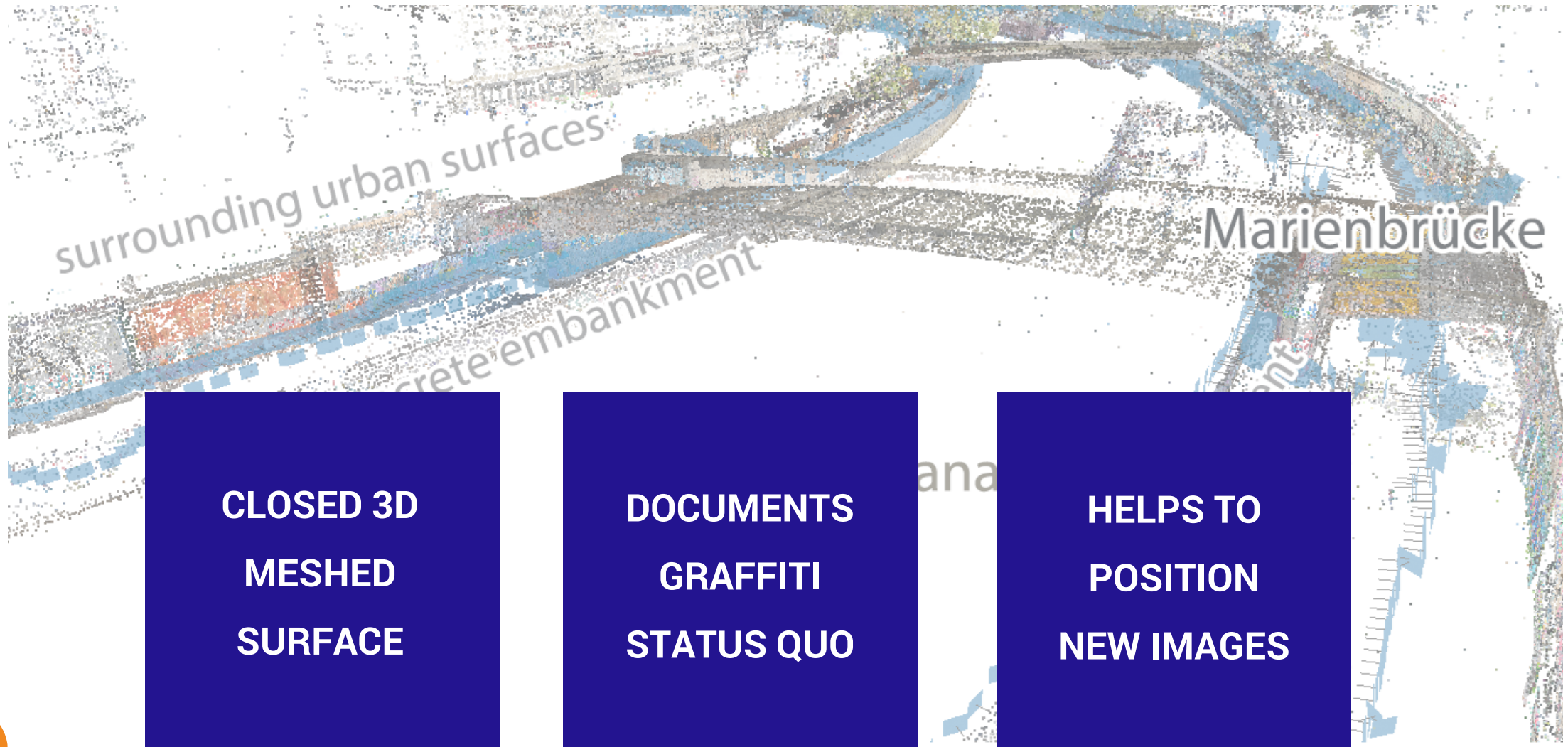
THREE purposes



CLOSED 3D
MESHED
SURFACE

DOCUMENTS
GRAFFITI
STATUS QUO

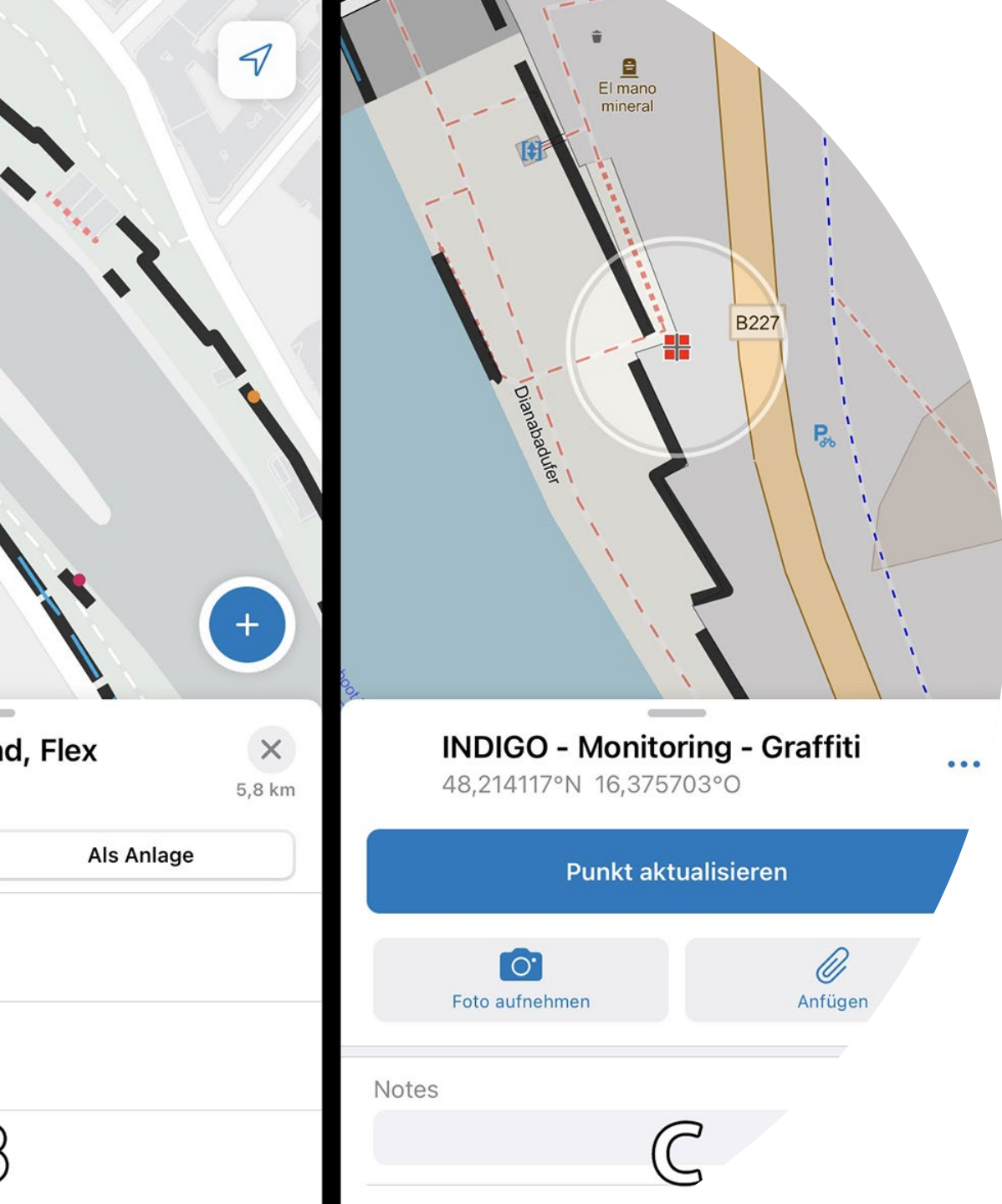
THREE purposes



CLOSED 3D
MESHED
SURFACE

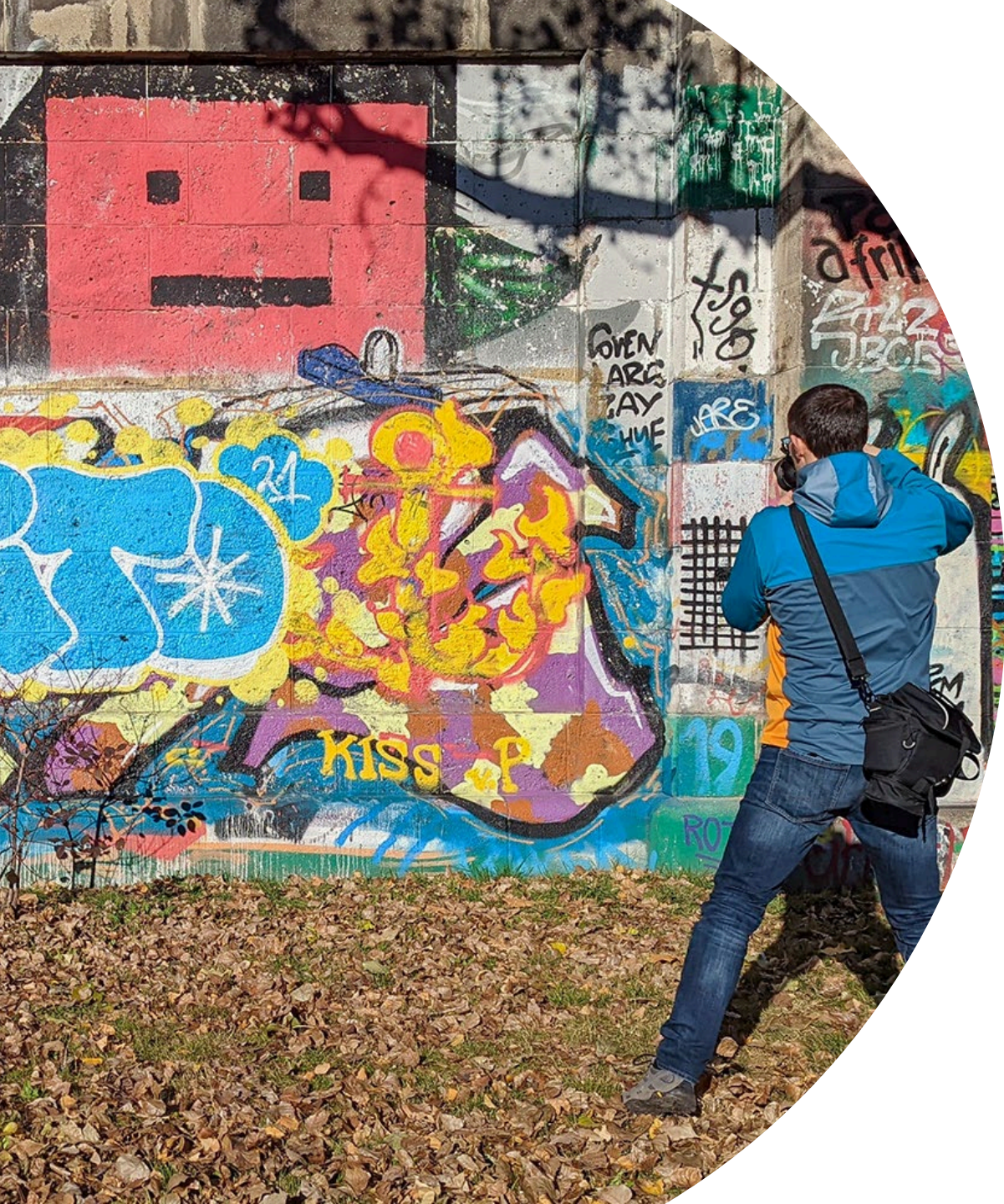
DOCUMENTS
GRAFFITI
STATUS QUO

HELPS TO
POSITION
NEW IMAGES



FOLLOW-UP photography

Instagram + monitoring app



FOLLOW-UP **photography**

Instagram + monitoring app

2 photographers



FOLLOW-UP **photography**

Instagram + monitoring app

2 photographers

2 cameras + 2 spectrometers + 2 tablets

identically programmed



FOLLOW-UP **photography**

Instagram + monitoring app

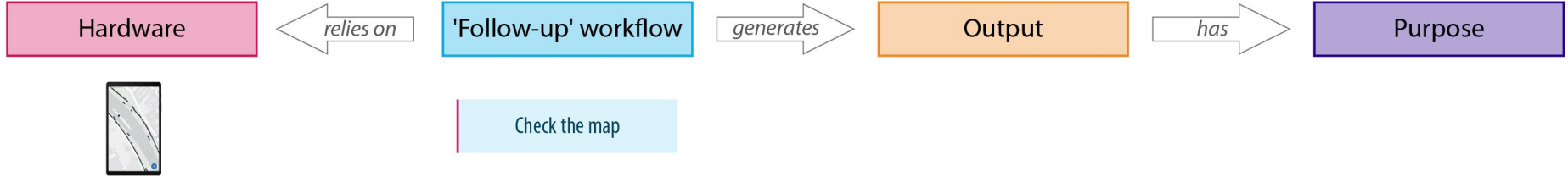
2 photographers

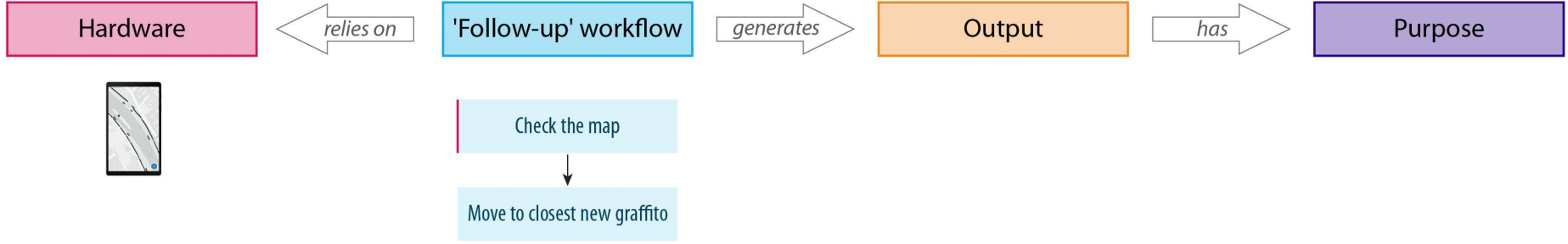
2 cameras + 2 spectrometers + 2 tablets

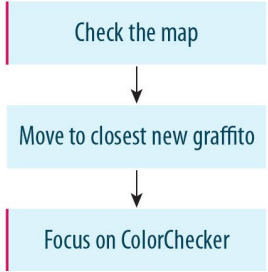
identically programmed

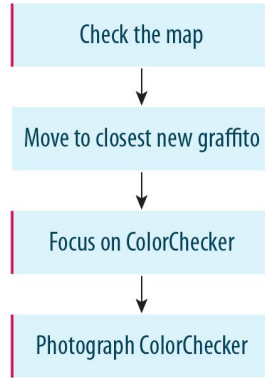
fixed acquisition procedure







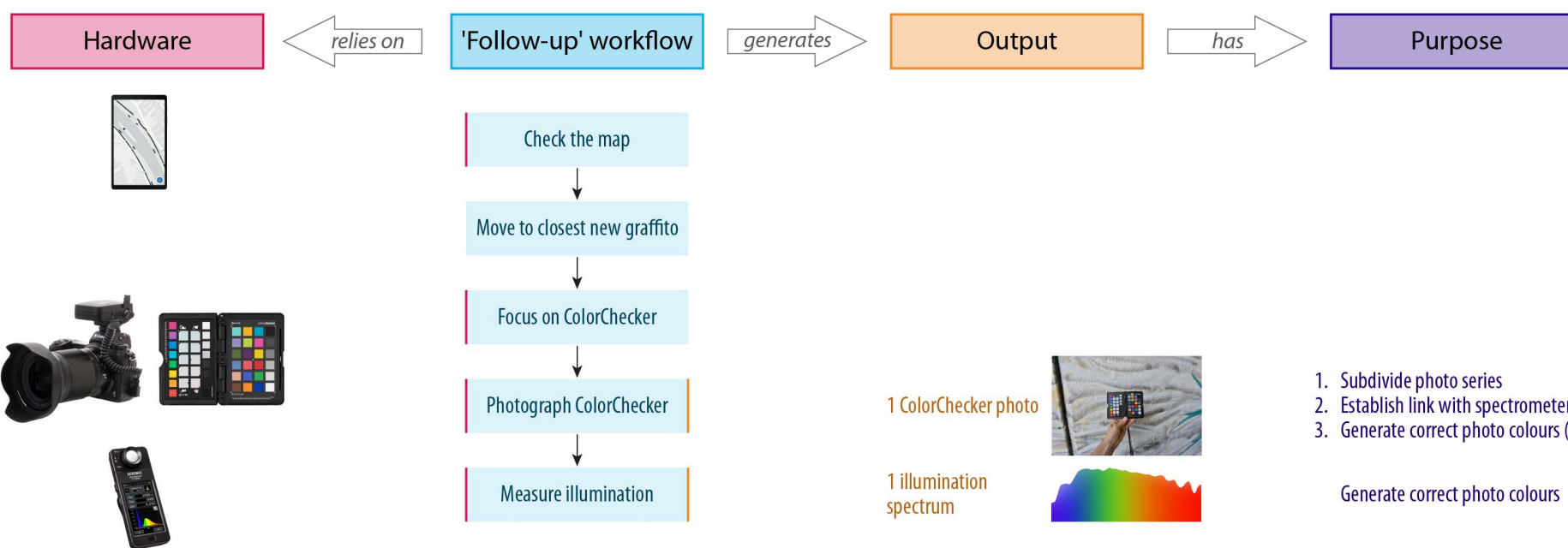


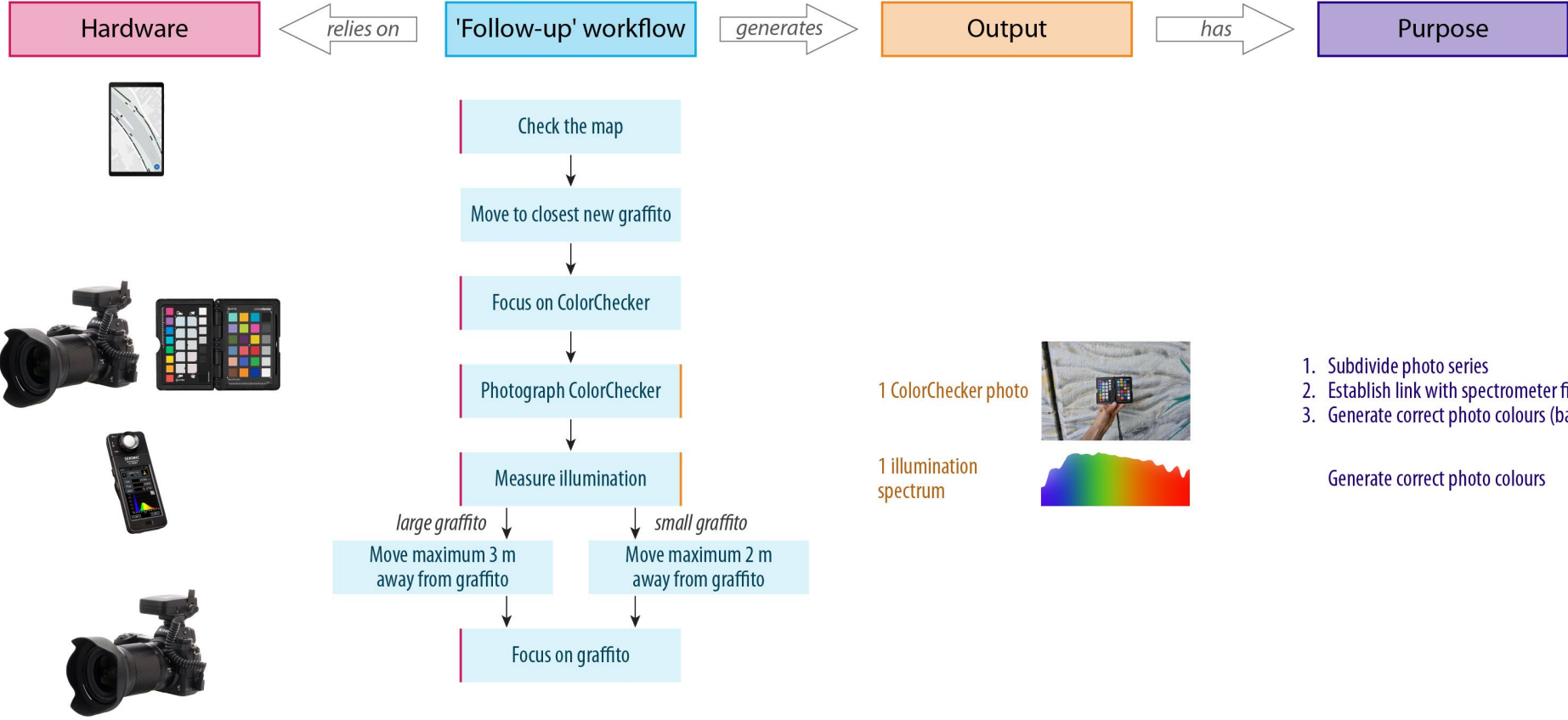


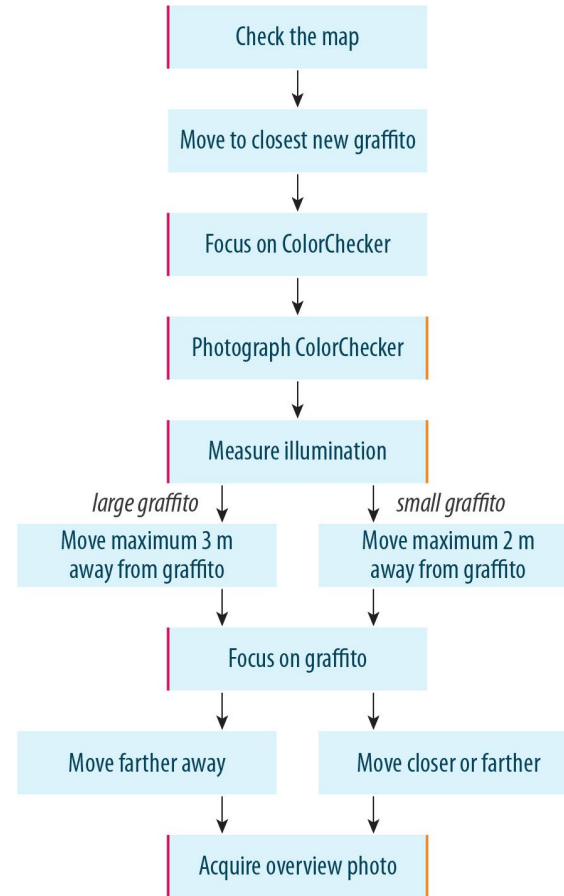
1 ColorChecker photo



1. Subdivide photo series







1 ColorChecker photo

1 illumination spectrum

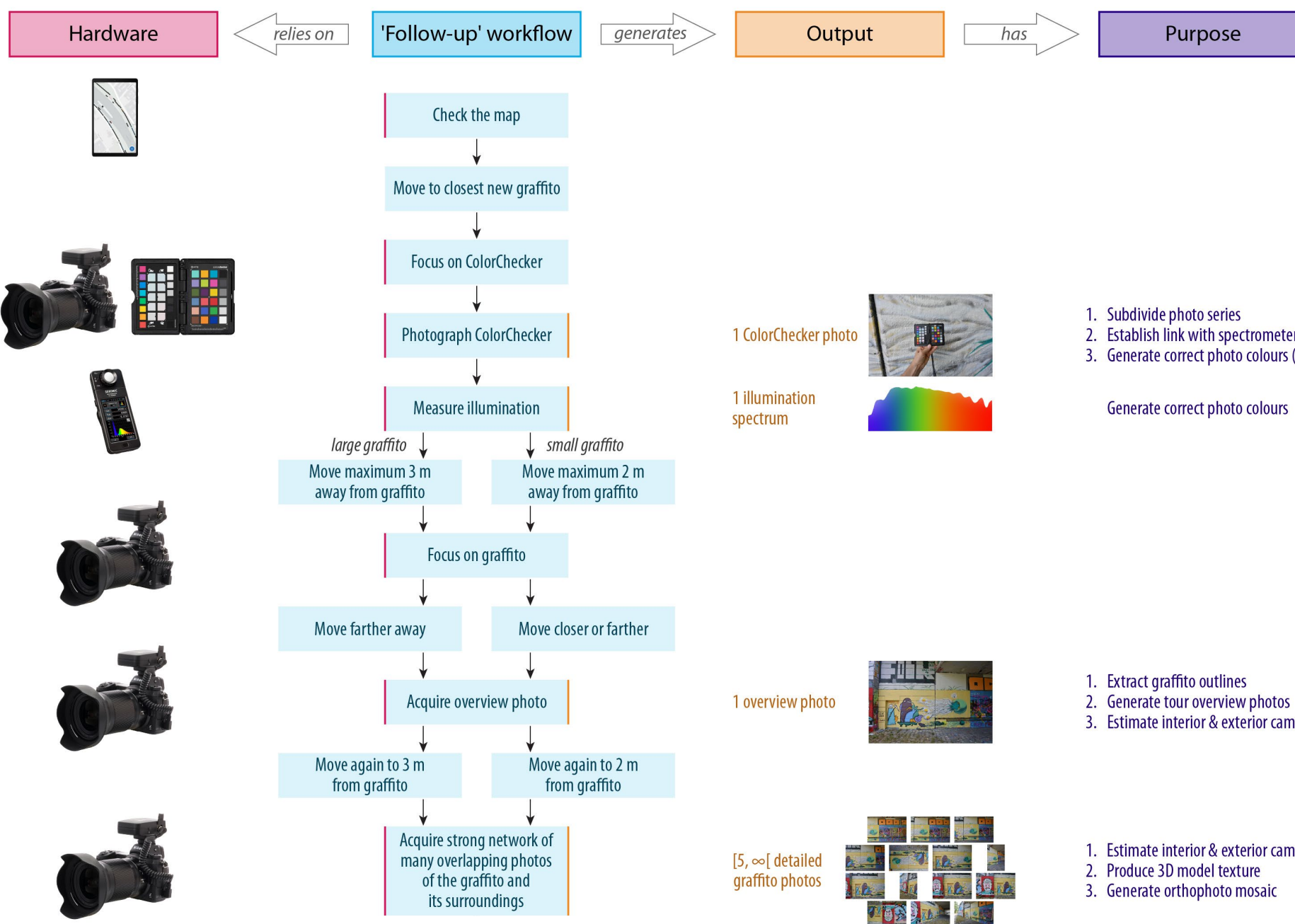
1 overview photo

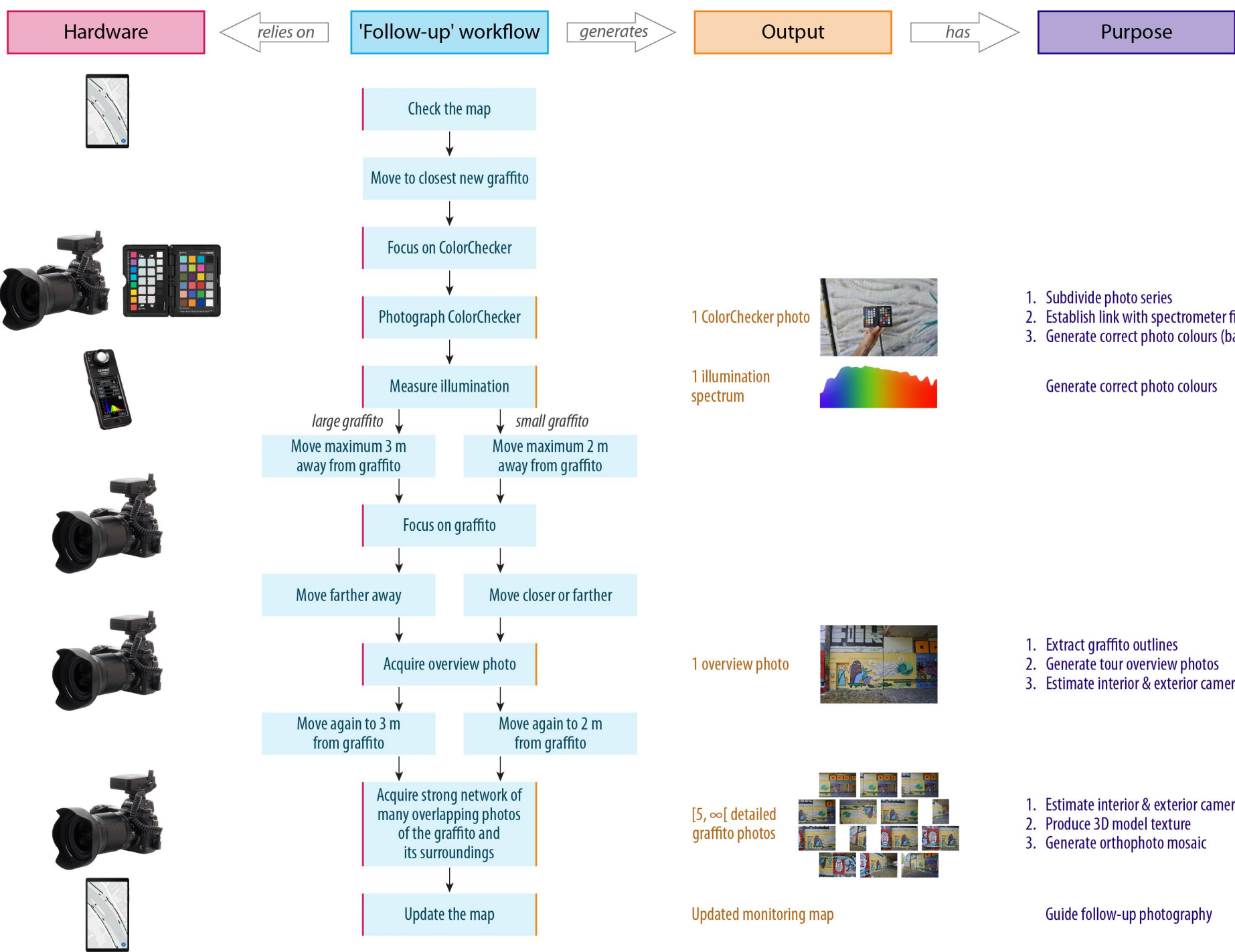


