

The participative time machine

S M A P S H O T

1st online event

HEIG-VD – MEI/INSIT

University of Applied Sciences Western Switzerland

# S M A P S H O T

## **Welcome**

Presentation of the development team  
sMapshot news: new collections, collaboration, media

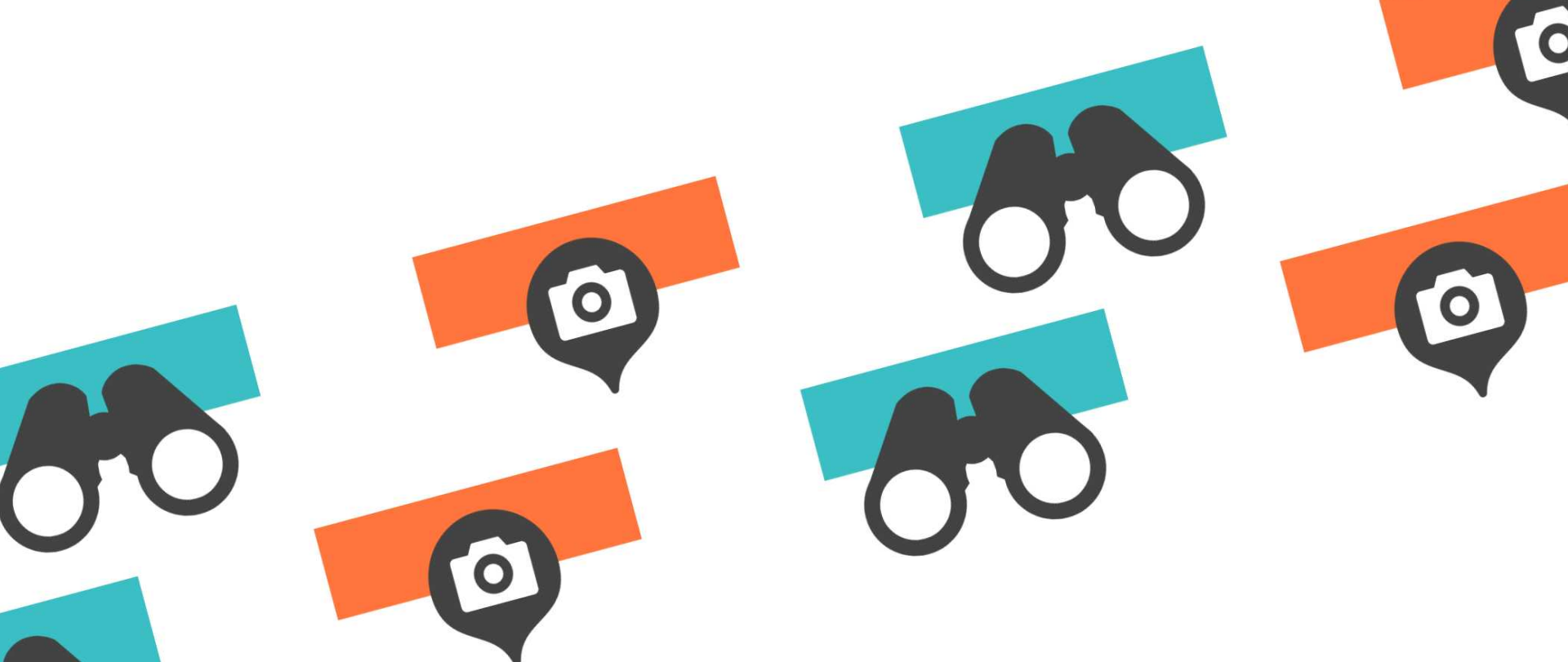
## **Breakout room 1** (German)

Reflections regarding the future development of sMapshot : new functionality, API development  
Benefits and problems of artificial intelligence in the context of sMapshot  
Discussion

## **Breakout room 2** (English)

Rephotography of historical images  
Master thesis by Alfred Hirschfeld and Christoffer Karlsson (Lund University)  
Discussion

## **Closing**



The snapshot  
development team

# Snapshot development

Daniel Rappo  
MEI  
Project management



James Taylor  
MEI  
Web development



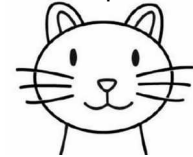
Jens Ingensand  
INSIT  
Project management