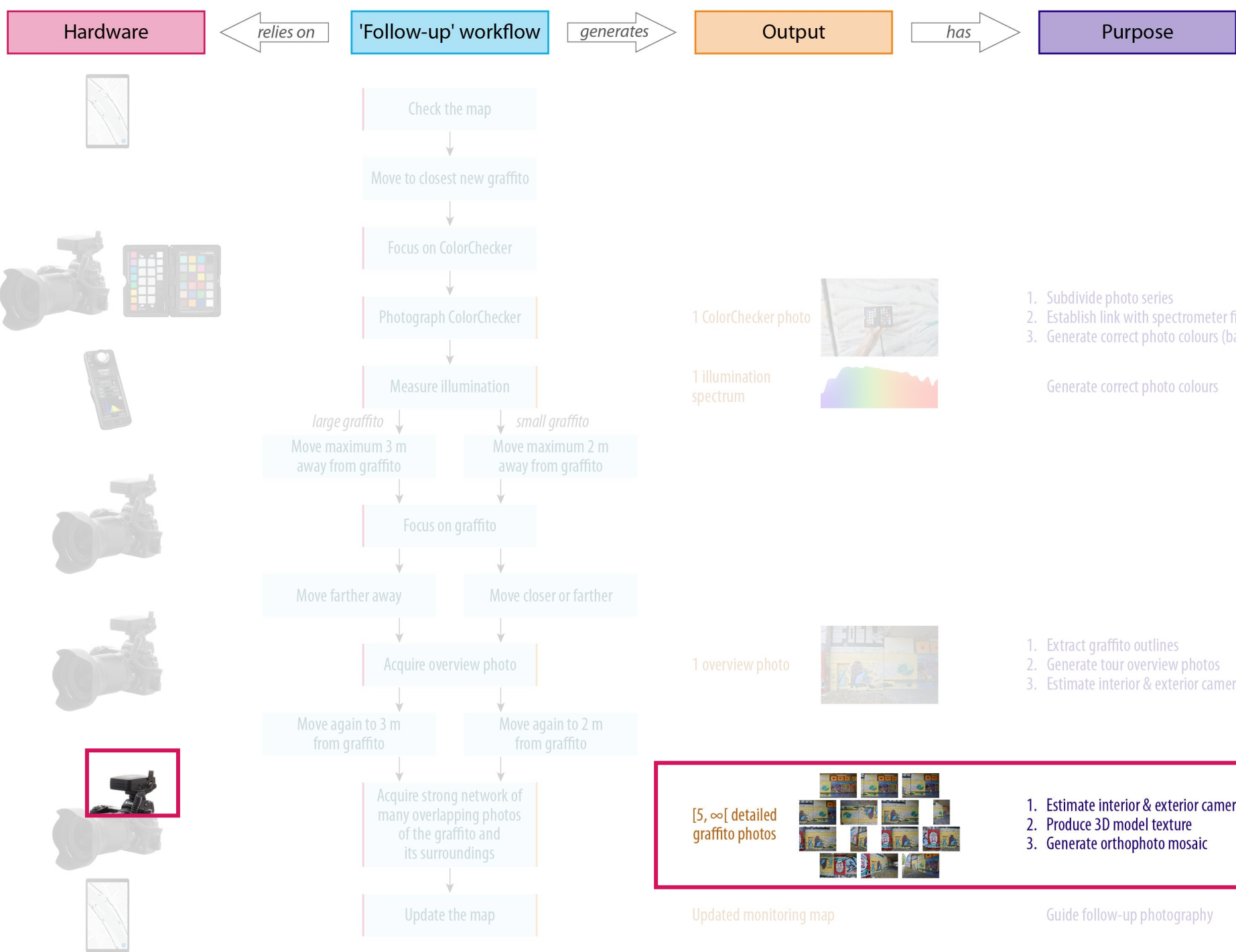
1. Subdivide photo series
2. Establish link with spectrometer file
3. Generate correct photo colours (backup)

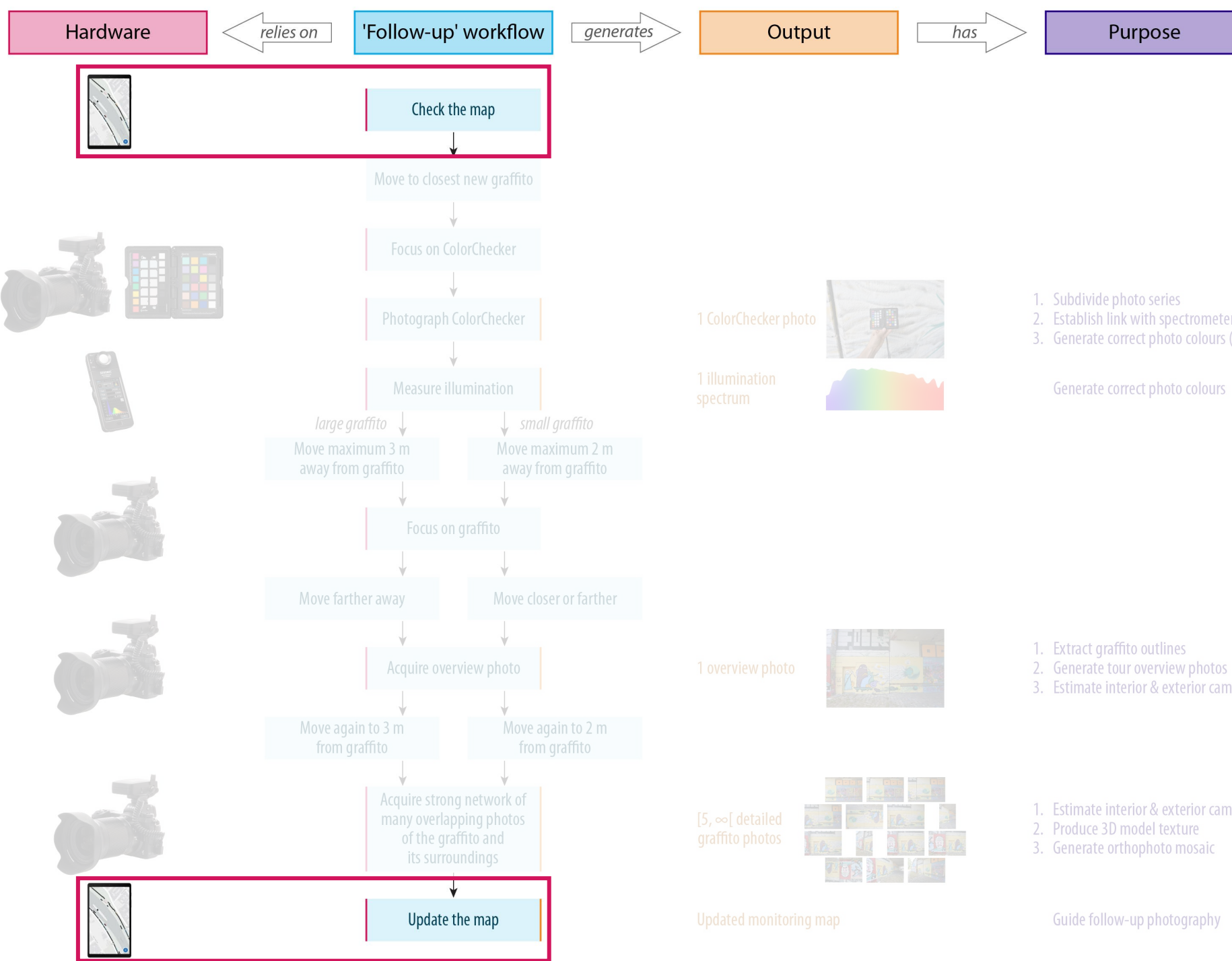
Generate correct photo colours

1. Extract graffiti outlines
2. Generate tour overview photos
3. Estimate interior & exterior camera orientations









ACCURATE photo coordinates



ACCURATE photo coordinates



Scene2Map NTRIP-Client

NTRIP CLIENT ACTIVATION Data

☐ OFF **POSITION** 3d

RTK STATUS NO

Status

WiFi Network Client Access Data

This NTRIP Client requires access to an Internet enabled Network!

If access fails, an accesspoint will be created ("NTRIP_Client_" with PW:"NTRIP")

Address: Save

Password:

NTRIP Caster Settings

Network Name: Save

Port:

Mountpoint:

Username:

Password:

Send my Position

(Required if your Caster provides VRS (Virtual Reference Station))

Repeat time: ☐ 1 sec. ☐ 2 sec. ☒ 10 sec. ☐ 20 sec. Apply

Restart NTRIP client for changes to take effect Restart

@Martin Wieser 2022

IMAGE positioning

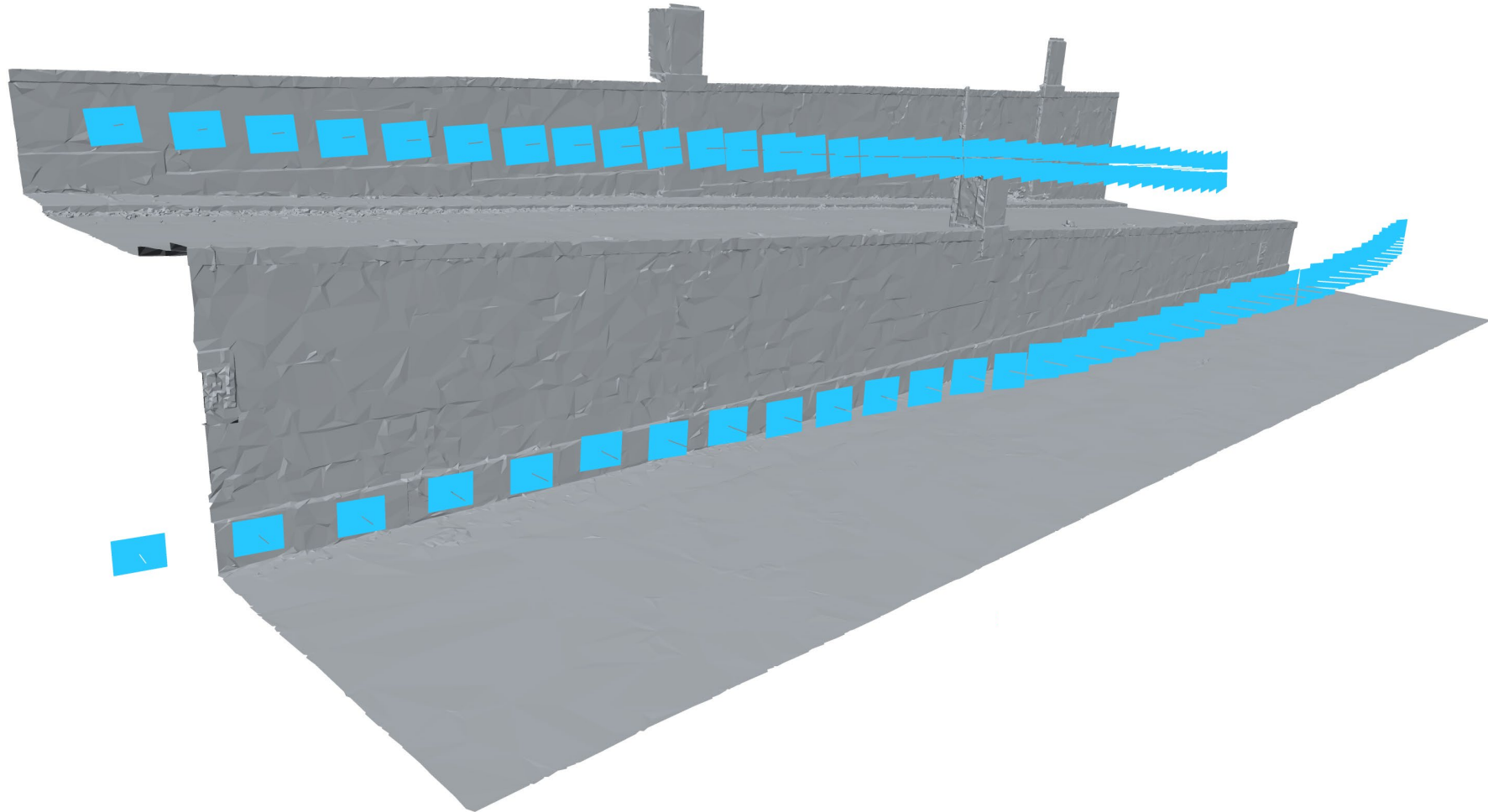


Illustration by Benjamin Wild

IMAGE positioning

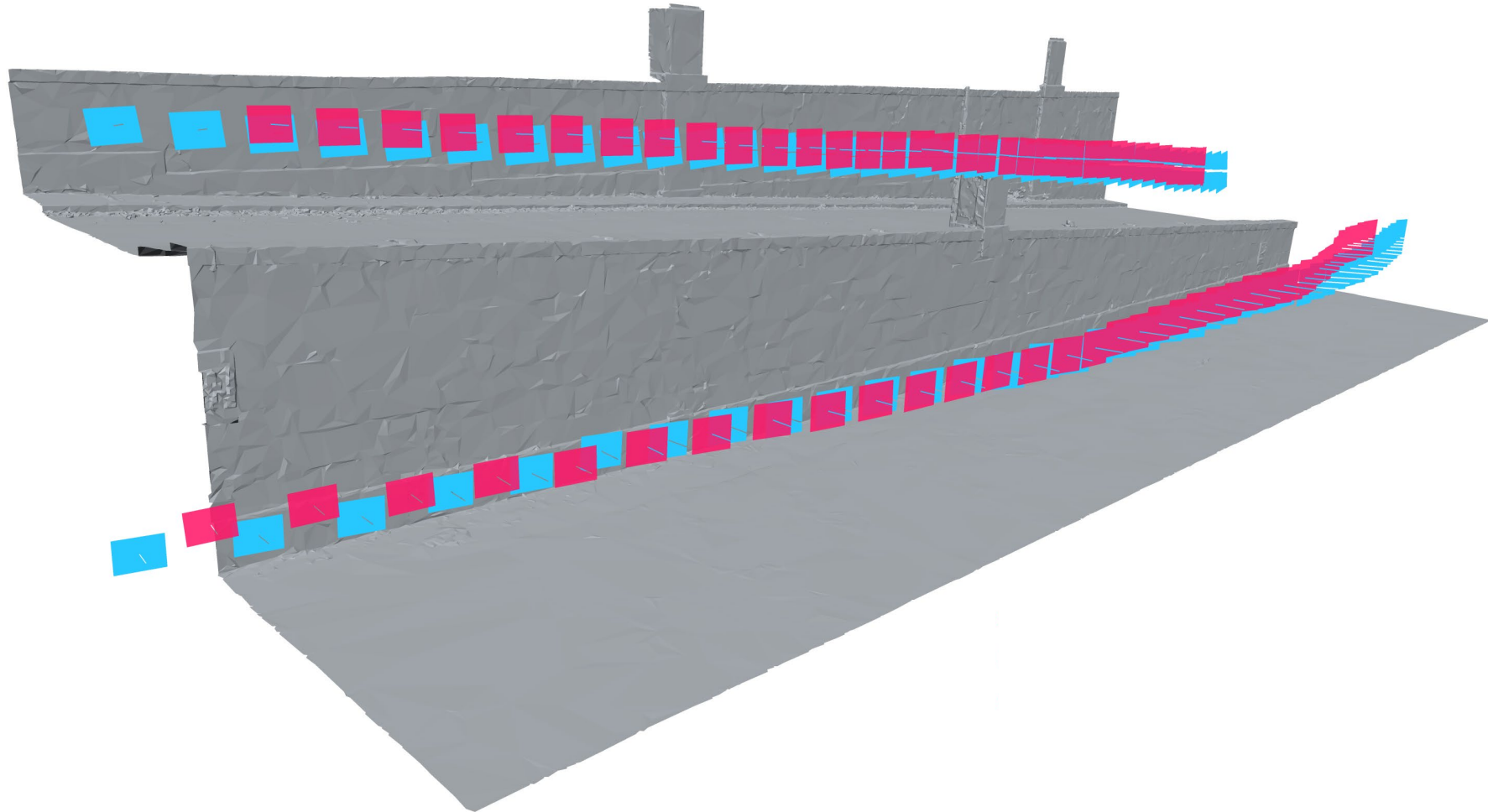
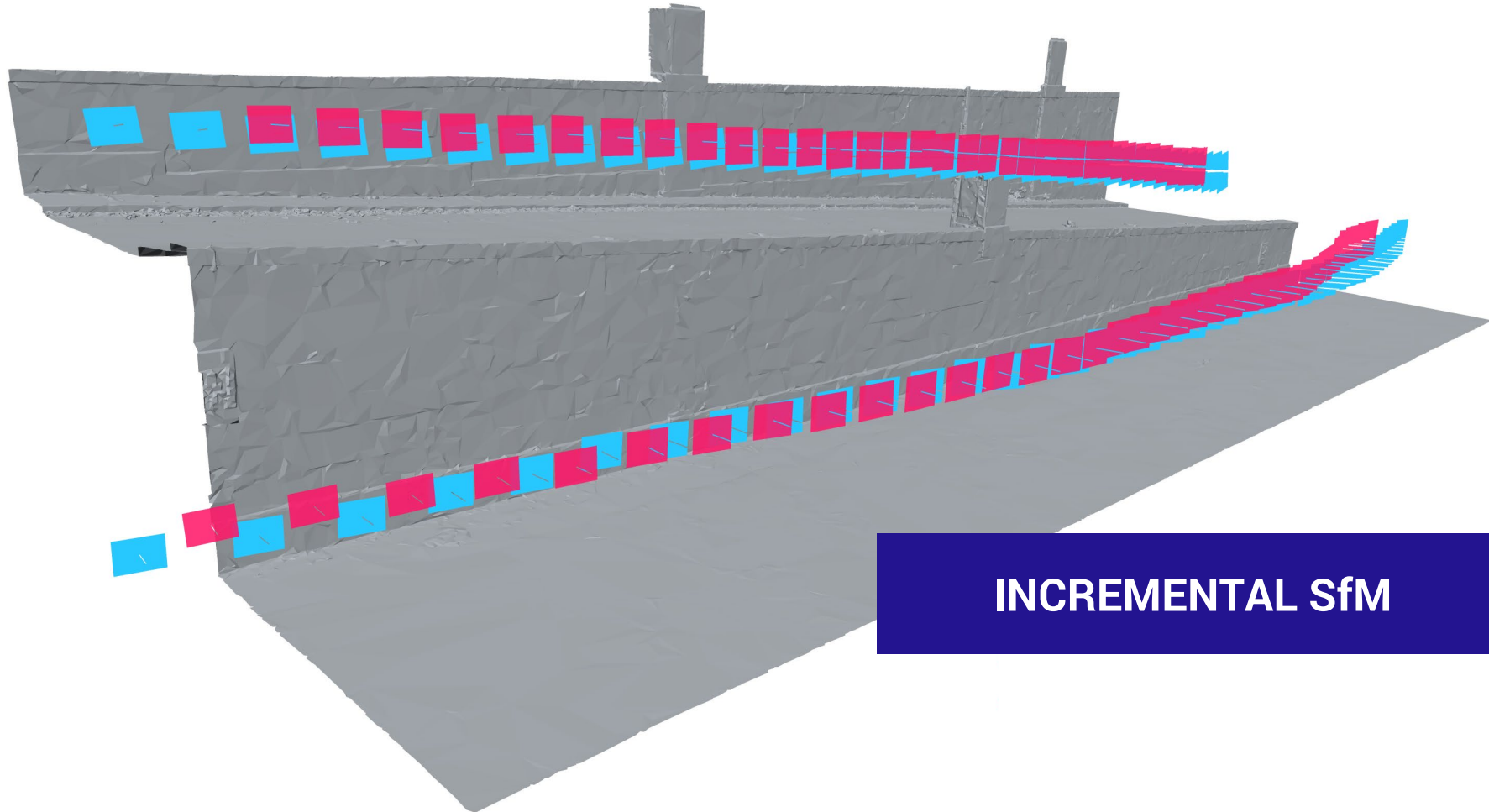


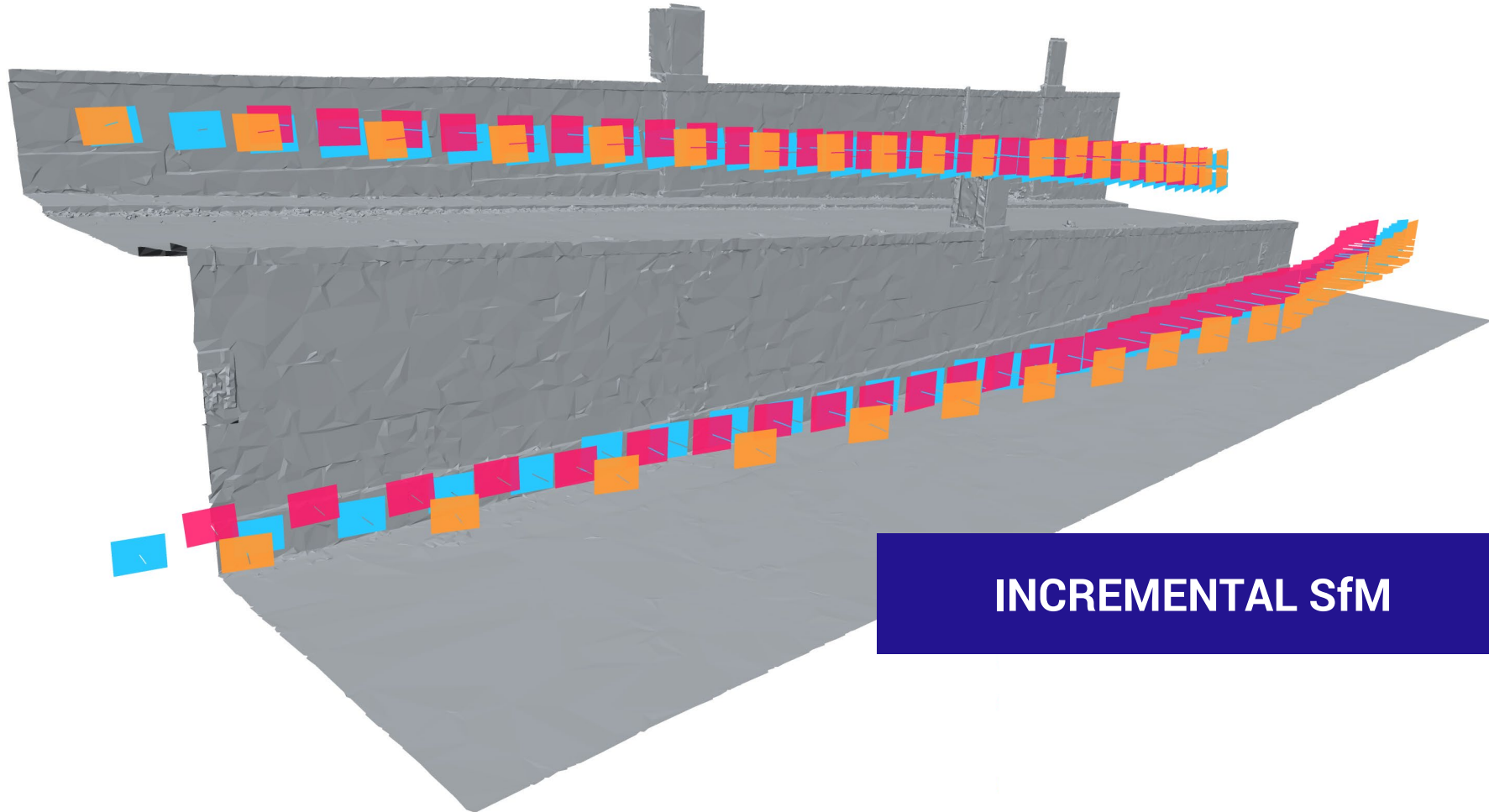
Illustration by Benjamin Wild

IMAGE positioning



INCREMENTAL SfM

IMAGE positioning



INCREMENTAL SfM

IMAGE positioning

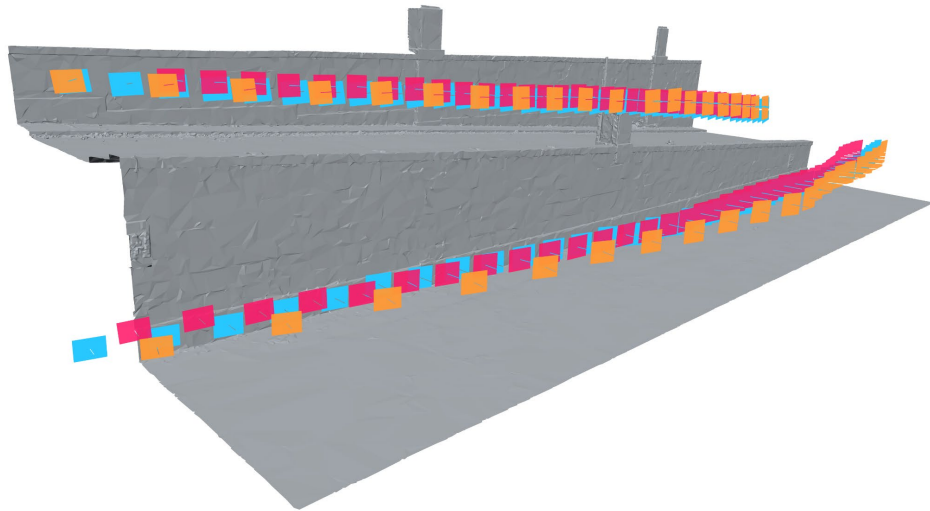
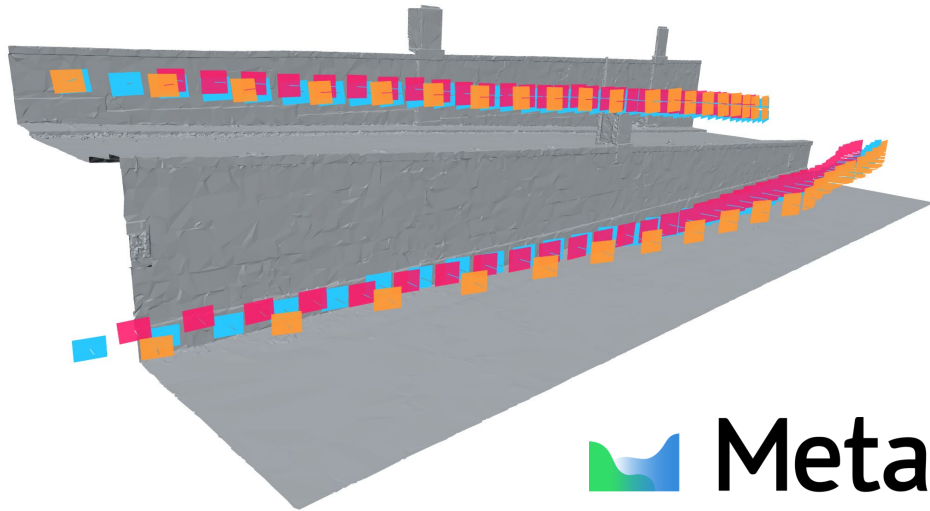


IMAGE positioning



 Metashape





INDIGO Toolbox

1. Choose graffito directory to be processed

2. Run

AUTOGRAF

position-accurate pixels



AUTOGRAF

Go to file

Code

About

bewild96 Update README.md

75d27bb
15 days ago
24 commits

	Heritage_ClassificationResults	Add files via upload	2 months ago
	images	Add files via upload	last month
	src	Add files via upload	2 months ago
	LICENSE	Initial commit	2 months ago
	README.md	Update README.md	15 days ago

AUTOMATIC ORTHORECTIFICATION OF GRAFFITI PHOTOS

photographs

graffiti

orthorectification

Readme

GPL-3.0 license

6 stars

1 watching

0 forks

☰ README.md



Short Description

AUTOGRAF (AUTomated Orthorectification of GRAffiti photos) is an open-source python-based Metashape add-on which enables the automated orthorectification of graffiti photos at a specific site of interest. It employs state-of-the-art photogrammetric computer vision techniques to allow highly accurate georeferencing and orthorectification of large numbers of photographs. A paper detailing AUTOGRAF's methodology will soon be submitted to *Heritage* (an MDPI journal).

AUTOGRAF is developed as part of the [INDIGO project](#) (In-ventory and DI-sseminate G-raffiti along the d-O-naukanal) carried out by the [Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology](#) in close collaboration with the [GEO Department of TU Wien University](#).

How to set up AUTOGRAF

Before AUTOGRAF can be used, the following preparatory steps [1-3] need to be performed:

1 - Install Agisoft's Metashape

About

AUTomatic Orthorectification of GRAffiti
photos

photographs graffiti orthorectification

 [Readme](#)

 GPL-3.0 license

☆ 6 stars

👁 1 watching

0 forks


Releases

No releases published

Packages

No packages published

Contributors 2

 bewild96

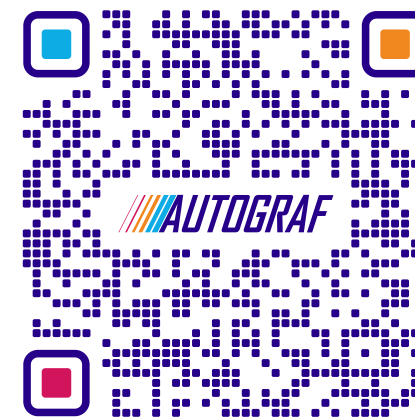
 BeyondConventionalBoundaries Geert ...

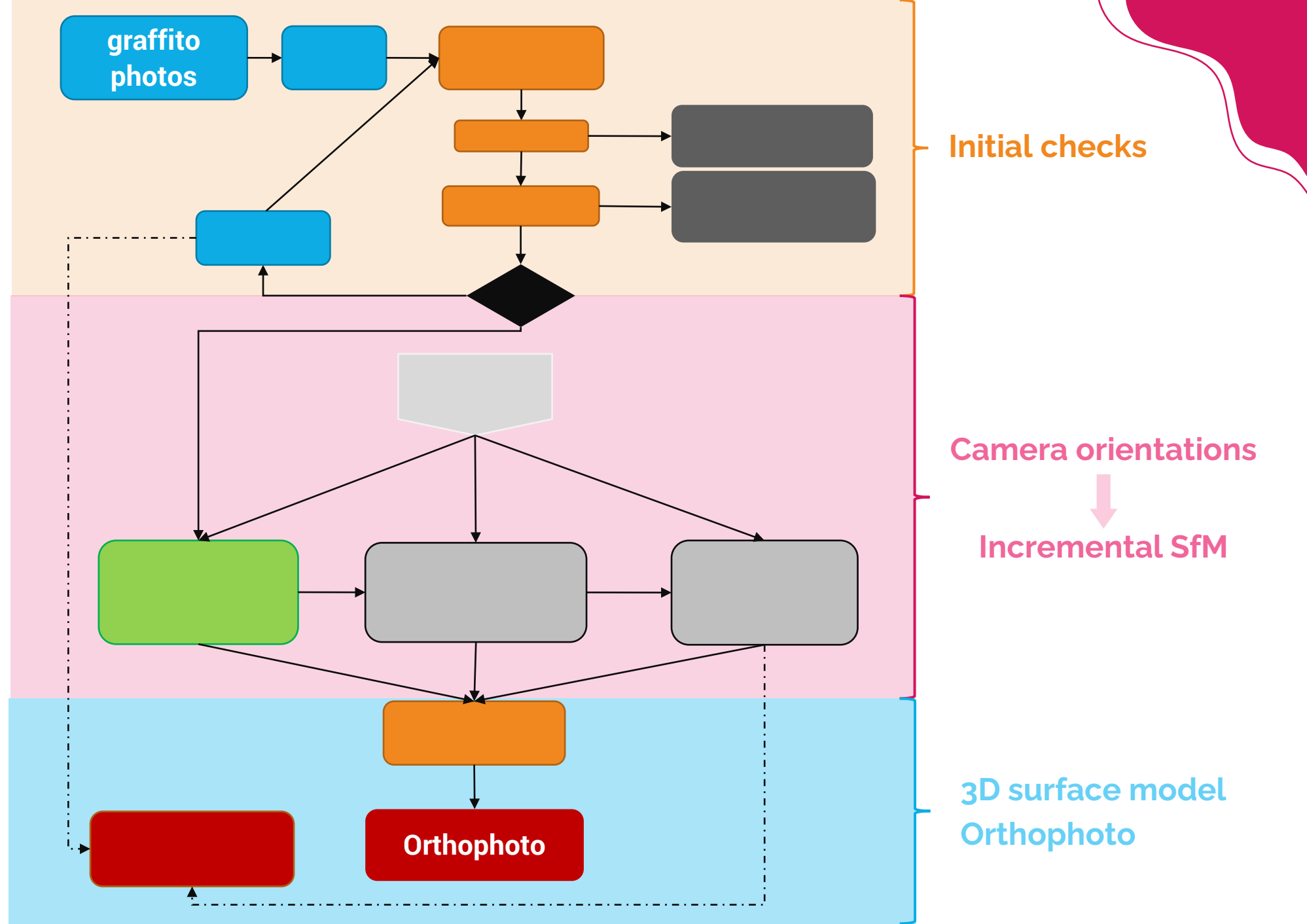
Languages

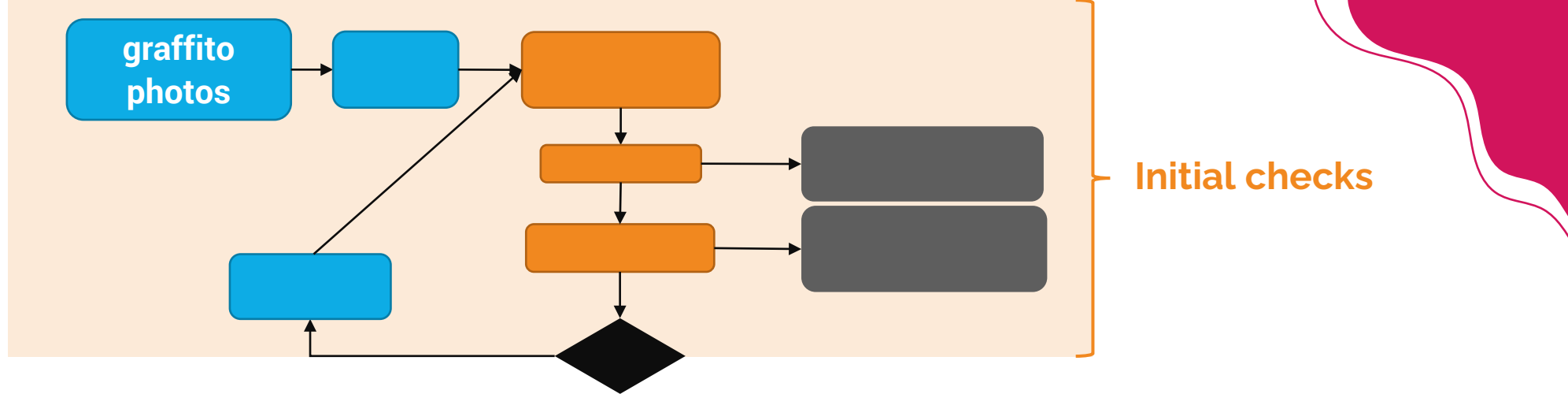
- Python 100.0%

AUTOGRAF

position-accurate pixels







INDIGO_2021-12-28_Z7II-B_0292.jpg



INDIGO_2021-12-28_Z7II-B_0293.jpg



INDIGO_2021-12-28_Z7II-B_0294 - Copy.jpg



INDIGO_2021-12-28_Z7II-B_0294.jpg



INDIGO_2021-12-28_Z7II-B_0295.jpg



INDIGO_2021-12-28_Z7II-B_0296.jpg



INDIGO_2021-12-28_Z7II-B_0296a.jpg



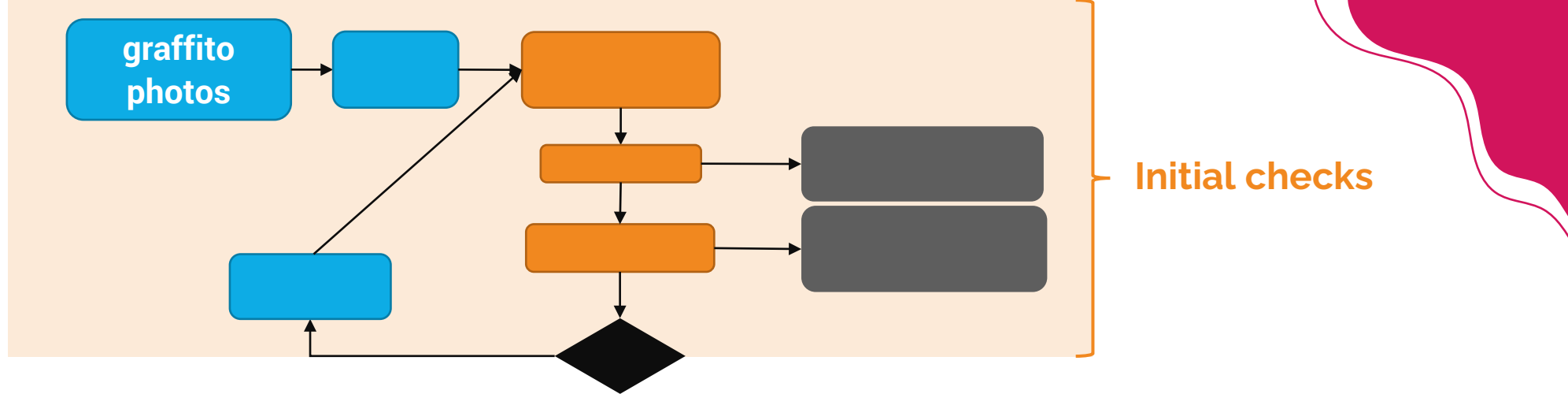
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INDIGO_2021-12-28_Z7II-B_0298.jpg



INDIGO_2021-12-28_Z7II-B_0300.jpg



INDIGO_2021-12-28_Z7II-B_0292.jpg



INDIGO_2021-12-28_Z7II-B_0293.jpg



INDIGO_2021-12-28_Z7II-B_0294 - Copy.jpg



INDIGO_2021-12-28_Z7II-B_0294.jpg



INDIGO_2021-12-28_Z7II-B_0295.jpg



INDIGO_2021-12-28_Z7II-B_0296.jpg



INDIGO_2021-12-28_Z7II-B_0296a.jpg



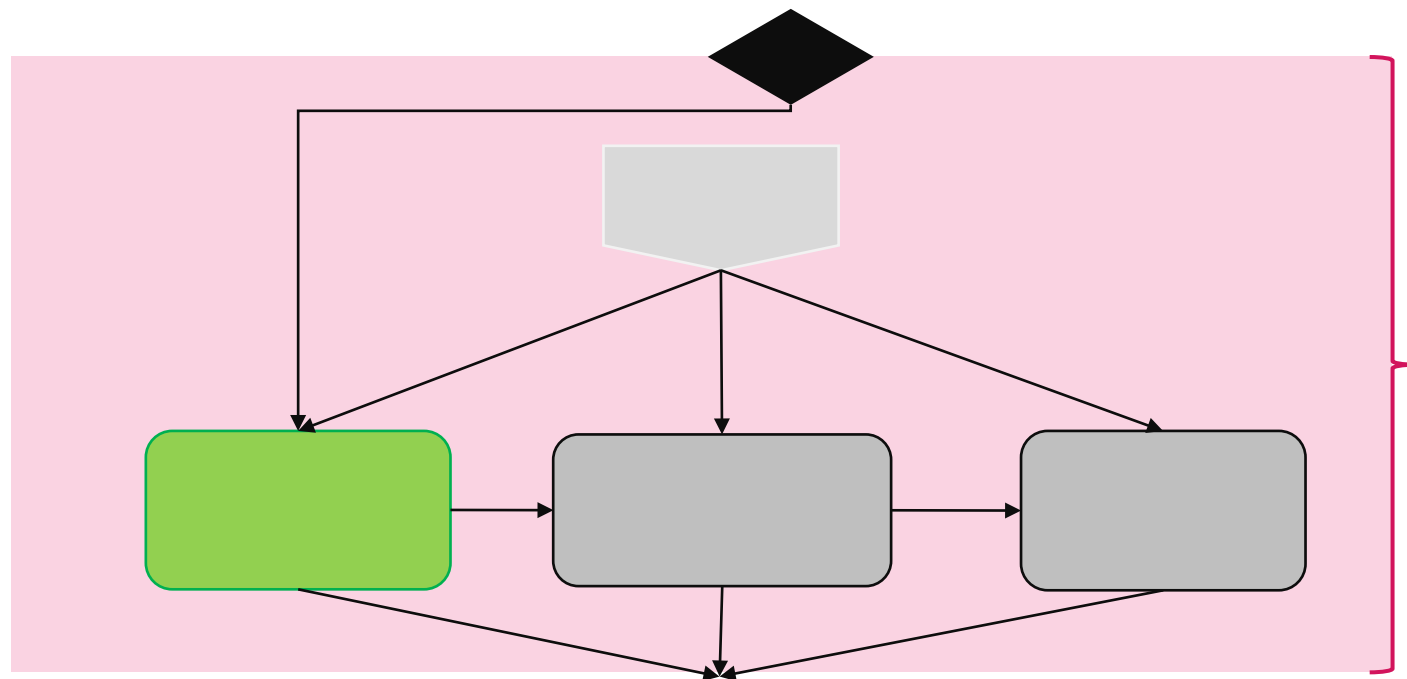
INDIGO_2021-12-28_Z7II-B_0297.jpg



INDIGO_2021-12-28_Z7II-B_0298.jpg



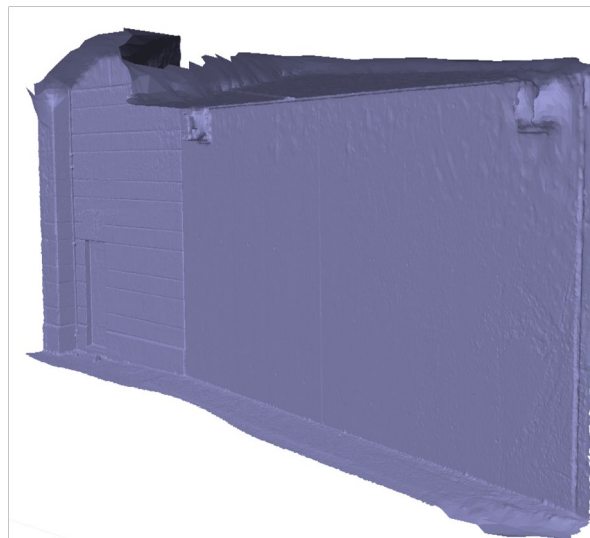
INDIGO_2021-12-28_Z7II-B_0300.jpg



Camera orientations



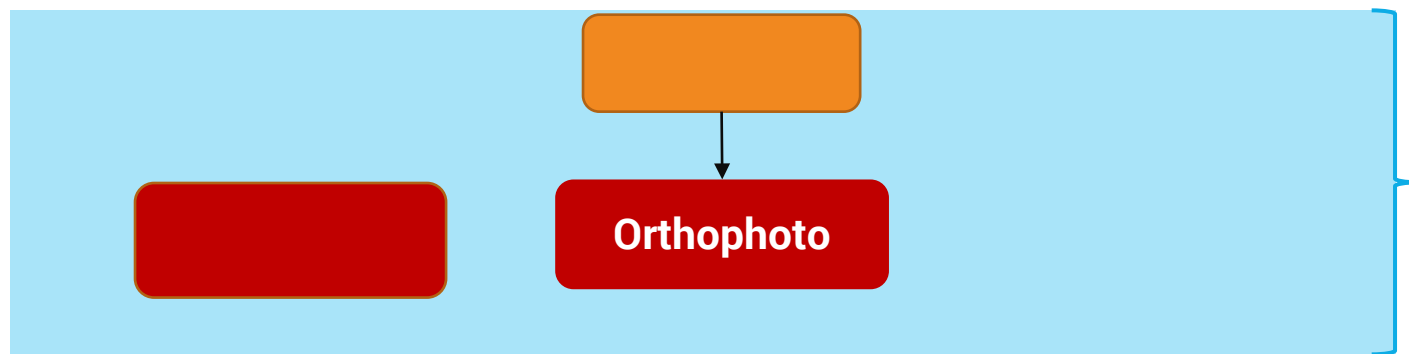
Incremental SfM



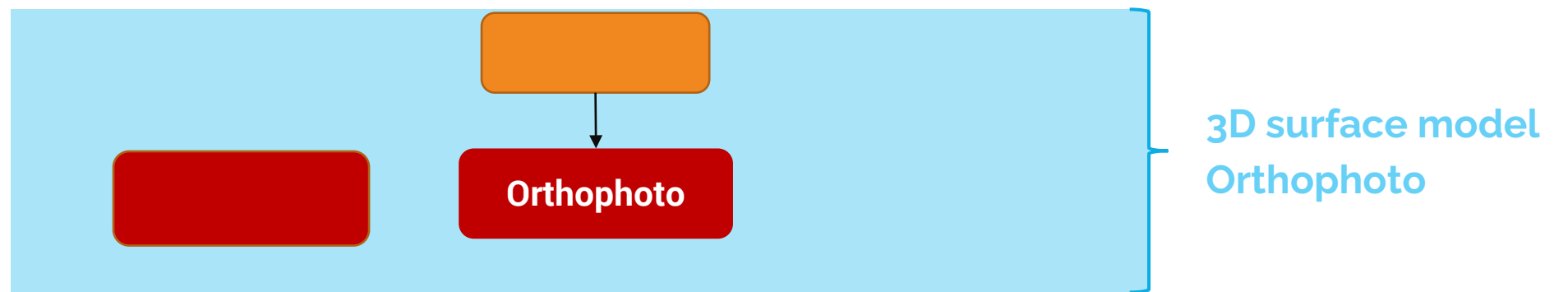
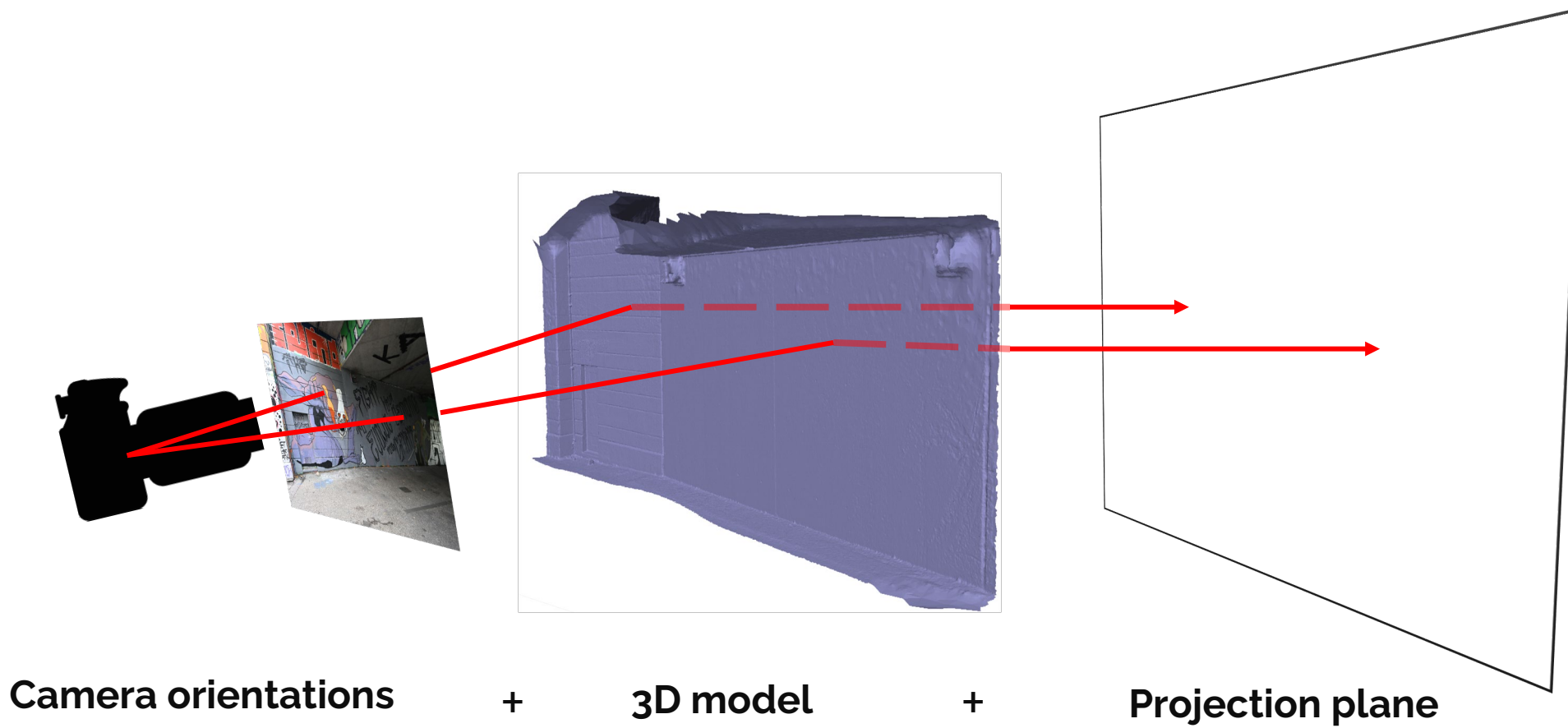
Camera orientations

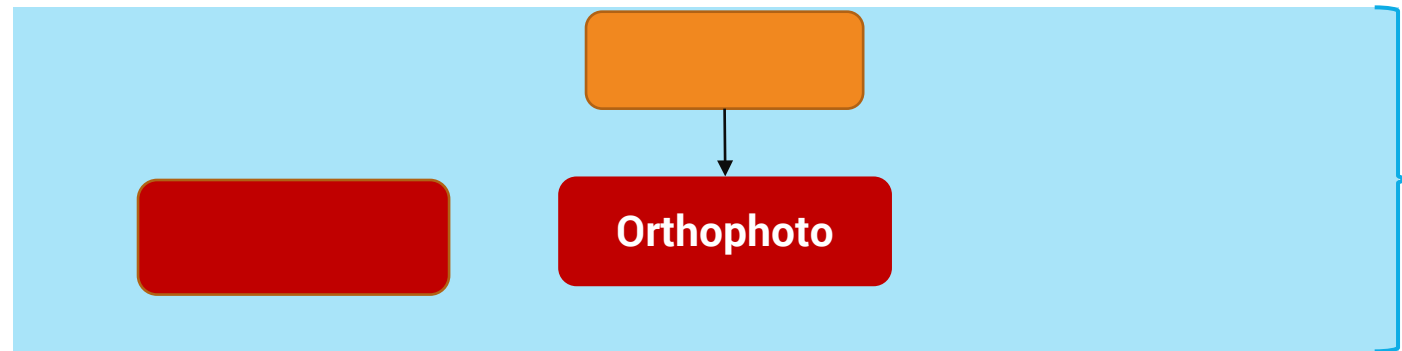
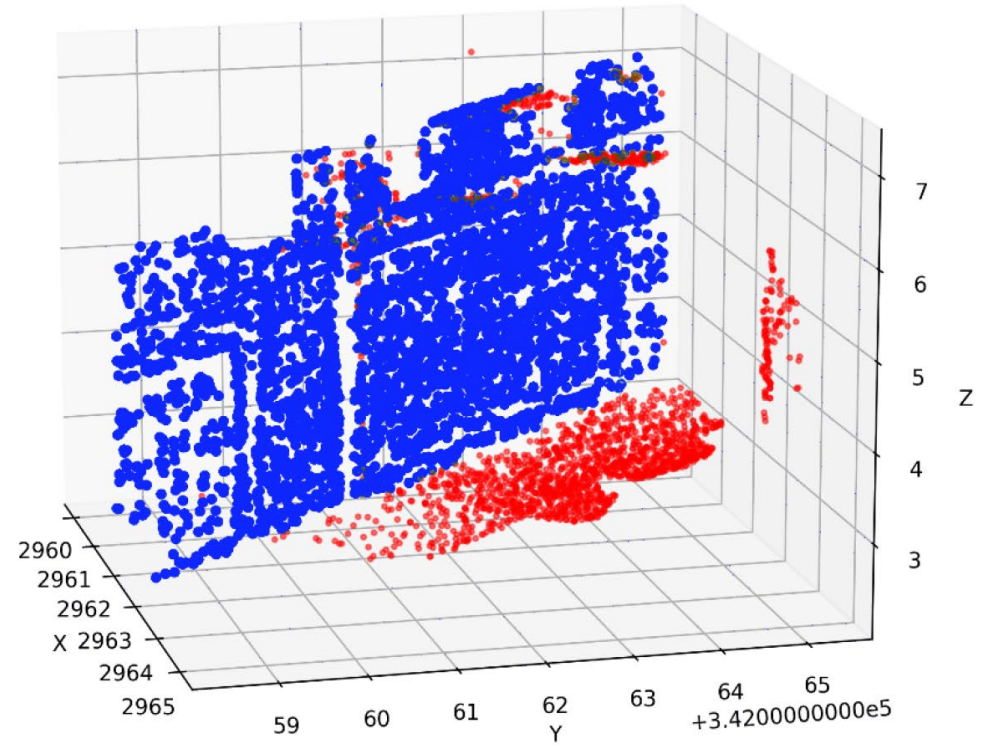
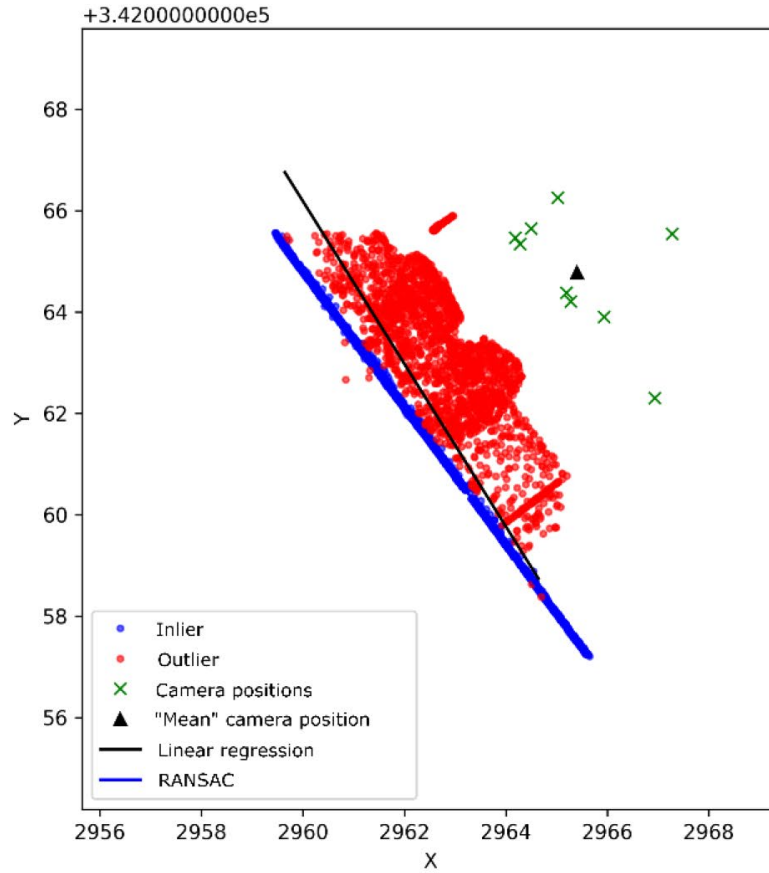
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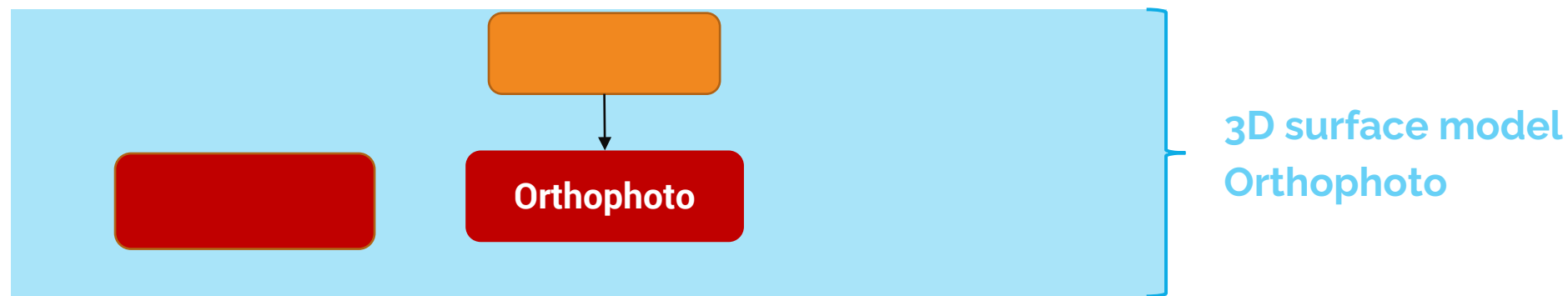
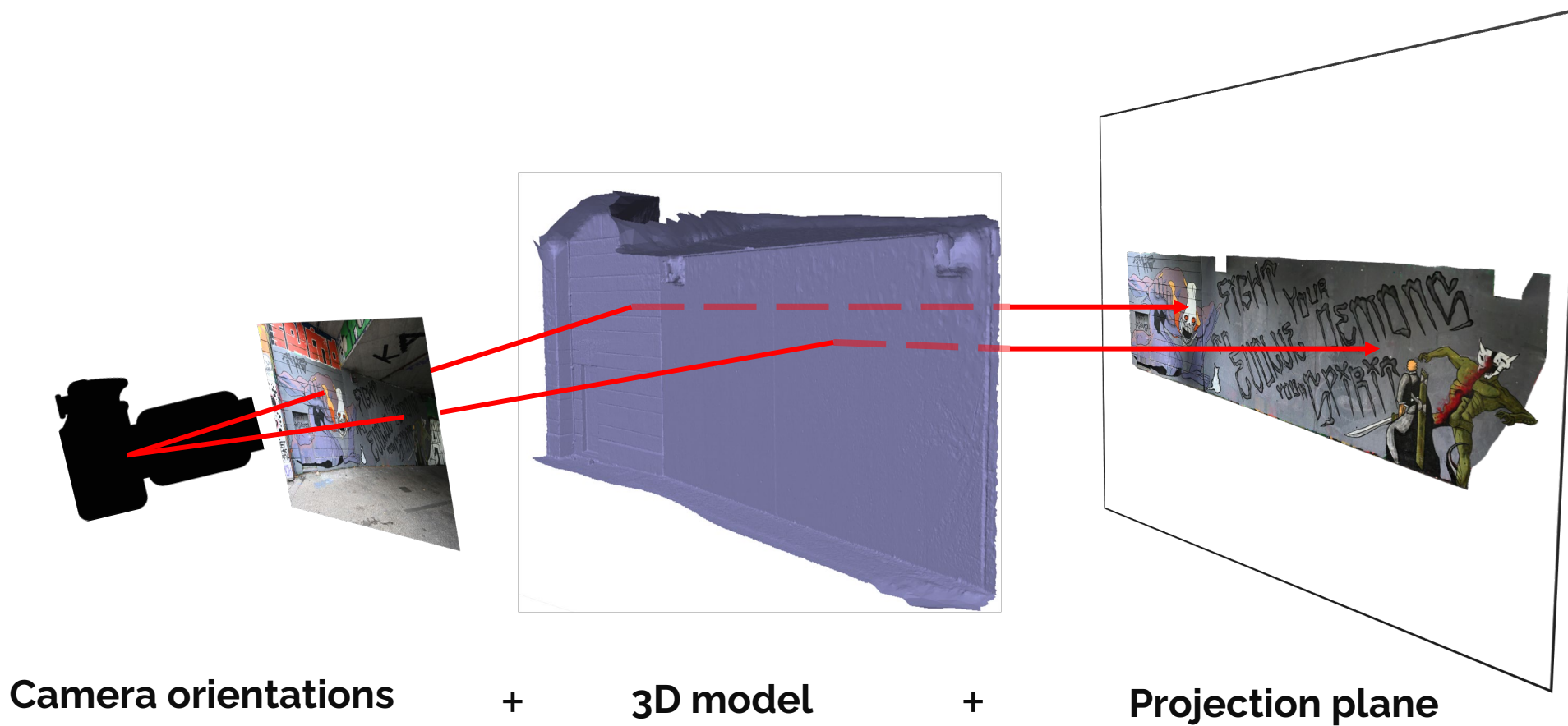
3D model



3D surface model
Orthophoto









AUTOGRAF

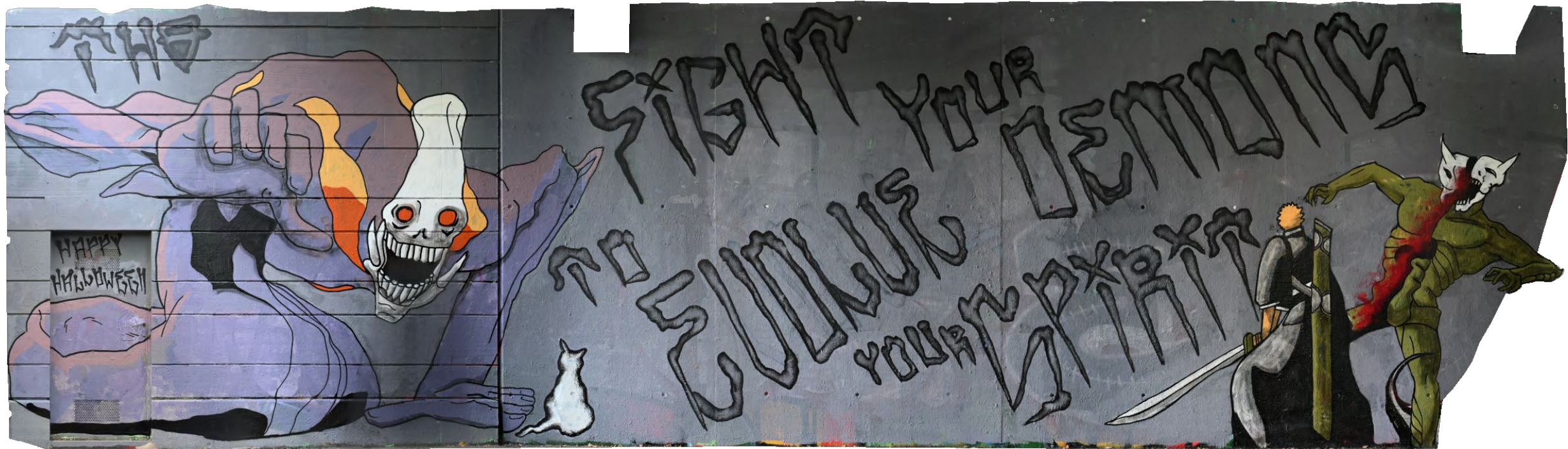
position-accurate pixels



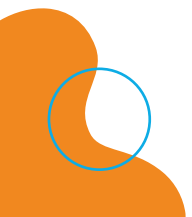
AUTOGRAF

AUTOGRAF

position-accurate pixels



GRAFFITI monitoring



GRAFFITI monitoring

BASEMAP

ESRI ArcGIS Field Maps
areas with overview photos
cloud-based | tablets



GRAFFITI **monitoring**

BASEMAP

ESRI ArcGIS Field Maps
areas with overview photos
cloud-based | tablets



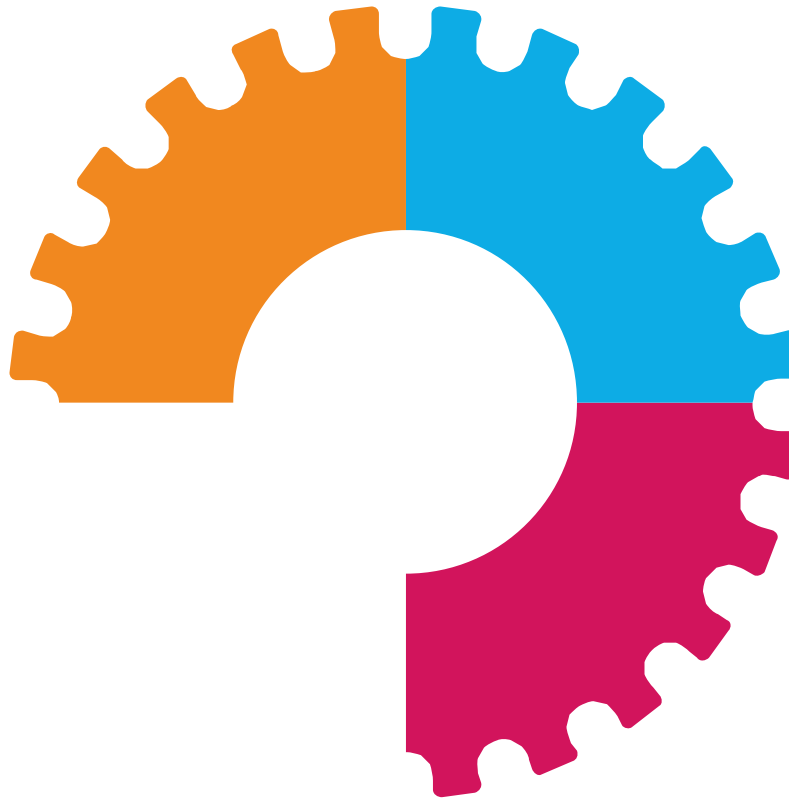
MONITOR

check social media
memory
hashtags + form (unused)

GRAFFITI **monitoring**

BASEMAP

ESRI ArcGIS Field Maps
areas with overview photos
cloud-based | tablets



MONITOR

check social media
memory
hashtags + form (unused)

ADD TO APP

point: "not photographed"

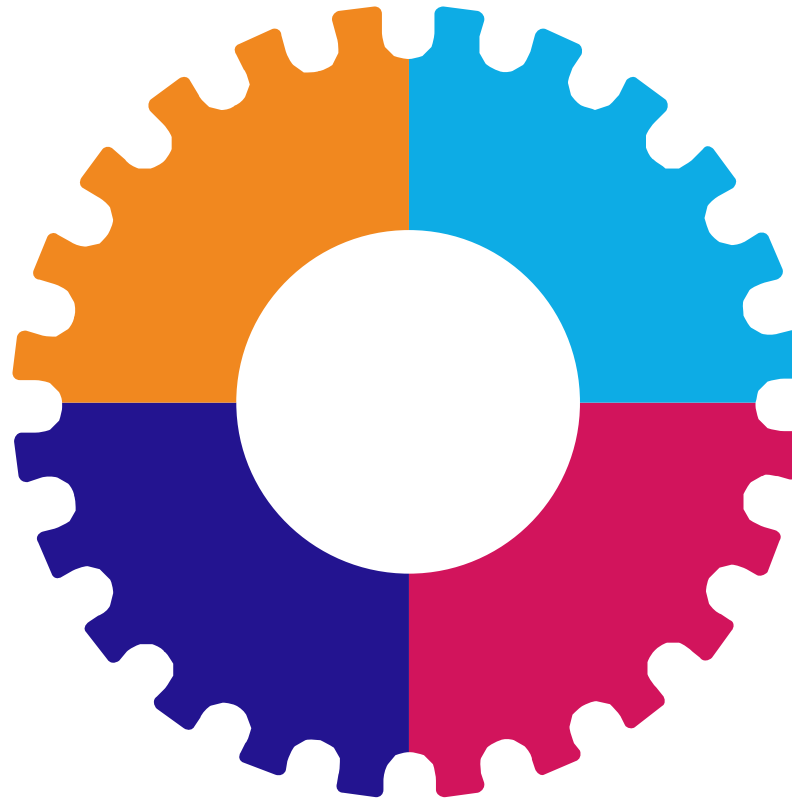
GRAFFITI **monitoring**

BASEMAP

ESRI ArcGIS Field Maps
areas with overview photos
cloud-based | tablets

DOCUMENT

± 10 photos
spectrometer reading
change status point
new overview photo



MONITOR

check social media
memory
hashtags + form (unused)

ADD TO APP

point: "not photographed"



CHANGE **detection**



CHANGE **detection**

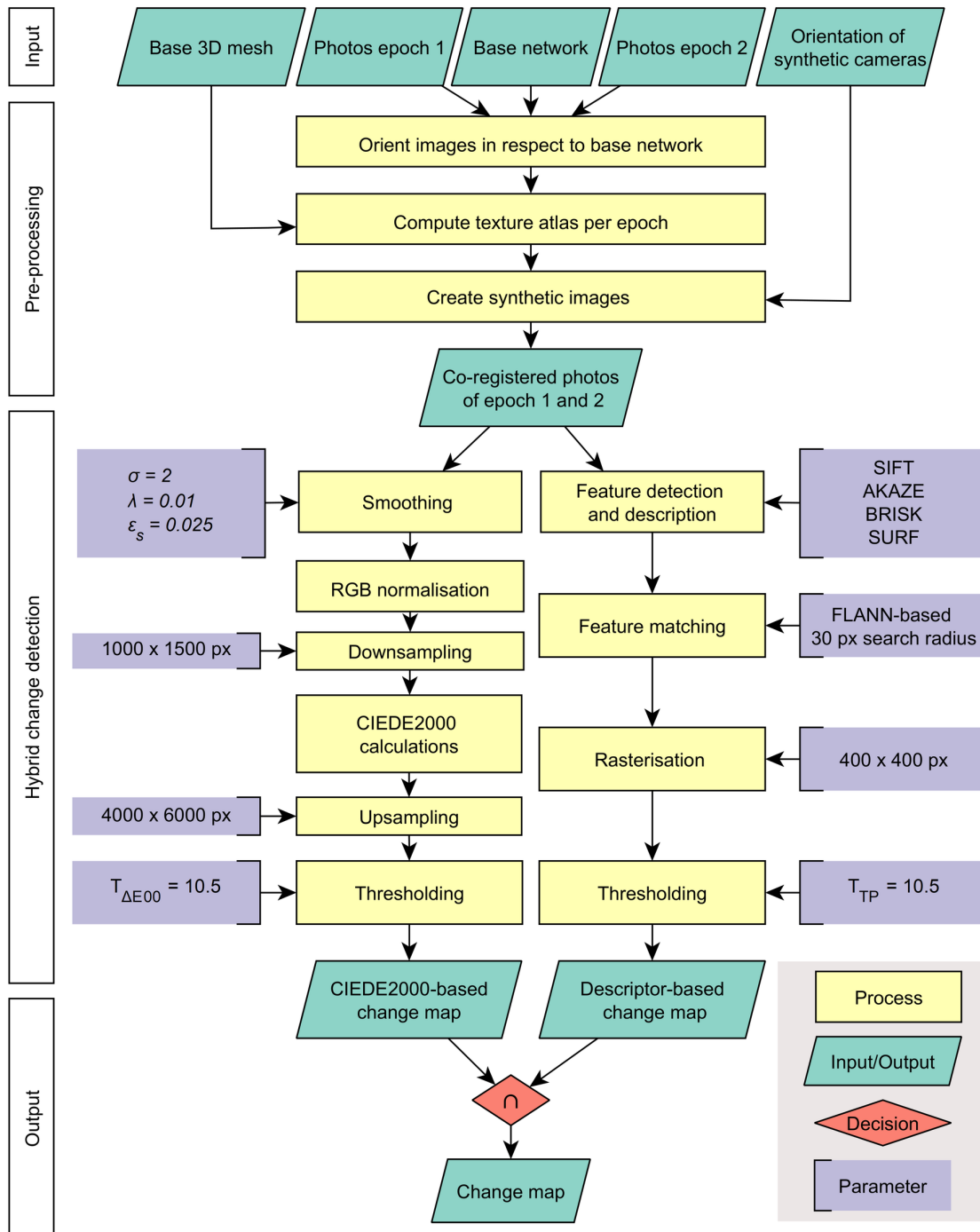


CHANGE
detection



CHANGE
detection





CHANGE detection



CHANGE detection



CHANGE detection



CHANGE detection



CHANGE detection





CHANGE detection





CHANGE detection

Published October 11, 2023 | Version 1.0.0

Dataset Open

INDIGO Change Detection Reference Dataset

Wild, Benjamin¹ ; Verhoeven, Geert² ; Muszyński, Rafał³ ; Pfeifer, Norbert¹

Show affiliations

Citation

Style APA

Wild, B., Verhoeven, G., Muszyński, R., & Pfeifer, N. (2023). INDIGO Change Detection Reference Dataset (1.0.0) [Data set]. TU Wien. <https://doi.org/10.48436/ajj4e-v4864>



Description

The INDIGO Change Detection Reference Dataset

Description

This graffiti-centred change detection dataset was developed in the context of [INDIGO](#), a research project focusing on the documentation, analysis and dissemination of graffiti along Vienna's Donaukanal. The dataset aims to support the development and assessment of change detection algorithms.

The dataset was collected from a test site approximately 50 meters in length along Vienna's Donaukanal during 11 days between 2022/10/21 and 2022/12/01. Various cameras with different settings were used, resulting in a total of 29 data collection sessions or "epochs" (see "EpochIDs.jpg" for details). Each epoch contains 17 images generated from 29 distinct 3D models with different textures. In total, the dataset comprises 6,902 unique image pairs, along with corresponding reference change maps. Additionally, exclusion masks are provided to ignore parts of the scene that might be irrelevant, such as the background.

COLLECTED photos



COLLECTED photos



TOTAL
COVERAGE

2

COLLECTED **photos**



TOTAL
COVERAGE

2

TC PHOTOS

26.7 k

42.0 k

COLLECTED **photos**



TOTAL
COVERAGE

2

FOLLOW-UP

106

TC PHOTOS

26.7 k

42.0 k

COLLECTED **photos**



TOTAL
COVERAGE

2

FOLLOW-UP

106

TC PHOTOS

26.7 k

42.0 k

FU PHOTOS

94.6 k

SOME results

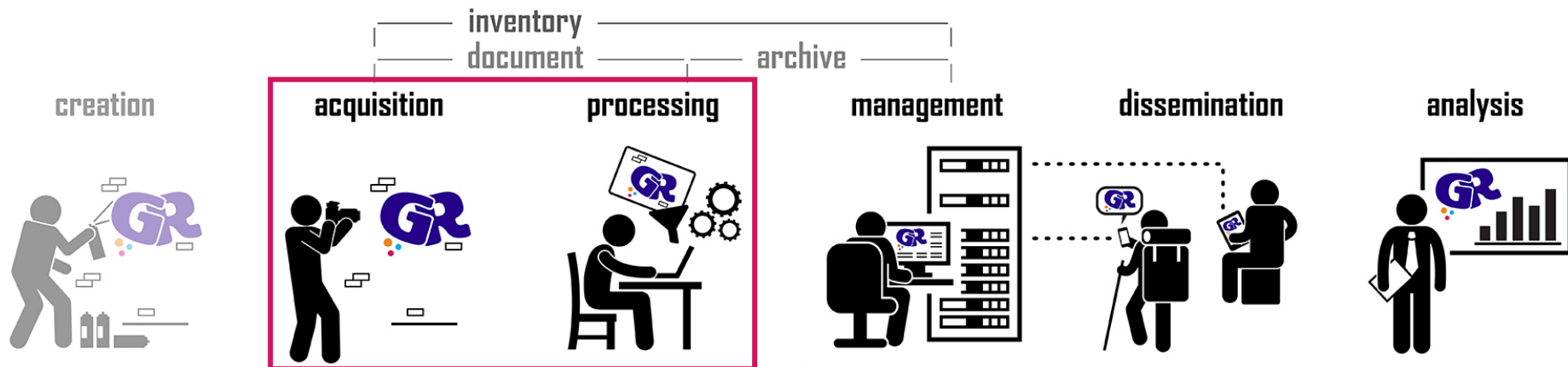
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars



SOME results

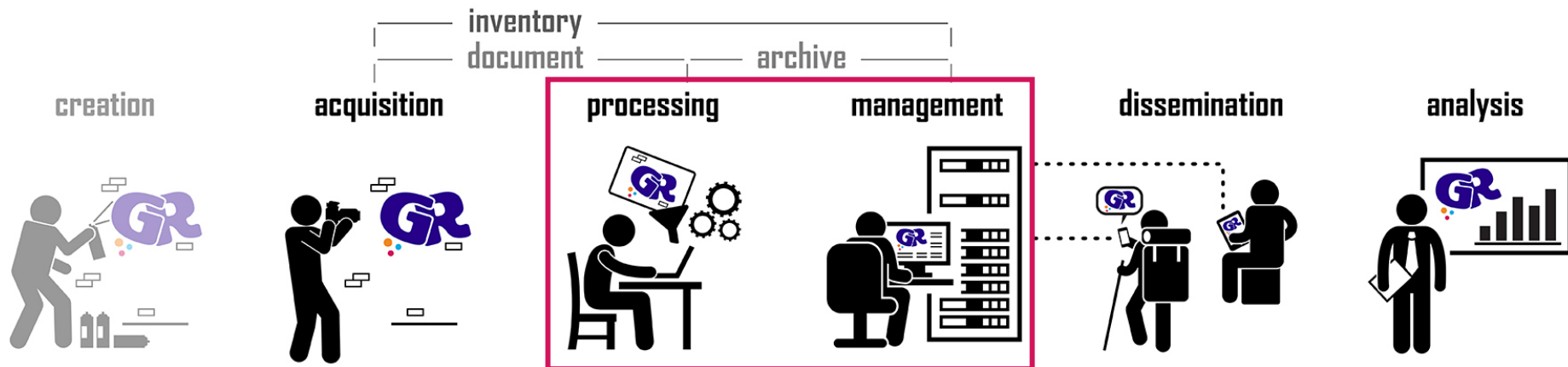
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars



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



MOMENTS of creation

date + time



© Sophie Hay



16 June 2023 @ 10:25 CET



date + time

MOMENTS of creation

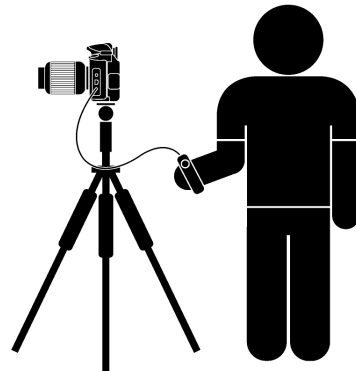
creation event
date + time



© Sophie Hay



16 June 2023 @ 10:25 CET



date + time
creation event

MOMENTS of creation

photo | graffiti
creation event
date + time



© Sophie Hay



16 June 2023 @ 10:25 CET



date + time
creation event
photo | graffiti

MOMENTS of creation

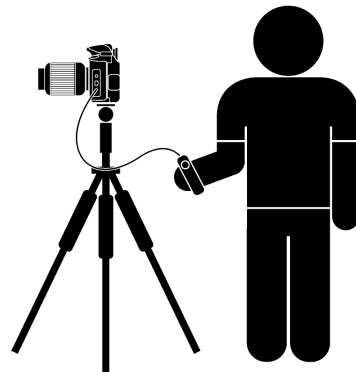
photo | graffiti
creation event
date + time



© Sophie Hay



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

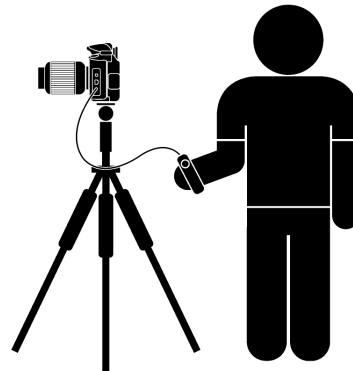


between AD 41 & AD 79



12 days \pm 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 \pm 19 years



12 days \pm 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 | graffiti
creation event
date + time



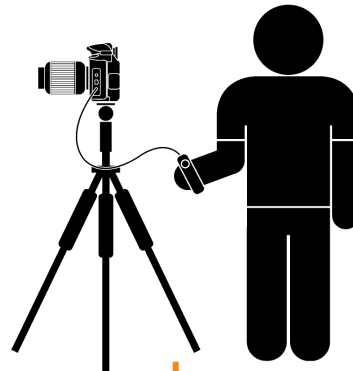
between AD 41 & AD 79

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 | graffiti
related to temporal fuzziness

MOMENTS of creation

*extended
temporal uncertainty*

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



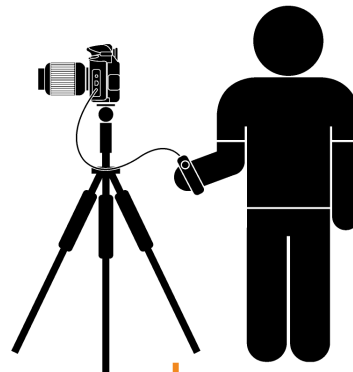
between AD 41 & AD 79

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 | graffiti
related to temporal fuzziness*

temporal uncertainty
narrow

MOMENTS of creation

visibility (interrupted)
extended
temporal uncertainty

related to temporal fuzziness
photo | graffiti
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 | graffiti
related to temporal fuzziness

temporal uncertainty
narrow
visibility

INDIGO METADATA

real graffito
vs
digital derivatives

MOMENTS of creation

visibility (interrupted)
extended
temporal uncertainty

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



© Sophie Hay

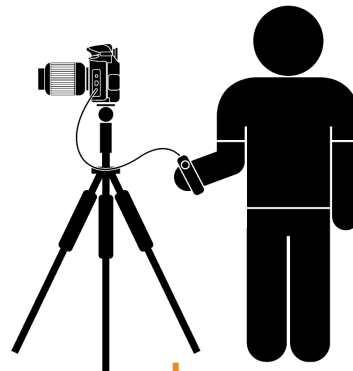
between AD 41 & AD 79

1963 years \pm 19 years

12 days \pm 2 days



16 June 2023 @ 10:25 CET



between 02 & 06 June 2023

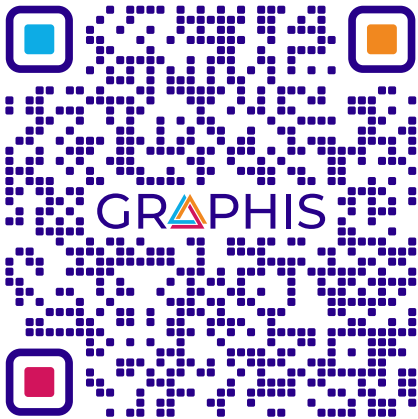


date + time
creation event
photo | graffito
~~related to temporal fuzziness~~

temporal uncertainty
narrow
visibility

CREATING location

GRAPHIS



CREATING location

Database statistics

Nr. of images

1

Circles

0

Rectangles

0

Polygons

0

Region appearance

C

C

C

✓

✓

✓

Region operations

○

□

⬠

↕

✂

✖

Welcome GEERT VERHOEVEN.

Enjoy working with GRAPHIS

New database was created:

PolygonTest.sqlite

Importing images

Start to import 1 images

?

📁

INDIGO_2023-04-12_Z7ii-B_0685.jpg

F:\Projects\Projects_LBIArchPro\INDIGO\Supplementary\WP 18-Symposium_2\03Presentations\Day3_20230618\SessionG\g oINDIGO2023_VerhoevenAndSchlegel_SpatioTemporal\Figures\INDIGO_2023-04-12_Z7ii-B_0685.jpg

User information

Name

Geert Verhoeven

Identifier

0000-0003-4825-9604

Change region info

View region info

All region info

Region

Region Identifier

Region Name

Region Role

Identifier

Name

cropping

Region Content Type

Identifier

Name

Region Creator

Description

Transcription

Identifier

Name

Role

GRAPHIS @ INDIGO 2023 - <https://projectindigo.eu>

2.1.2

GRAPHIS

CREATING location

MENU

Database statistics

Nr. of images1

Circles0

Rectangles0

Polygons1

Region appearance

C

C

C

✓

✓

✓

Region operations

○

□

⬡

↔

⌂

✖

Welcome GEERT VERHOEVEN.

Enjoy working with GRAPHIS

New database was created:

PolygonTest.sqlite

Importing images

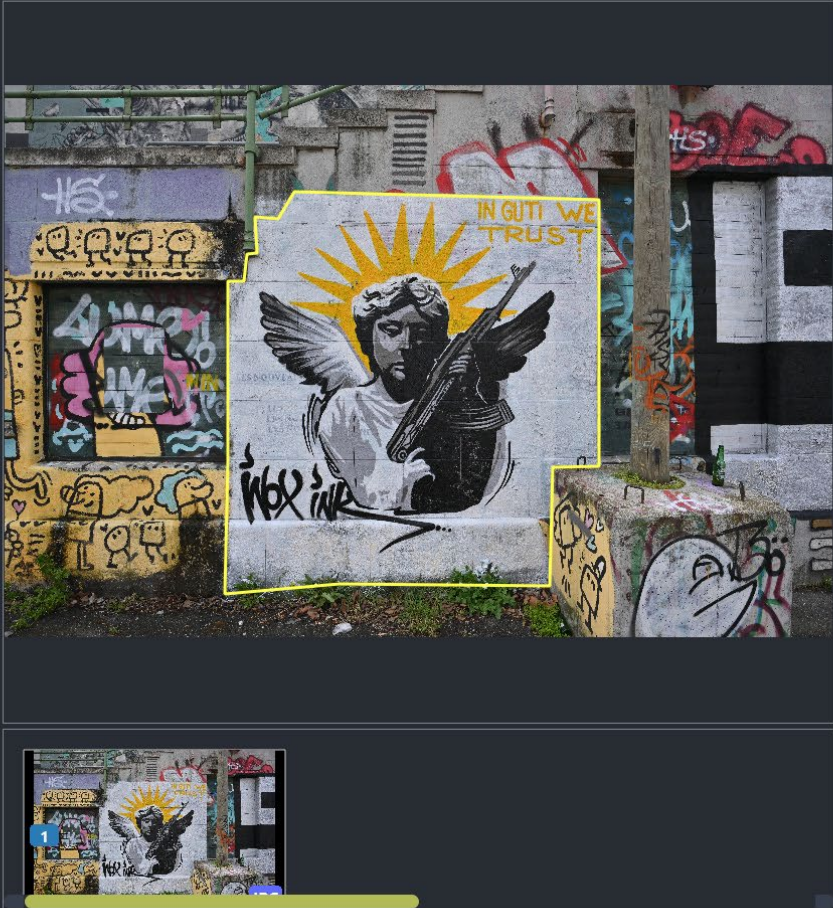
Start to import 1 images

?

⌂

INDIGO_2023-04-12_Z7ii-B_0685.jpg

F:\Projects\Projects_LBIArchPro\INDIGO\Supplementary\WP18-Symposium_2\03Presentations\Day3_20230618\SessionG\g oINDIGO2023_VerhoevenAndSchlegel_SpatioTemporal\Figures\INDIGO_2023-04-12_Z7ii-B_0685.jpg



User information

NameGeert Verhoeven

Identifier0000-0003-4825-9604

Change region infoView region infoAll region info

Region

Region IdentifierINDIGO_20230412_G0001

Region Namegraffito

Region Role

Identifierhttps://vocabs.acdh.oew.ac.at/graphis-imgreg/mainSubjectArea

Namemain subject area

Region Content Type

Identifierhttps://vocabs.acdh.oew.ac.at/graphis-imgreg/graffiti

Namedgraffito

Region Creator

Description

Transcription

Identifier0000-0003-4825-9604

NameGeert Verhoeven

Rolehttps://vocabs.acdh.oew.ac.at/graphis-imgreg/imgRegCreator

GRAPHIS @ INDIGO 2023 - <https://projectindigo.eu>

2.1.2

GRAPHIS

2D polygon (pixel coordinates)

CREATING location

MENU

Database statistics

Nr. of images1

Circles0

Rectangles0

Polygons1

Region appearance

C

C

C

✓

✓

✓

Region operations

○

□

⬡

↕

⌂

✖

Welcome GEERT VERHOEVEN.

Enjoy working with GRAPHIS

New database was created:

PolygonTest.sqlite

Importing images

Start to import 1 images

?

⌂

INDIGO_2023-04-12_Z7ii-B_0685.jpg

F:\Projects\Projects_LBIArchPro\INDIGO\Supplementary\WP18-Symposium_2\03Presentations\Day3_20230618\SessionG\g
oINDIGO2023_VerhoevenAndSchlegel_SpatioTemporal\Figures\INDIGO_2023-04-12_Z7ii-B_0685.jpg

User information

NameGeert Verhoeven

Identifier0000-0003-4825-9604

Change region info

View region info

All region info

Region

Region IdentifierINDIGO_20230412_G0001

Region Namegraffito

Region Role

Identifierhttps://vocabs.acdh.oew.ac.at/graphis-imgreg/mainSubjectArea

Namemain subject area

Region Content Type

Identifierhttps://vocabs.acdh.oew.ac.at/graphis-imgreg/graffiti

Namedgraffito

Region Creator

Description

Transcription

Identifier0000-0003-4825-9604

NameGeert Verhoeven

Rolehttps://vocabs.acdh.oew.ac.at/graphis-imgreg/imgRegCreator

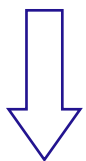
GRAPHIS @ INDIGO 2023 - <https://projectindigo.eu>

2.1.2

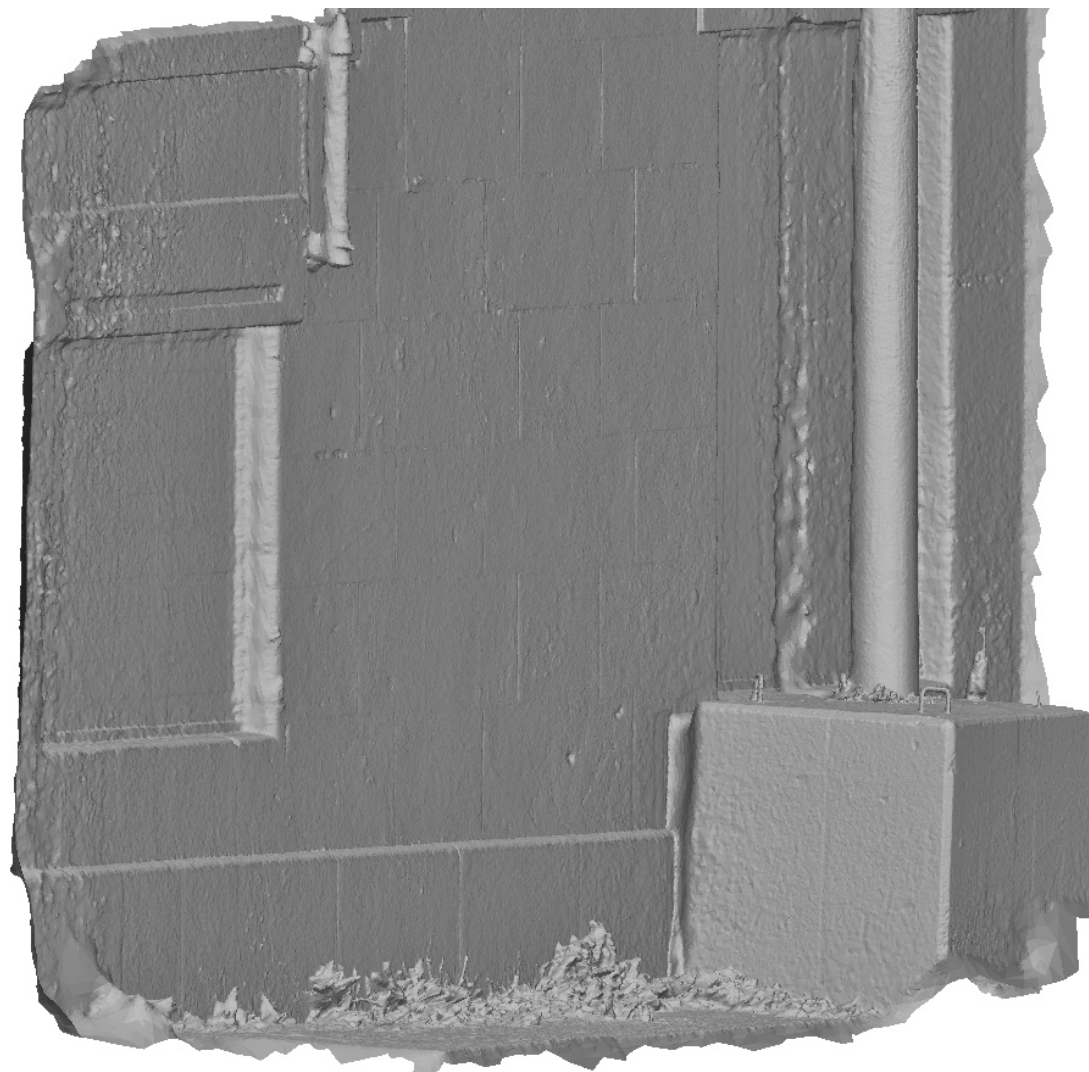
CREATING location

GRAPHIS

2D polygon (pixel coordinates)



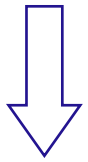
AUTOGRAF



CREATING location

GRAPHIS

2D polygon (pixel coordinates)



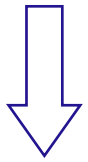
AUTOGRAF



CREATING location

GRAPHIS

2D polygon (pixel coordinates)



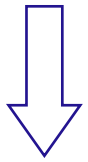
AUTOGRAF



CREATING location

GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

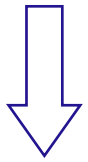
3D polyline (real-world coordinates)



CREATING location

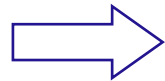
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polyline (real-world coordinates)

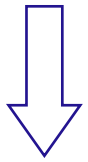


2D polygon (pseudo real-world coordinates)

CREATING location

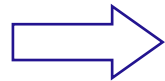
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polyline (real-world coordinates)



2D polygon (pseudo real-world coordinates)

?

STORING location

GRAPHIS
2D polygon (pixel coordinates)

AUTOGRAF
3D polyline (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

AUTOGRAF

3D polyline (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

3D polyline (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

3D polyline (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]
        ]
      ]
    }
  }
]
```

STORING **time**

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

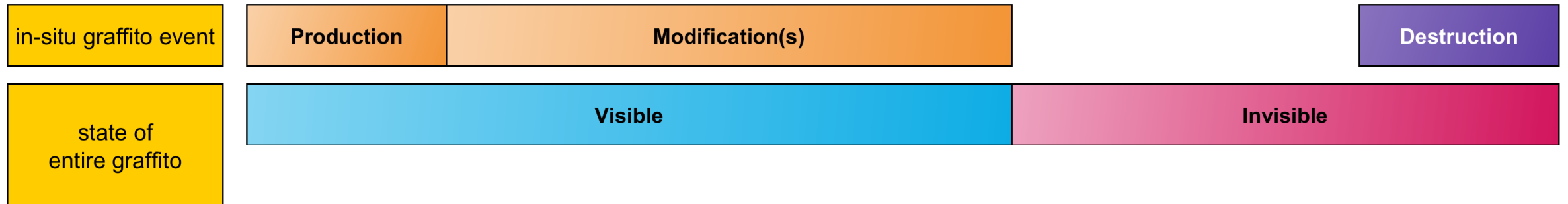
3D polyline (real-world coordinates)

```
"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]
        ]
      ]
    }
  }
]
```

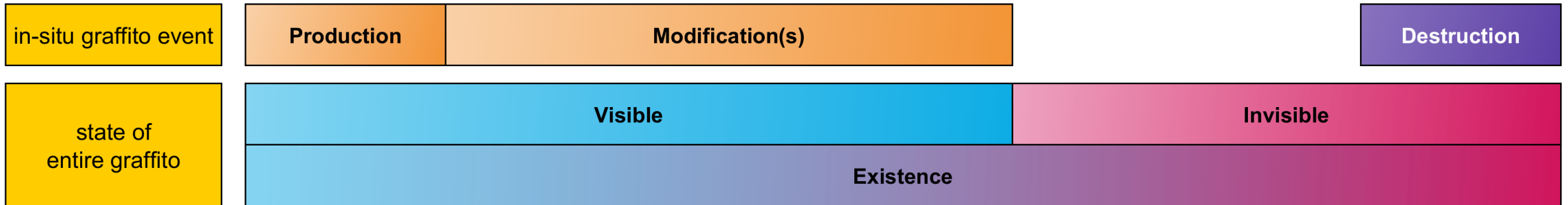

STORING **time**



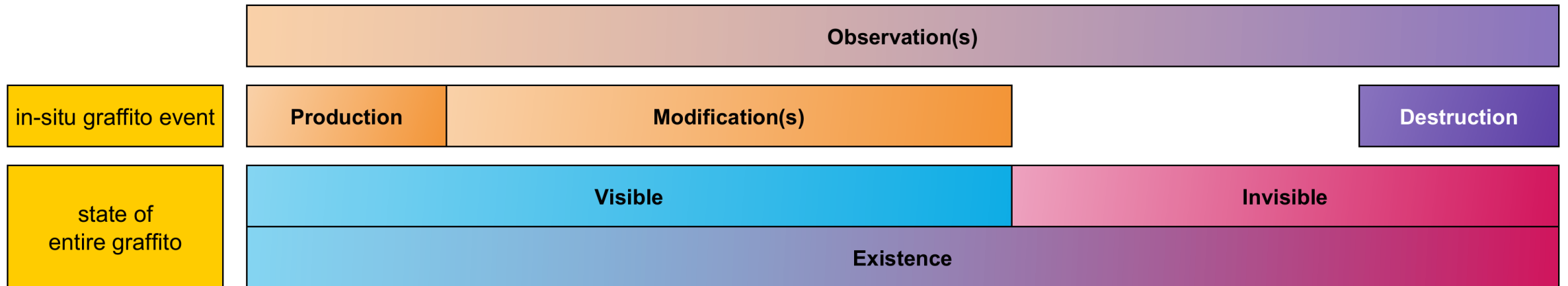
STORING **time**



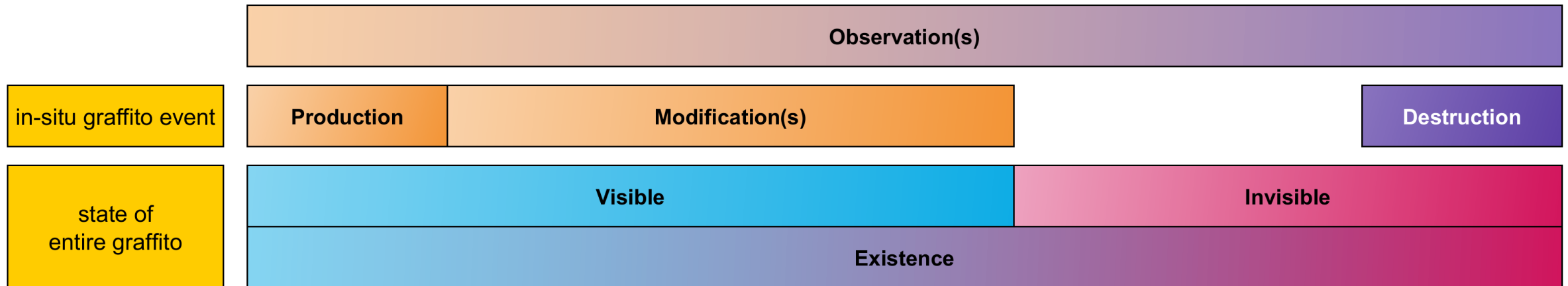
STORING **time**



STORING time



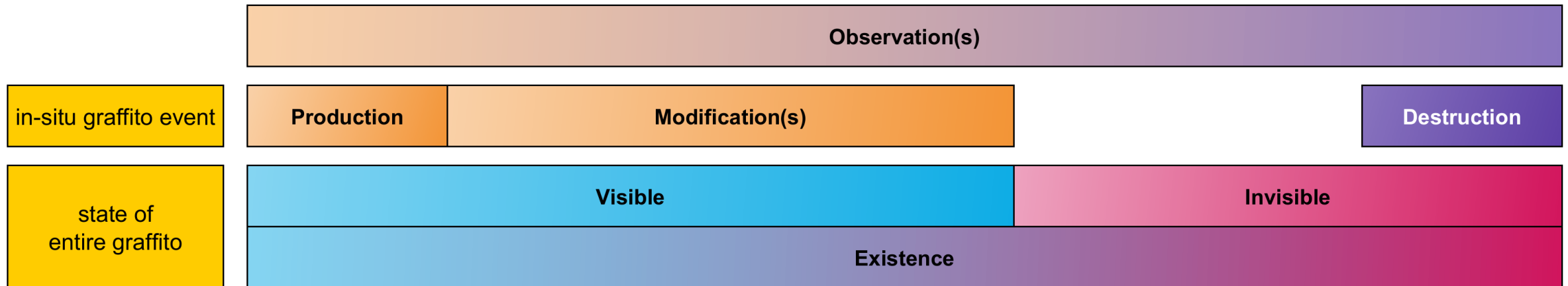
STORING **time**



```
"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": { ... }
```

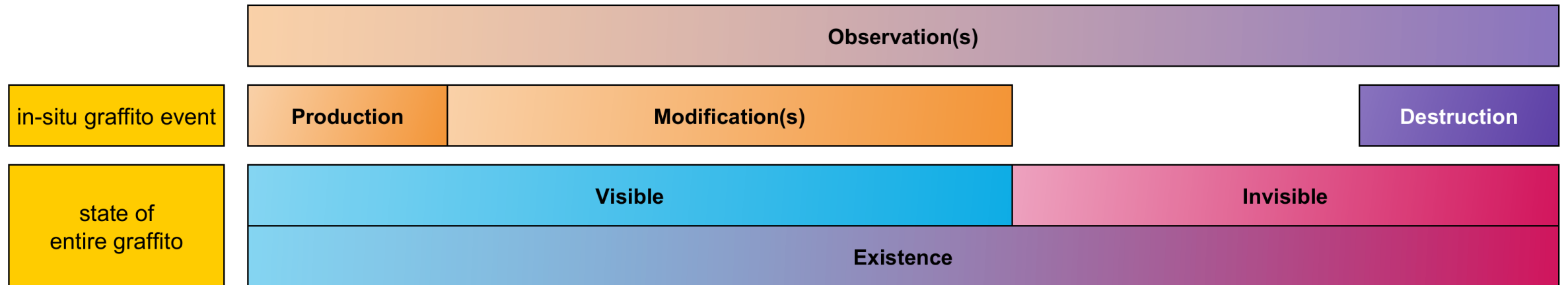
STORING **time**



```
"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": { ... },
```

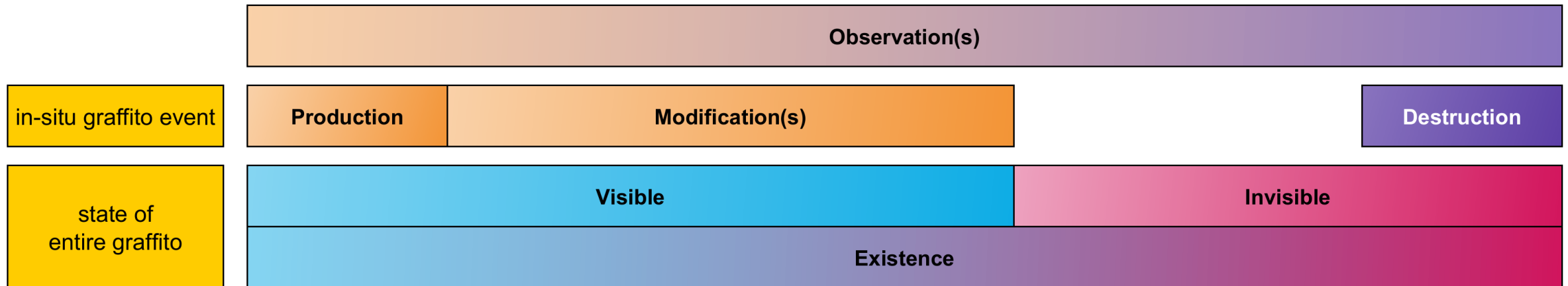
```
  "modification": [ ... ],
  "destruction": { ... },
  "visible": { ... },
  "invisible": { ... },
  "existence": { ... }
```


STORING **time**



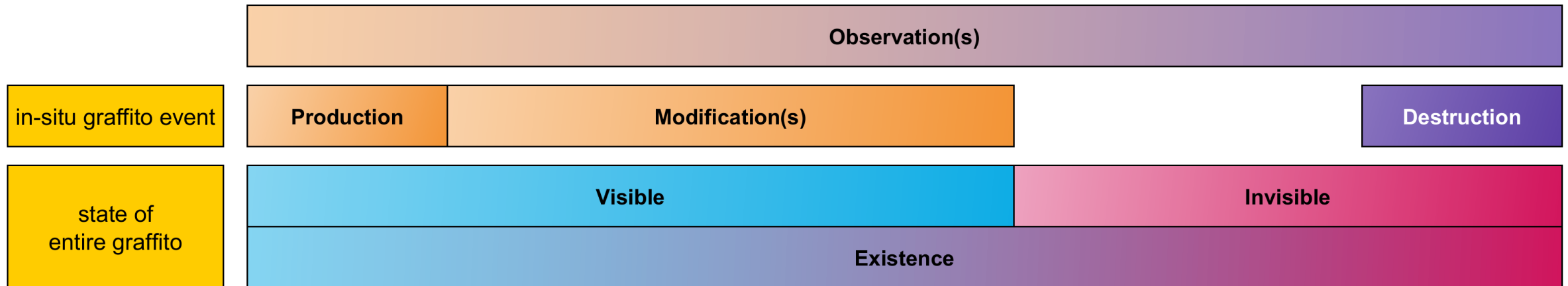
```
"visible": {  
  "start": {  
    "end": {  
      "span": {
```

STORING **time**



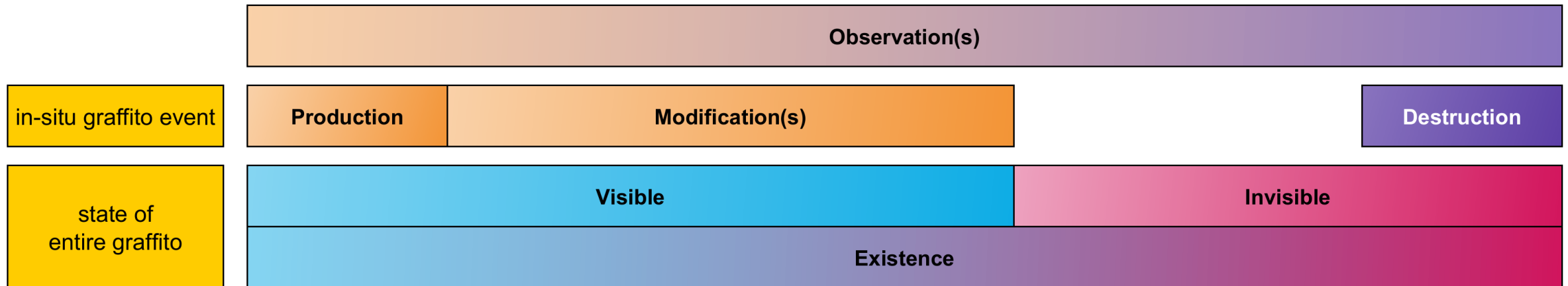
```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "span": {
```


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**

2022-09-05 10:20



2022-09-12 12:36



2022-09-14 09:45



2022-09-21 17:05



```
"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"  
  }  
}
```

SOME results

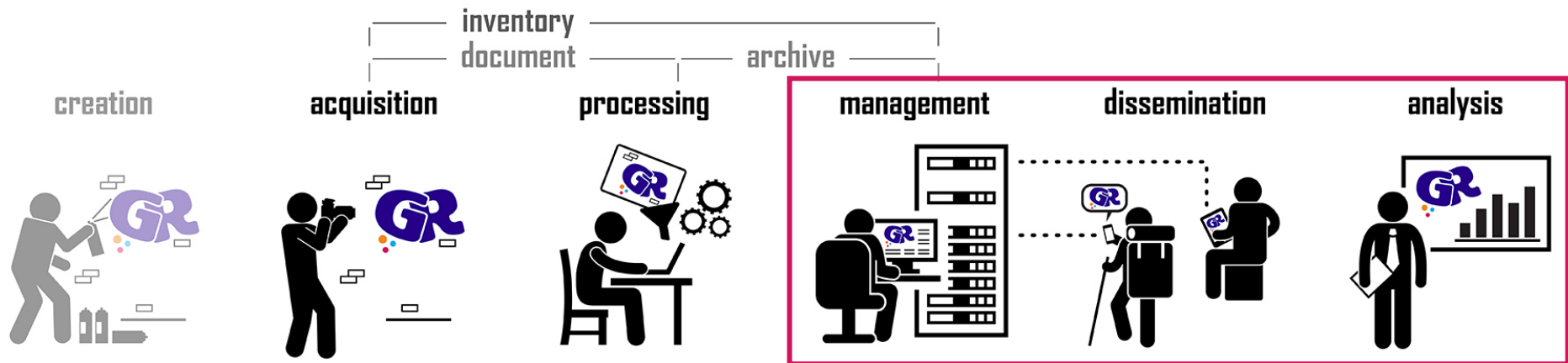
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI ***TERMINOLOGY***

GRAFFITI *CHARACTERISATION*

5
research
pillars



UNIFORM terminology

TERMINOLOGY & HIERARCHY



UNIFORM terminology

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?



UNIFORM terminology

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?



UNIFORM terminology

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?



UNIFORM terminology

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?

Graffiti
|___ Street Art



UNIFORM terminology

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?

Graffiti

|___ Street Art

Street Art

|___ Graffiti



UNIFORM terminology

TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?

Graffiti
|___ Street Art

Street Art
|___ Graffiti

Graffiti | Street Art



UNIFORM terminology

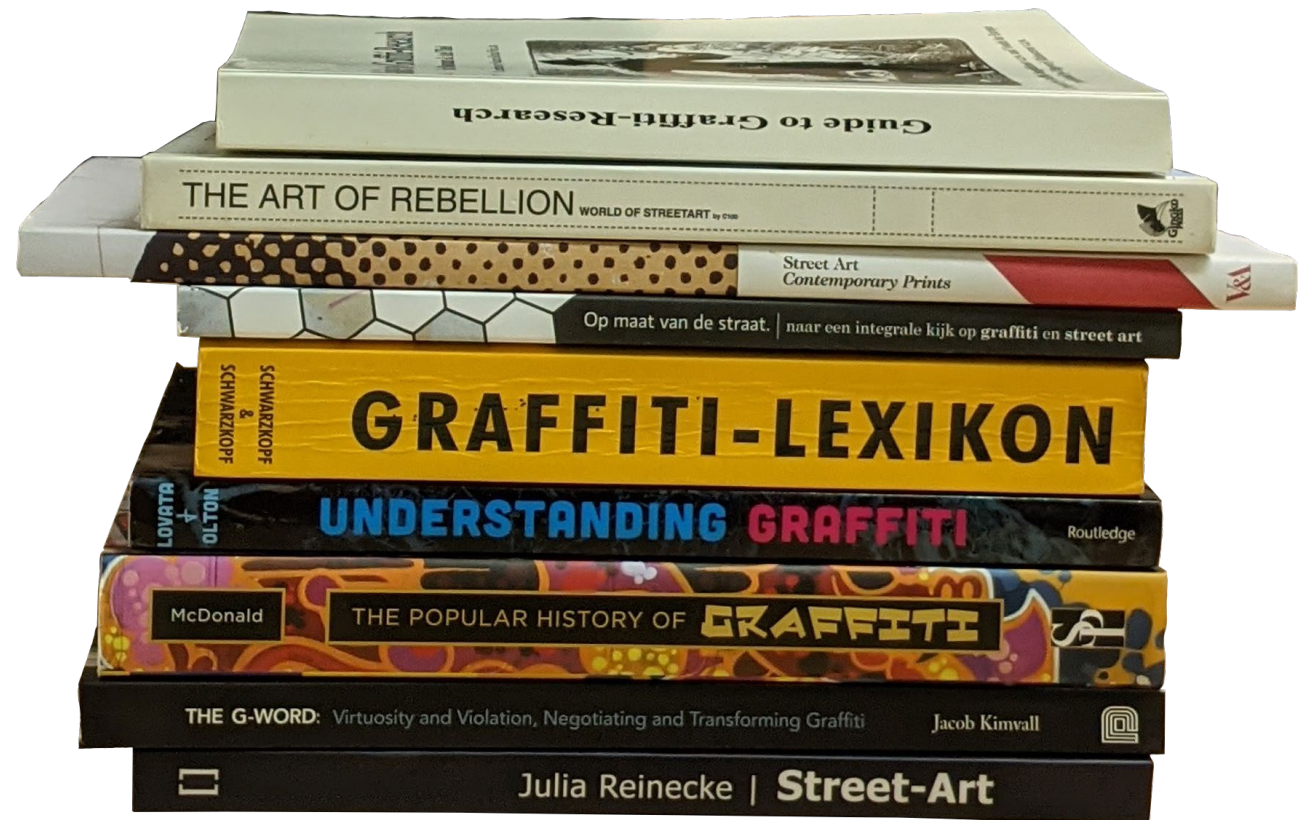
TERMINOLOGY & HIERARCHY

Graffiti ? Street Art ?


Graffiti
|___ Street Art

Street Art
|___ Graffiti

Graffiti | Street Art



GRAFFITI thesaurus

Vocabs

VocabulariesAboutEditorAPI

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INDIGO Graffiti Thesaurus

Content languageEnglish ▾

Search

AlphabeticalHierarchyGroups

Activities <facet>

- Physical and Mental Activities <hierarchy name>
- Processes and Techniques <hierarchy name>

Agents <facet>

- People <hierarchy name>

Associated Concepts <facet>

- Associated Concepts <hierarchy name>

Objects <facet>

- Built Environment <hierarchy name>
- Components <hierarchy name>
 - components (objects parts)
 - components by specific context <guide term>
- Visual and Verbal Communication <hierarchy name>

Physical Attributes <facet>

- Design Elements <hierarchy name>
 - design elements (attributes)
 - motifs
 - @ signs (motif)**
 - anarchy symbols
 - arrows (motif)
 - bubbles (motif)
 - clouds (motif)
 - cracks (motif)
 - crowns (motif)
 - drips (motif)
 - gender signs (motif)
 - glories
 - hearts (motif)
 - natural element motifs
 - smilies (graffiti)
 - swirls (motif)

Styles and Periods <facet>

Physical Attributes <facet> > Design Elements <hierarchy name> > design elements (attributes) > motifs > @ signs (motif)

PREFERRED TERM

@ signs (motif) 

BROADER CONCEPT

motifs

ENTRY TERMS

@
at
at-sign
at-signs
@ sign
@-sign
@-signs

BELONGS TO GROUP

sign and element

CREATOR

Jona Schlegel
Stefan Wogrin

EDITORIAL NOTE

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URI

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INDIGO Graffiti Thesaurus

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Hierarchy

Synonyms & preferred terms

GRAFFITI thesaurus


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Hierarchy

Synonyms & preferred terms

URI

Semantic Web

GRAFFITI thesaurus


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INDIGO Graffiti Thesaurus Content language English ▾ Search

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BROADER CONCEPT motifs

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Hierarchy

Synonyms & preferred terms

URI

Semantic Web

Structure → Getty Art & Architecture Thesaurus

SOME results

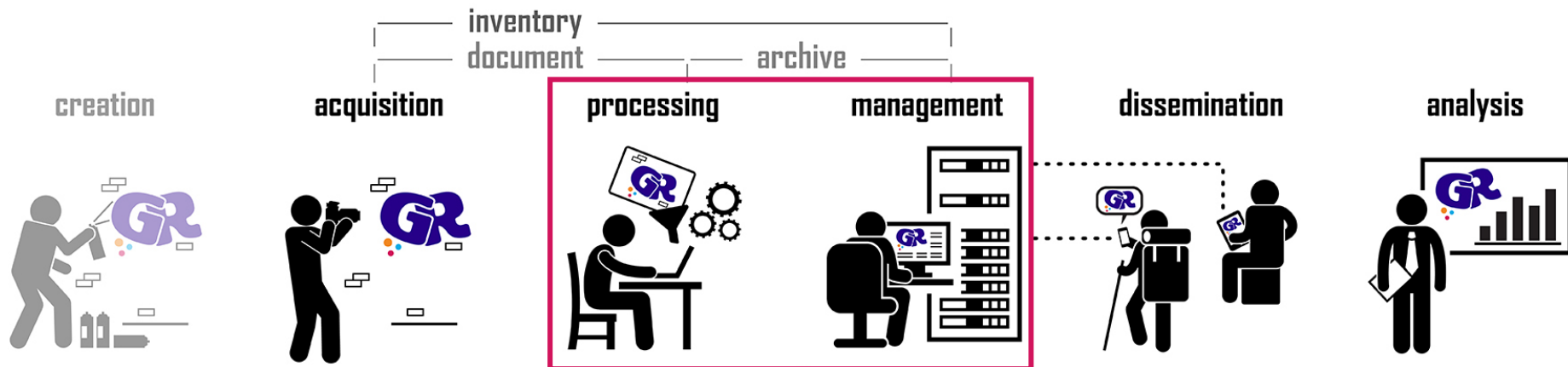
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars





COOLPI
colour-accurate pixels



Product Solutions Open Source Pricing

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GraffitiProjectINDIGO / COOLPIPublic

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CodeIssuesPull requestsActionsProjectsSecurityInsights

main1 branch0 tagsGo to fileCode

amolada Add files via uploadebb6c3 on Oct 20, 2022155 commits

dist	Add files via upload	9 months ago
docs	Add files via upload	9 months ago
graffiti_image_processing	Add files via upload	9 months ago
notebooks	Add files via upload	10 months ago
src	Add files via upload	9 months ago
tests/coolpi-gui-test	Add files via upload	10 months ago
wpp_data	Add files via upload	10 months ago
LICENSE	Initial commit	last year
LICENSE.txt	Add files via upload	9 months ago
MANIFEST.in	Add files via upload	9 months ago
README.md	Add files via upload	9 months ago
pyproject.toml	Add files via upload	9 months ago

README.md

COOLPI

Description

Colour Operations Library for Processing Images (COOLPI) is an open-source toolbox programmed in Python for the treatment of colorimetric and spectral data. It includes classes, methods and functions developed and tested following the colorimetric standards published by the Commission Internationale de l'Éclairage (CIE, 2018).

The COOLPI package has been developed as part of the INDIGO project (IN-ventory and DI-sseminate Graffiti along the d-O-naukanal) carried out by the Ludwig Boltzmann Institute for Archaeological Prospection and Virtual Archaeology in close collaboration with the GEO Department of TU Wien University.

The achievement of colour-accurate digital images is one of the primary research topics within the INDIGO project. Therefore, the COOLPI package also includes specific procedures for digital image processing and colour correction, particularly from images in RAW format.

About

Colour Operations Library for Processing Images

ReadmeGPL-3.0, GPL-3.0 licenses found4 stars0 watching1 forkReport repository

Releases

No releases published

Packages

No packages published

Contributors2

amolada Adolfo Molada Tebar

BeyondConventionalBoundaries Geert ...

Languages

Jupyter Notebook 98.1%

Python 1.9%

COOLPI

colour-accurate pixels

The image shows the COOLPI logo. It consists of a square QR code made of small blue and white pixels. In the center of the QR code, the word "COOLPI" is written in a stylized, blocky font. To the right of the QR code, there is a vertical bar composed of three colored segments: blue, orange, and red. Below the QR code, the word "COOLPI" is written again in a large, bold, blue sans-serif font, followed by the same three-colored vertical bar.

GRAFFITI styles

This book presents a classification system for graffiti art styles that reflects the expertise of graffiti writers and the work of art historian Erwin Panofsky. Based on Panofsky's theories of iconographical analysis, the classification model is designed to identify the style of a graffiti art piece through its visual characteristics.

Tested by image cataloguers in archives, libraries, and museums, the system assists information professionals in identifying the iconic styles of graffiti art pieces. It also demonstrates the power of Panofsky's theories to provide access to non-representational or abstract art images. The result is a new paradigm for Panofsky's theories that challenges the assumptions of traditional models. This innovative book is a valuable resource for anyone who wants to learn more about graffiti art and for information professionals concerned with both the practical and intellectual issues surrounding image access.

Lisa Gottlieb is a graduate of Wellesley College, the University of Chicago, and the University of Toronto. She is coauthor with Juris Dilevko of *Reading and the Reference Librarian: The Importance to Library Service of Staff Reading Habits* (2004). Her articles have appeared in the *Journal of the American Society for Information Science and Technology*, *American Studies*, *Library Quarterly*, and other journals.

ISBN-978-0-7864-3436-7



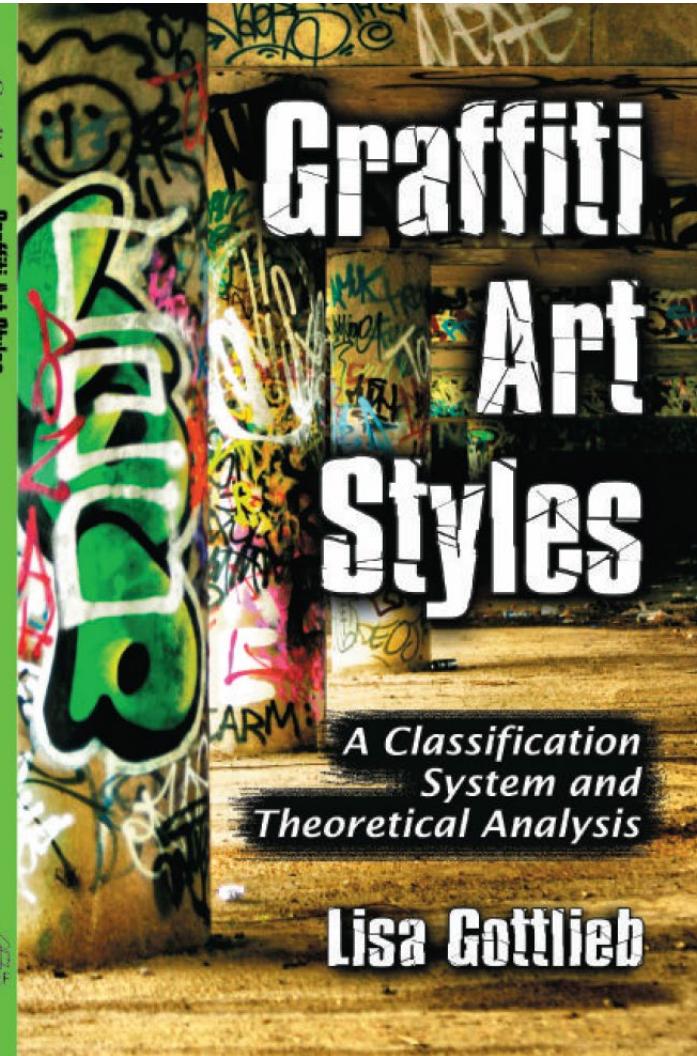
9 780786 434367




Cover image ©2008 Shutterstock

Gottlieb

Grffiti Art Styles



GRAFFITI styles


Graffiti Styles Visualiser | version 1.0

GUI
Info

Gottlieb style
Abstract
A1C2F3I5J2K2

In addition to the characteristics listed below, Abstract pieces are described by graffiti art experts as "very organic in shape." One expert notes that pieces "might fit the shape of a crescent, a check mark, a wedge, or some other non-quadrilateral." The Abstract style is also known as "Transcend," the name of the crew chiefly associated with this style.

Abstract pieces can have any (or any combination) of the following: Fades (L2), Fill shapes (L3), and Shines (L5); conversely, pieces can have no fill effects whatsoever (L6)

Curent style characteristics

Defining A1C2F3I5J2K2

Predominant B2B3D1E1E3G2

Other H1H2L2L3L5L6M1M2

Gottlieb match Yes - Abstract

Legibility
Defining Predom Other

☒ Illegible A1
☐ Partially legible A2
☐ Legible A3

Number of colours
Defining Predom Other

☐ 2 colours B1
☒ At least 3 colours B2
☒ At least 5 colours B3

Symmetry
Defining Predom Other

☐ Symmetry C1
☒ Assymetrical C2

Dimensionality
Defining Predom Other

☒ 2-dimensional D1
☐ 2-dimens. with 3D effects D2
☐ Relief effect D3
☐ 3-dimensional D4

Letter outlines
Defining Predom Other

☒ Hard only E1
☐ Implied E2
☒ Interrupted E3
☐ None E4

Linearity
Defini... Predom Other

☐ Curved only F1
☐ Straight only F2
☒ Curved and straight F3

Letter strokes
Defining Predom Other

☐ Uniform G1
☒ Varied G2

Negative space
Defini... Predom Other

☒ Exaggerated H1
☒ Standard H2
☐ Limited H3

Letter overlap
Defining Predom Other

☐ None I1
☐ Minimal I2
☐ Standard I3
☐ Interlocking I4
☒ Intertwined I5

Use of arrows
Defini... Predom Other

☐ Integral J1
☒ Non integral J2

Letter Shape Cons.
Defining Predom Other

☐ Consistent K1
☒ Inconsistent K2

Fill effects
Defining Predom Other

☐ Directional highlights L1
☒ Fades L2
☒ Fill shape L3
☐ Scrub fills L4
☒ Shines L5
☒ None L6

Fill consistency
Defining Predom Other

☒ Consistent M1
☒ Inconsistent M2

SOME results

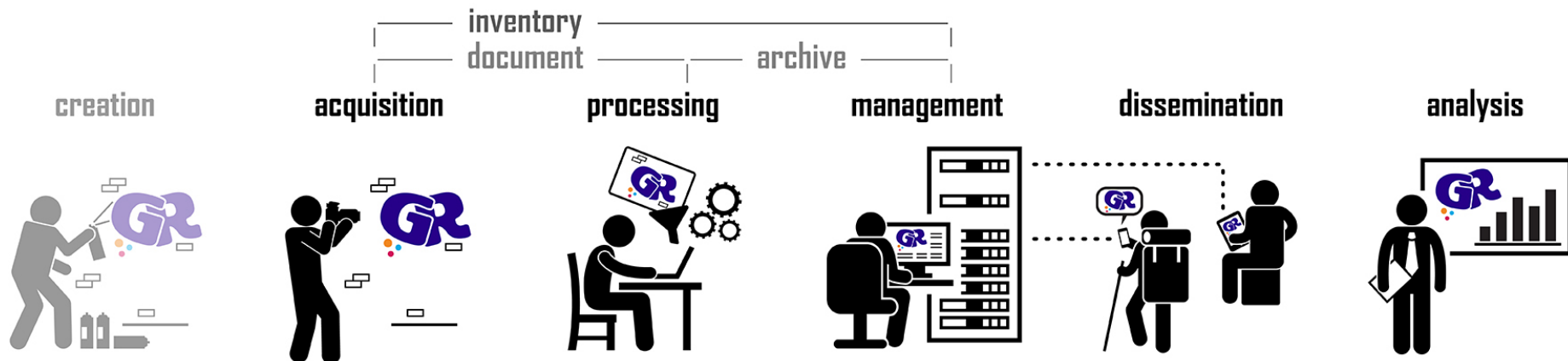
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars



GRAFFITI metadata

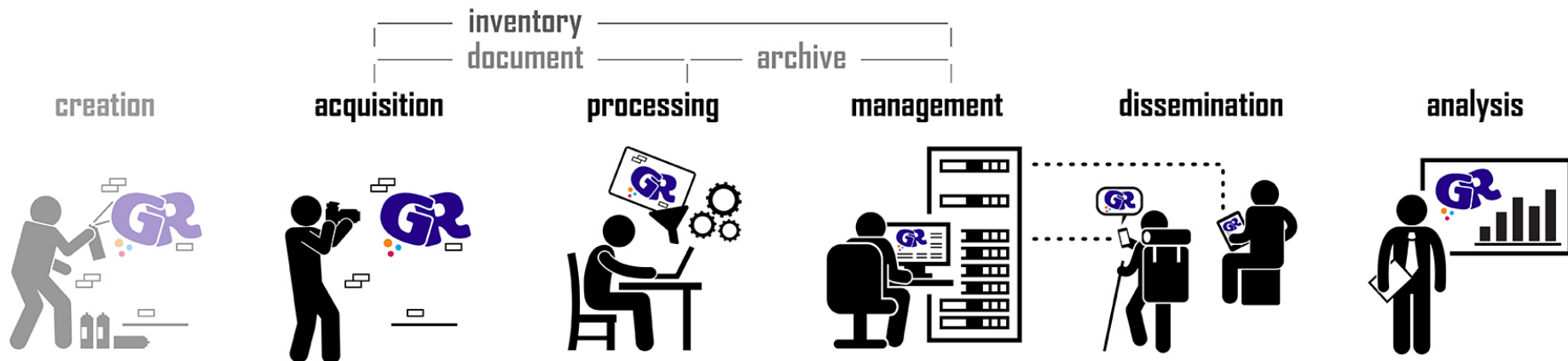
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars



GRAFFITI metadata

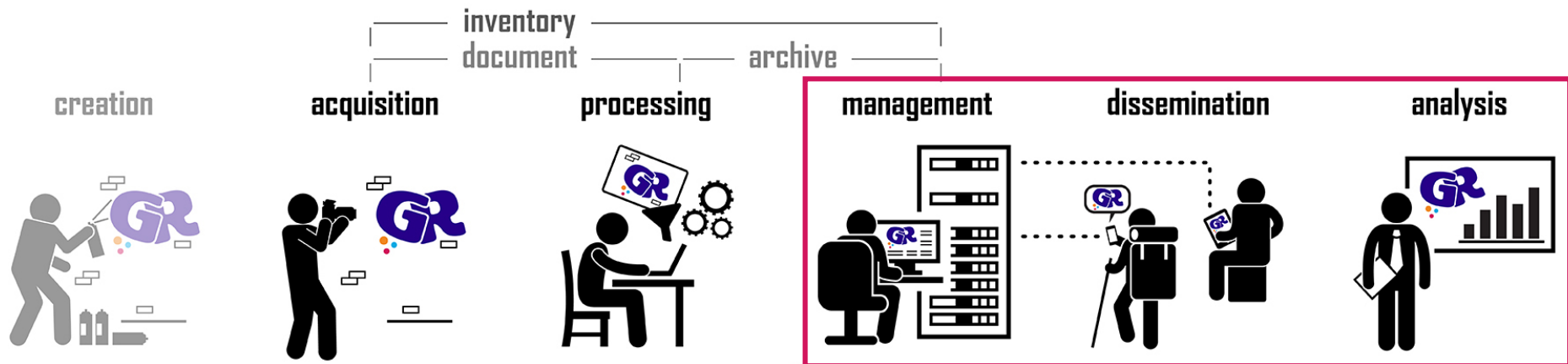
GRAFFITI *LOCATION*

GRAFFITI *TEMPORALITY*

GRAFFITI *TERMINOLOGY*

GRAFFITI *CHARACTERISATION*

5
research
pillars





INDIGO

core division



INDIGO

core division

real graffito
physical resource



INDIGO

core division

real graffito
physical resource

approximations
digital resources



INDIGO

core division

real graffiti
physical resource

approximations
digital resources

digital photos

textured 3D models

orthophotographs

polygons



INDIGO

core division

real graffiti
physical resource

approximations
digital resources

digital photos

textured 3D models

orthophotographs

polygons

metadata

metadata



INDIGO

core division

real graffiti
physical resource

approximations
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textured 3D models

orthophotographs

polygons

metadata



metadata



INDIGO

core division

real graffito

digital resources

digital photos

textured 3D models

orthophotographs

polygons

metadata

GRAFFITI (meta)data

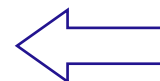
<i>INDIGO metadata (physical graffito)</i>	
Category Level	Category Name
1	Descriptive metadata
1.1	Core metadata
1.2	Locational metadata
1.3	Temporal metadata
1.4	Contentual / aboutness metadata
1.5	Formal / appearance metadata
2	Administrative metadata
2.1	Rights metadata
2.2	Access metadata
2.3	Technical metadata
3	Structural metadata
3.1	Origin relationships
3.2	Graffiti ensemble relationships
3.2	Spatio-temporal relationships

digital photos

textured 3D models

orthophotographs

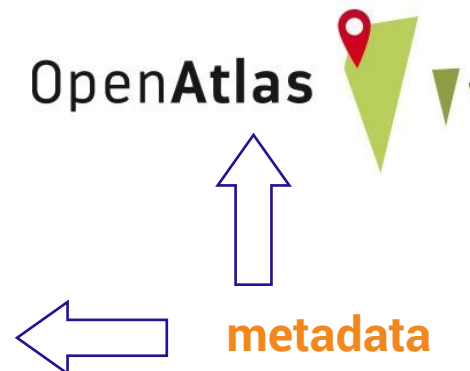
polygons



metadata

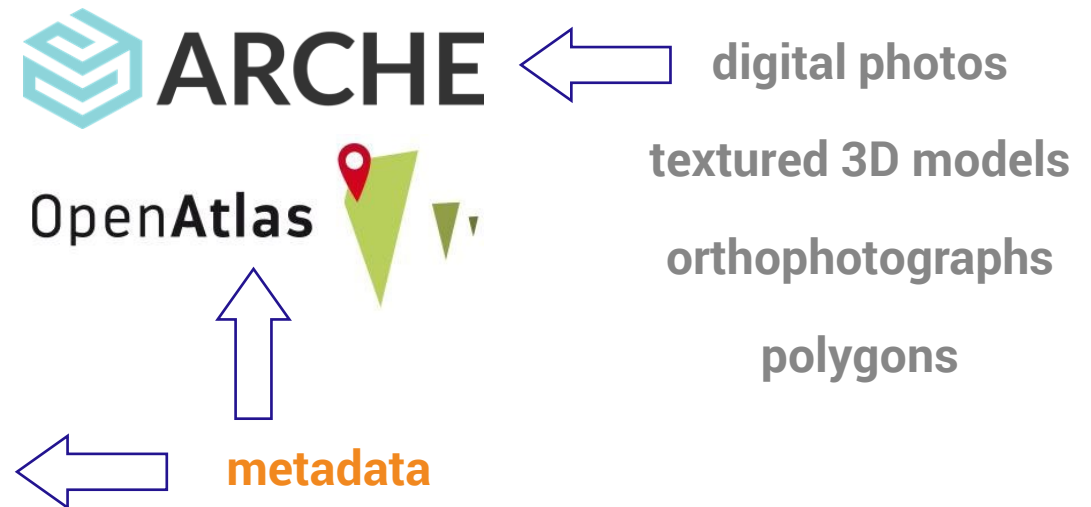
GRAFFITI (meta)data

<i>INDIGO metadata (physical graffito)</i>	
Category Level	Category Name
1	Descriptive metadata
1.1	Core metadata
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2.1	Rights metadata
2.2	Access metadata
2.3	Technical metadata
3	Structural metadata
3.1	Origin relationships
3.2	Graffiti ensemble relationships
3.2	Spatio-temporal relationships

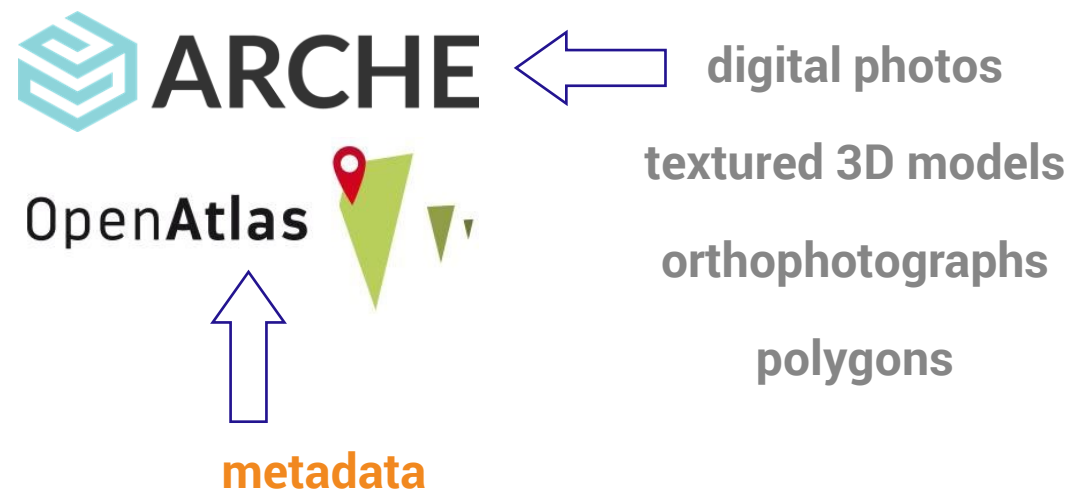


GRAFFITI (meta)data

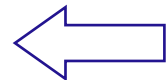
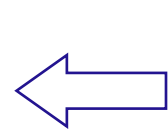
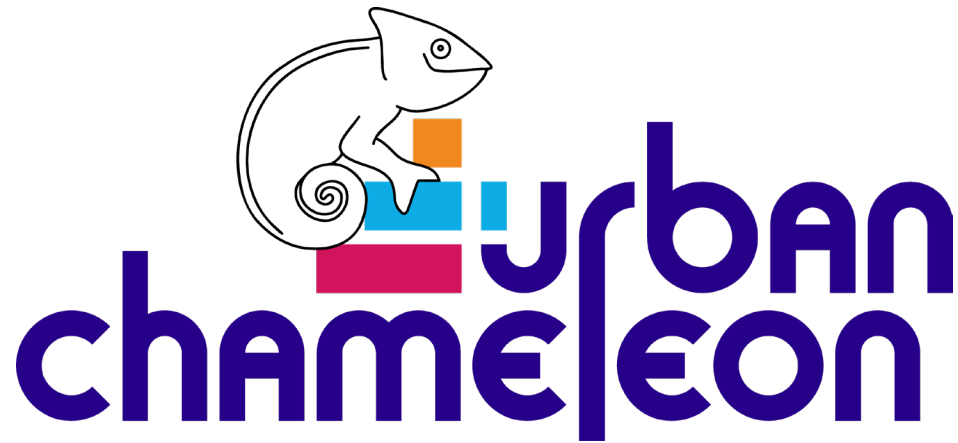
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2.2	Access metadata
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3	Structural metadata
3.1	Origin relationships
3.2	Graffiti ensemble relationships
3.2	Spatio-temporal relationships



FINAL goal



FINAL goal

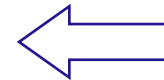


ARCHE

OpenAtlas



metadata



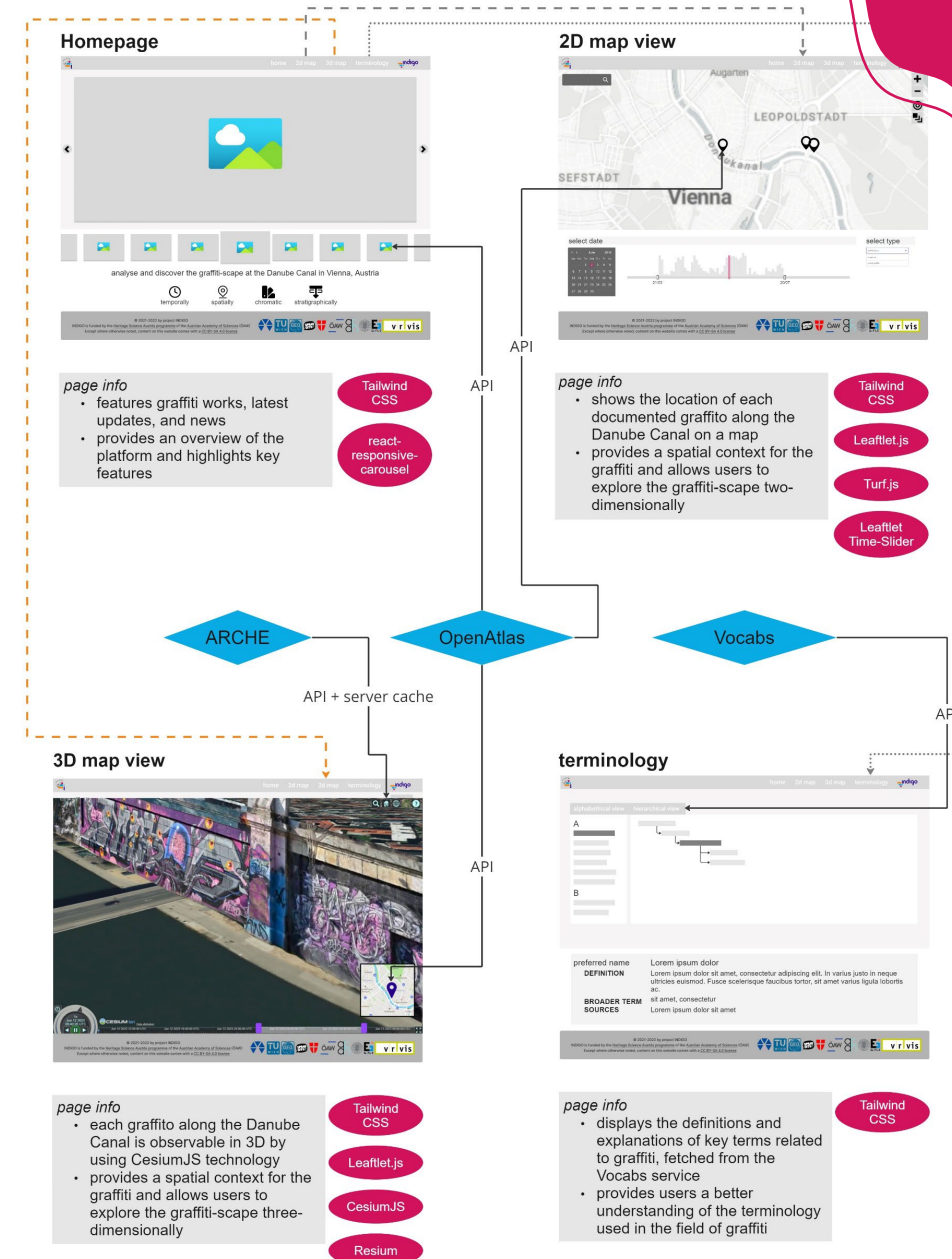
digital photos

textured 3D models

orthophotographs

polygons

FINAL goal





INTERACTIVE 3D dissemination

archaeologists / art historians

sociologists / linguists

ethnographers / anthropologists

architects / geographers



INTERACTIVE 3D **dissemination**

archaeologists / art historians

sociologists / linguists

ethnographers / anthropologists

architects / geographers

ETHICAL + COPYRIGHT aspects

RIGHT now



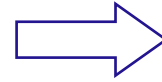
RIGHT now

DATA, LOTS OF DATA



RIGHT now

DATA, LOTS OF DATA

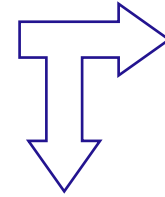


ARCHE

CoreTrustSeal certified data repository

RIGHT now

DATA, LOTS OF DATA



ANONYMISATION

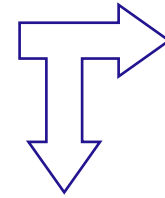


ARCHE

CoreTrustSeal certified data repository

RIGHT now

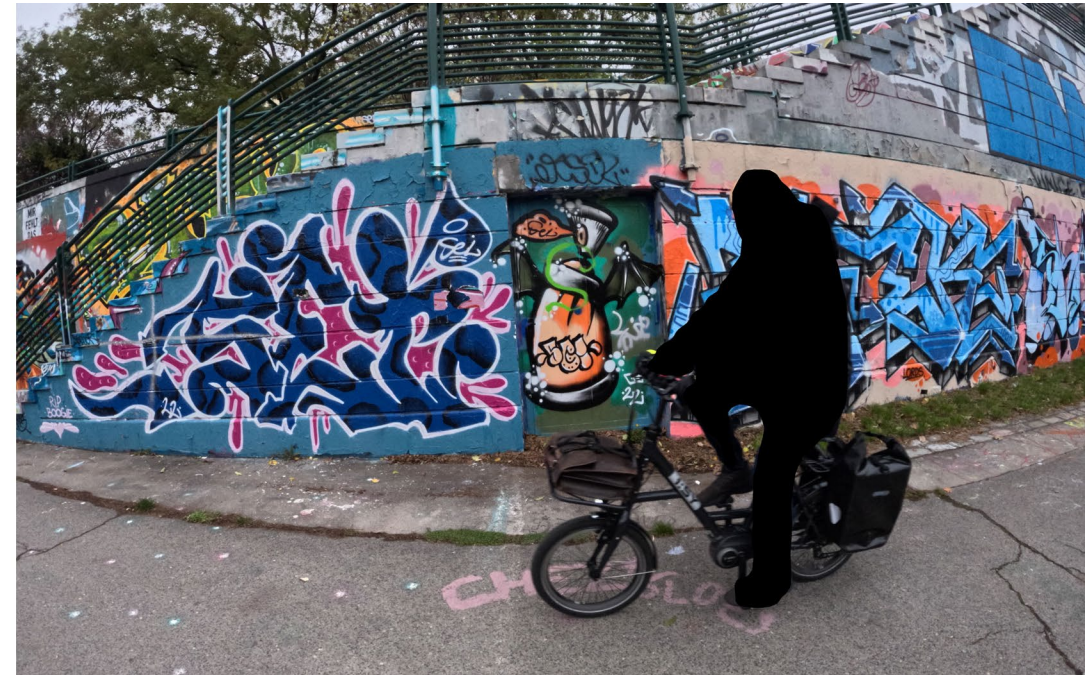
DATA, LOTS OF DATA



ANONYMISATION

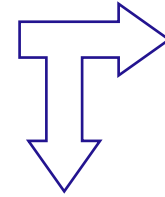


ARCHE
CoreTrustSeal certified data repository



RIGHT now

DATA, LOTS OF DATA



ANONYMISATION

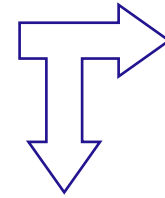


ARCHE
CoreTrustSeal certified data repository



RIGHT now

DATA, LOTS OF DATA



ANONYMISATION



ARCHE
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DISSEMINATION general audience

DISSEMINATION **general audience**

NewsLetter

vol.24 · Week 40 · 03-07 October 2022



VRVis meeting

01 Thursday 06-10-2022
10:00 @ VRVis
discuss collaboration



bot character by DEADBEAT HERO south of the Friedensbrücke on the right Donaukanal bank [21-09-2022]
Nikon Z 7H + Nikon NIKKOR Z 20mm f/1.8 S @ f/5.6 - 1/400 s - ISO 360



CVL
Computer Vision Lab



UC



1. CVL meeting

Tuesday 27-09-2022 | meeting between Sebastian Zambanini of the TU Wien's Computer Vision Lab and Geert to discuss potential thesis subjects

2. Proceedings meeting

Wednesday 28-09-2022 | the editors of the goINDIGO 2022 proceedings meet to sync info about article submissions and outstanding papers

3. Monthly team meeting

Friday 30-09-2022 | during monthly team meeting 11, the INDIGO project staff discussed the status quo and talked about upcoming matters

last two weeks

NEWSLETTER

26

DISSEMINATION **general audience**

Gallery Wednesday



NEWSLETTER

26

INSTAGRAM

±500

DISSEMINATION general audience

Die Presse SAMSTAG, 16. JULI 2022

WISSEN & INNOVATION W3

Digital. Ein Forschungsteam entwickelt ein 3-D-Modell der unzähligen Graffiti am Donaukanal: um die kurzlebigen Werke zu bewahren und eine Basis für andere Forschungen schaffen. Zu Besuch bei einer der längsten Graffitiflächen der Welt.

Buntes Erbe zum Lachen, Ärgern und Grübeln

VON ALICE SENARCLÈNS DE GRANCY

Wir haben seit fast vier Jahren einen Hund und gehen mit ihm oft im Prater spazieren, aber auch entlang des Donaukanals“, erzählt Geert Verhoeven von der Idee zu seinem aktuellen Forschungsprojekt. Dabei betrachtete er die Graffiti an den Wänden – „manche waren weniger schön, manche wirkten wie Kunst“ – und bemerkte auch deren Vergänglichkeit: „Sie werden teilweise nach ein paar Stunden oder Tagen übersprüht.“ Der Archäolog begann, die oft kurzlebigen Werke als Kulturerbe zu sehen, das es zu bewahren gilt, und startete gemeinsam mit dem Kunsthistoriker Stefan Wogrin und anderen wissenschaftlichen Partnern das Projekt Indigo (Inventory and Disseminate Graffiti along the Donaukanal).

Der Donaukanal ist heute berühmt für die vielen Graffiti, dabei wissen die meisten nicht, dass Sprays eigentlich nur auf 300 Metern erlaubt ist“, erzählen die beiden Männer an diesem windigen und untypisch kalten Sommertag vor der Kaiserbadschleuse. Hier entstand 1984 neben dem Nachtclub Flex die erste legale Graffiti-Fläche Wiens. Anfang und Ende sind mit einer – bunt besprühten – Reliefplatte markiert, auf der eine Taube zu sehen ist: Die sogenannte Wienerwand sei ein Unikum mit klarer Botschaft, berichtet Wogrin, der sich seit rund 20 Jahren mit Graffiti befasst – und selbst anfragt: „Man wollte die Sprayer genauso wenig wie die Tauben.“ Dennoch ermöglicht es die Stadt Wien Künstlerinnen und Künstlern aus der Graffiti-Szene so, auf diesen Flächen zu arbeiten, ohne kriminell zu sein.

Thema lässt niemanden kalt
Denn Graffiti polarisieren bis heute. „Die einen lieben sie, die anderen hassen sie“, sagt Verhoeven, der diese Reaktionen auch von wissenschaftlichen Tagungen kennt. „Es gibt jedes Mal 100.000 Fragen.“ Das Interesse gefällt ihm – und auch, dass ein Beitrag aus seiner Forschungsgruppe im März einen Best Paper Award bei einer Konferenz



Außergewöhnlicher Kulturschatz: Geert Verhoeven (l.) und Stefan Wogrin vor einem ihrer Forschungsobjekte.

(Jana Madsen)

im italienischen Mantua gewonnen hat. Üblicherweise befasst er sich als stellvertretender Leiter des Ludwig-Boltzmann-Instituts (LBI) für Archäologische Prospektion und Virtuelle Archäologie mit ganz anderen Kulturschätzen: Er begleitete die Forschungen rund um das jungsteinzeitliche Sonnenberg, war bei den Arbeiten zum römischen Camunum oder der Wikinger-

Fundstätte Birka dabei. „Und im Stephansdom habe ich Fresken dokumentiert und publiziert“, schildert Geert Verhoeven, der 2010 innerhalb von vier Tagen sein Haus in Belgien verkauft hat und für die Forschungsstelle nach Wien gezogen ist. Die am LBI genutzten und weiterentwickelten Messsysteme und Simulationsmethoden bilden die Klammer über die verschiedenen Themen. Ziel ist stets, Kulturerbe digital festzuhalten.

Digitaler Spaziergang am Kanal
Diese virtuellen Werkzeuge sollen nun auch helfen, die Graffiti am Donaukanal darzustellen – auch Anwendungen für den Tourismus sind denkbar: Den Forschern schwebt ein digitaler Spaziergang am Donaukanal vor, bei dem man auch ältere, an einer Stelle vorhandene Graffiti anschauen und mehr über sie erfahren kann.

Doch noch sind große technische Hürden zu nehmen: Die Far-

Reality und Visualisierung in Wien, soll künftig helfen, das Neuland zu ergründen. „Es gibt noch keine Projekte, die können, was wir brauchen“, erläutert Verhoeven.

Schließlich soll, unterstützt vom Förderprogramm Heritage Science Austria der Österreichischen Akademie der Wissenschaften, ein öffentlich zugängliches Archiv entstehen, das weltweit kein Pendant findet. Der Donaukanal sei, zusammen mit der Berliner Mauer, wohl die längste ununterbrochene Graffitifläche der Welt, so Verhoeven – und in Bezug auf die Graffiti-Forschung „definitiv die längste“. Die Daten sollen dann Disziplinen wie Soziologie, Linguistik, Kriminologie oder Kunstgeschichte für ihre Forschung offenstehen.

Putin, dargestellt als Hitler

Inhaltliche Analysen folgen also später, doch aus seinen Beobachtungen weiß Wogrin schon heute: „Die Motive haben oft einen Bezug zum Kanal. Man sieht viele Fische oder Fischeknochen oder auch Okopusse.“ Für politische Botschaften werde meist mit Schablonen gearbeitet, so ließen sich Parolen schnell aufsprühen. Darin habe man zuletzt auch den Beginn des Ukraine-Kriegs gespürt, fand Putin als Hitler dargestellt und einzelne Säulen mit den Farben der Ukraine gelb-blau bemalt. Aber es gibt Graffiti, die für noch mehr Diskussionen sorgen: „Was tun mit Homophoben oder nationalsozialistischen Botschaften“, fragt Verhoeven. „Als Forscher wollen wir alle Daten anbieten, aber freilich keine Bühne für Neonazis sein.“

Überdies soll ein Thesaurus entstehen, der die Terminologie erklärt und vereinheitlicht. „Ist es Street-Art oder Graffiti? Sind es Writers, Creators oder Künstler, die hier wirken?“, verdeutlicht Wogrin offene Fragen. Bis zum Projektende im Juli 2023 wird die Datenbank jedenfalls noch ordentlich wachsen.

Er hoffe, dass das Projekt dann immer noch gefördert werde, sagt Verhoeven. Denn er will das Neuland hier am Kanal, auf das ihn einst sein Hund geführt hat, weiter für die Nachwelt dokumentieren.

NEWSLETTER

26

PRESS

2

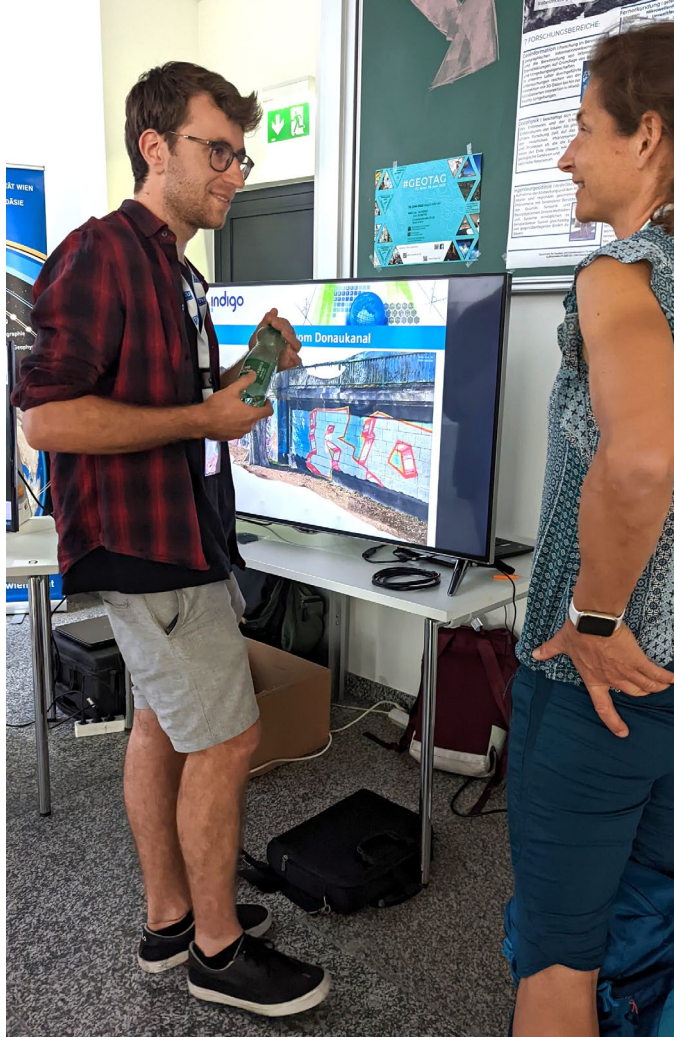
INSTAGRAM

±500

Die Presse 16/07/2022

DISSEMINATION general audience

Lange Nacht Der Forschung 2022



NEWSLETTER

26

PRESS

2

INSTAGRAM

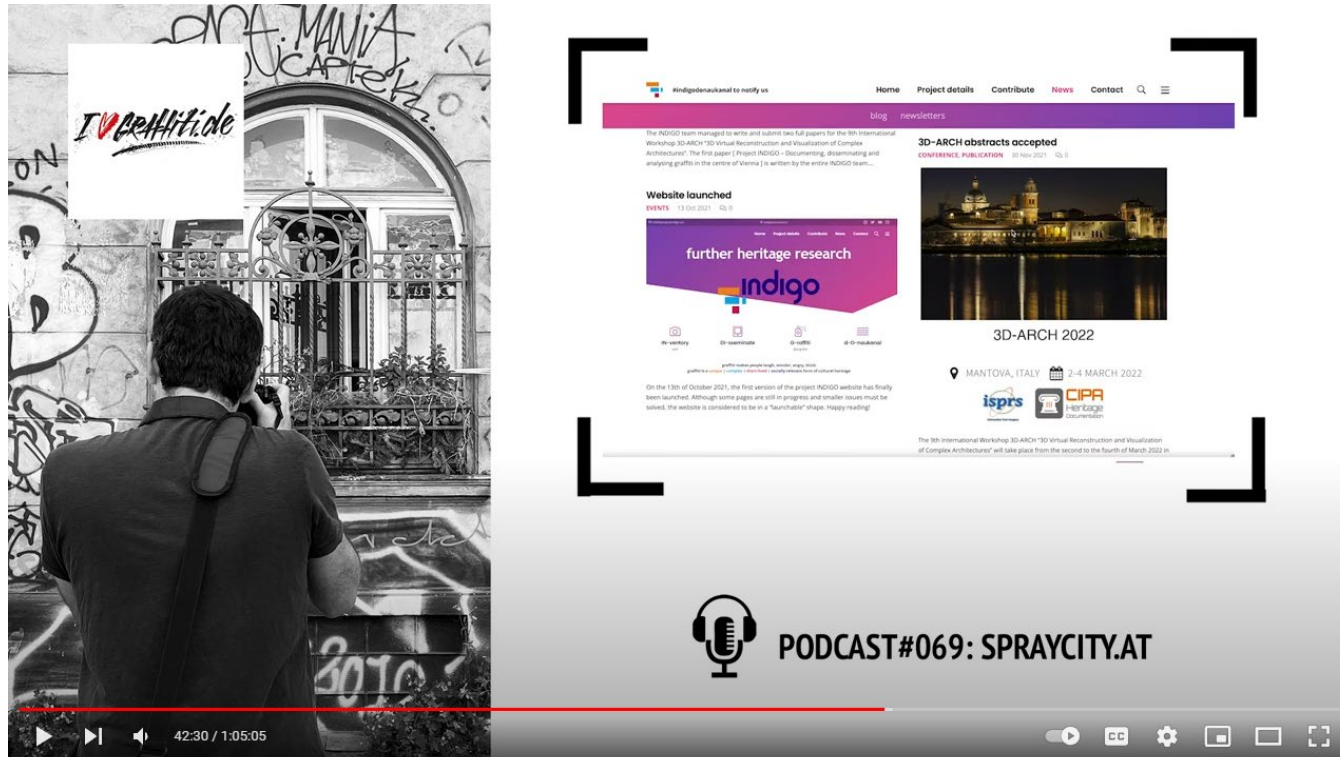
±500

EVENTS

5

DISSEMINATION **general audience**

ILOVEGRAFFITI.DE Podcast 69



PODCAST #069 – Graffiti in WIEN und ÖSTERREICH - SPRAYCITY.AT

5,502 views May 31, 2022

ILOVEGRAFFITI.DE
45.3K subscribers

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128 Dislike Share Download Clip Save ...

Bevor wir euch in einigen Tagen eine frische 5MINUTES Episode aus Wien servieren, wollen wir uns im Podcast mit jemandem unterhalten, der auf dem Gebiet Graffiti in Österreich wirklich ein Experte ist: Stefan von SPRAYCITY.AT (<https://spraycity.at>) Als wir im März 2008 angefangen haben ...more

Comments

19


Add a comment...

PODCASTS

3

DISSEMINATION **general audience**

GEObranchen.de


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Geobusiness & Geowissenschaft 

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22 AUGUST 2023

Graffiti erforschen – mit Geoinformation

Der Wiener Donaukanal ist ein Graffiti-Hotspot: Ein buntes Bild reiht sich dort an das andere, die Vielfalt ist groß: Vom grimmigen Totenkopf bis zur fröhlichen Comic-Figur, vom Namensschriftzug bis zum politischen Statement. Aus wissenschaftlicher Sicht sind diese Bilder höchst interessant – kunstgeschichtlich, soziologisch, historisch.



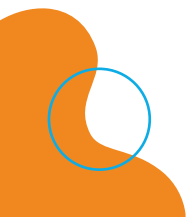
PODCASTS

3

BLOGS


4

DISSEMINATION scientific audience



DISSEMINATION scientific audience

 **AUTOGRAF**

 **COOLP**

 **GRAPHIS**

SOFTWARE

3

DISSEMINATION scientific audience



SOFTWARE



3

HARDWARE

1

DISSEMINATION scientific audience

Heritage [open-access]



Article

AUTOGRAF—AUTomated Orthorectification of GRAffiti Photos

Benjamin Wild ^{1,*}, Geert J. Verhoeven ², Martin Wieser ³, Camillo Ressel ¹, Jona Schlegel ², Stefan Wogrin ⁴, Johannes Otepka-Schremmer ¹ and Norbert Pfeifer ¹

¹ Department of Geodesy and Geoinformation, TU Wien, 1040 Vienna, Austria

² Ludwig Boltzmann Gesellschaft—LBI ArchPro, 1190 Vienna, Austria

³ Independent Researcher, Vienna, Austria

⁴ SprayCity, Austria; Vienna, Austria

* Correspondence: benjamin.wild@tuwien.ac.at

Abstract: Admired and despised, created and destroyed, legal and illegal: Contemporary graffiti are polarising, and not everybody agrees to label them as cultural heritage. However, if one is among the steadily increasing number of heritage professionals and academics that value these short-lived creations, their digital documentation can be considered a part of our legacy to future generations. To document the geometric and spectral properties of a graffiti, digital photographs seem to be appropriate. This also holds true when documenting an entire graffiti-scape consisting of 1000s of individual creations. However, proper photo-based digital documentation of such an entire scene comes with logistical and technical challenges, certainly if the documentation is considered the basis for further analysis of the heritage assets. One main technical challenge relates to the photographs themselves. Conventional photographs suffer from multiple image distortions and usually lack a uniform scale, which hinders the derivation of dimensions and proportions. In addition, a single graffiti photograph often does not reflect the meaning and setting intended by the graffitiist, as the creation is frequently shown as an isolated entity without its surrounding environment. In other words, single photographs lack the spatio-temporal context, which is often of major importance in cultural heritage studies. Here, we present AUTOGRAF, an automated and freely-available orthorectification tool which converts conventional graffiti photos into high-resolution, distortion-free, and georeferenced graffiti orthophotomaps, a metric yet visual product. AUTOGRAF was developed in the framework of INDIGO, a graffiti-centred research project. Not only do these georeferenced photos support proper analysis, but they also set the basis for placing the graffiti in their native, albeit virtual, 3D environment. An experiment showed that 95 out of 100 tested graffiti photo sets were successfully orthorectified, highlighting the proposed methodology's potential to improve and automate one part of contemporary graffiti's digital preservation.

Keywords: graffiti; cultural heritage; orthophoto; photogrammetry; street-art; structure from motion; georeferencing

1. Introduction

Graffiti are an ephemeral yet ubiquitous phenomenon. Although sometimes only existing for several hours or days, one cannot avoid seeing graffiti in urban environments. Graffiti are polarising. They upset, please, provoke, and sometimes even insult individuals or societies. Often graffiti creators do not even intend to infuriate, but the mere existence of their works triggers human emotions.

Despite or maybe even because of their omnipresence and polarising nature, documentation of 'contemporary' graffiti, in contrast to 'ancient graffiti' such as inscriptions on the urban walls of Roman Pompeii, has never received much scientific attention [1,2]. Even in their overview and position paper on the academic legitimacy of

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Academic Editors: Francesco Fassi, Fabio Remondino and Luigi Fregonese

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Heritage **2022**, *5*, 2987–3009. <https://doi.org/10.3390/heritage5040155> www.mdpi.com/journal/heritage

SOFTWARE

3

ARTICLES

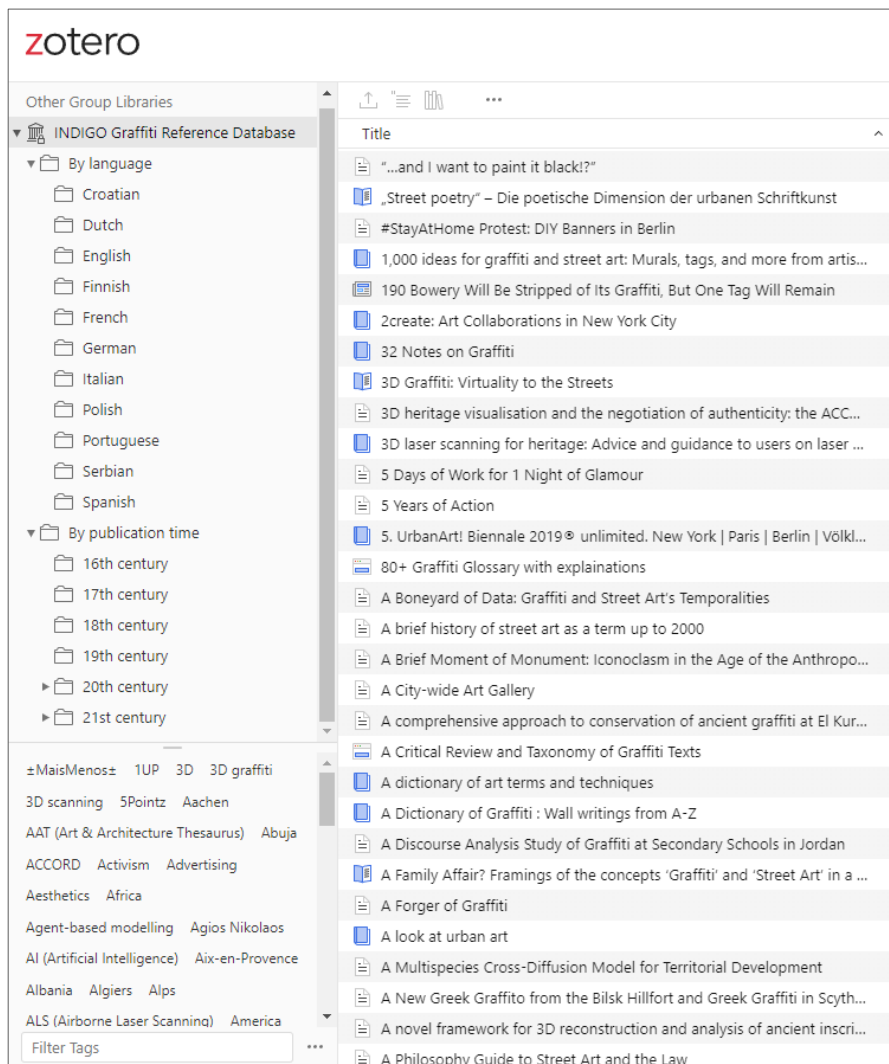
5+9 (+6)

HARDWARE

1

DISSEMINATION scientific audience

Graffiti literature database



SOFTWARE

3

ARTICLES

5+9 (+6)

HARDWARE

1

DATA SETS

5 (+1)

DISSEMINATION **scientific audience**



TALKS

24

DISSEMINATION scientific audience

Acquiring centimetre-accurate camera coordinates in project INDIGO

Martin Wieser | Independent researcher | scenemap@gmail.com
Geert Verhoeven | LBI ArchPro | geert.verhoeven@archpro.lbg.ac.at
Benjamin Wild | Technische Universität Wien | benjamin.wild@geo.tuwien.ac.at

INDIGO is funded by the Heritage Science Austria programme of the Austrian Academy of Sciences (OAW)

3rd Heritage Science Austria meeting: 23 September 2022

(1) Mount device
The camera's hot shoe is used for mounting and camera synchronisation

(2) Configure RTK
Input RTK provider (e.g. EPOSA)
Provide settings for correction data

(3) Prepare camera
Set and fix focusing
Deactivate electronic and optical image stabilisation

(4) Acquire photos
Follow a specific set of rules:
- oblique & perpendicular photos
- no change in focus or zoom
- different subject distances
- cover entire image sensor

(5) Download device data
Download camera positions & rotations over WiFi from the device's webserver via a browser

(6) Process device data & photos
Use the logged camera positions to georeference and scale the photo network
With many photos, centimetre accuracy is achievable

(7) Create products
From the georeferenced photo network a 3D mesh, point cloud or orthophotos can be produced in the desired CRS

RTK GNSS receiver
GPS & Galileo satellites
L1/L2/L5 multi-band
RTK

IMU
3-axis gyroscope
3-axis accelerometer
3-axis magnetometer

Position
Rotation

Feedback
LEDs & status display

GNSS: Global Navigation Satellite System
EPOSA: Echtzeit-Positionierung-Austria
CRS: Coordinate Reference System
IMU: Inertial Measurement Unit
GPS: Global Positioning System
RTK: Real-Time Kinematic

INDIGO

LUDWIG-BOLTZMANN-INSTITUTE
Archaeological Prospection and Virtual Archaeology

TU WIEN

OAW

SPARX CITY

GRFL

vrvis

Stadt Wien

TALKS

24

POSTERS

3

DISSEMINATION **scientific audience**



TALKS

24

SYMPOSIA

2

POSTERS

3

DISSEMINATION scientific audience



TALKS

24

SYMPOSIA

2

POSTERS

3

EDITED VOLUME

1 (+1)

INDIGO website



<https://projectindigo.eu>

#indigodonaukanal to notify us

Home Project details Contribute News Contact

Indigo

IN-ventory
and

DI-sseminate

G-raffiti
along the

d-O-naukanal

graffiti makes people laugh, wonder, angry, think
graffiti is a **unique** | **complex** | **short-lived** | **socially relevant** form of cultural heritage

the two-year INDIGO project aims to build the basis to systematically *document* | *disseminate* | *analyse* almost 13 km of uninterrupted graffiti along Vienna's *Donaukanal* (Eng. Danube Canal) in the next decade

graffiti community engagement and *regular photo visits* allow INDIGO to build a spatially, spectrally, and temporally accurate record of most (il)legal sprayings, engravings and other personal expressions on the Canal's public urban surfaces

a *spatial database* manages all images and *relevant metadata* like style, artist pseudonym and creation data, while the involvement of graffiti creators and scholars safeguard (meta)data correctness and completeness

this database feeds a *free online platform* that empowers everyone to explore (through virtual walks or displaying the change of graffiti



Tackling an Urban Chameleon via Digital Graffiti Archaeology