Martine Besse  
SARI-UNIZH / INSIT  
snapshot integration



Nicolas Blanc  
INSIT  
Data science,  
snapshot  
development



Shadia Huggenberger  
MEI  
Accounting



Stéphane Lecorney  
MEI  
Web development,  
project management



Timothée Produit  
IG-Group  
Development

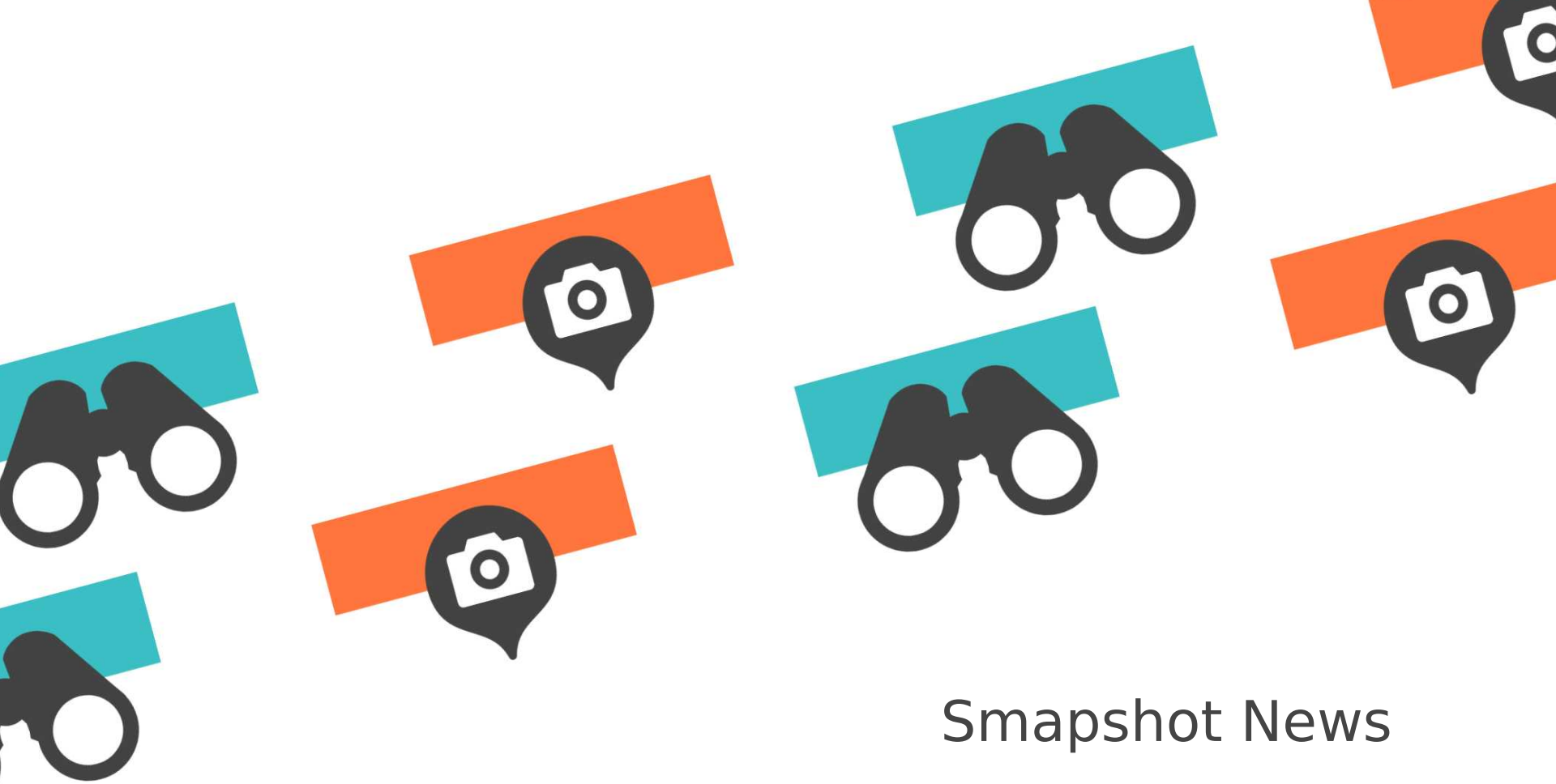


Christoffer Karlsson  
Lund university  
MSc Student



Alfred Hirschfeld  
Lund university  
MSc Student





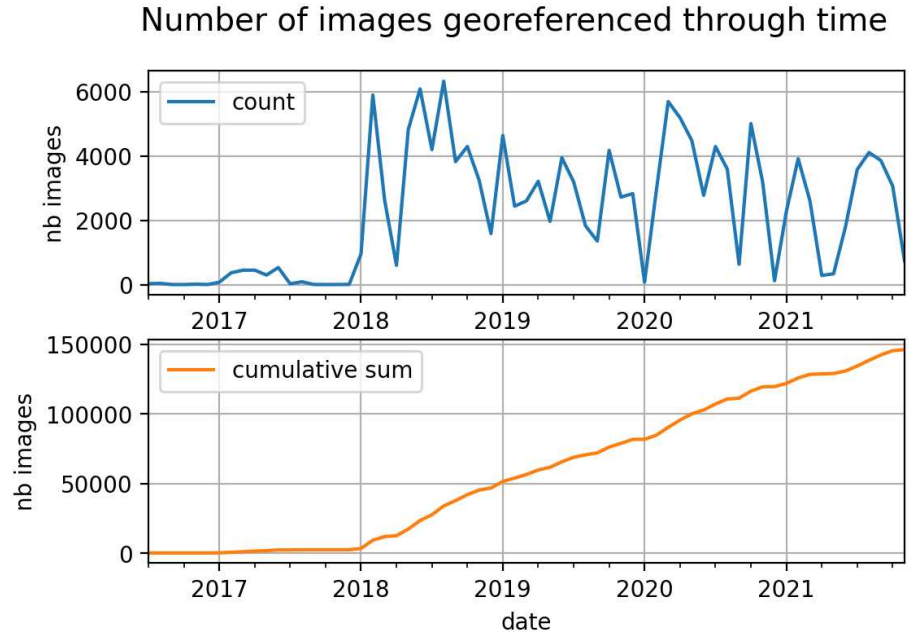
Snapshot News

# Snapshot news

Since 2017

**150k images** geolocalised by the crowd!  
Almost 200 k geolocalised images

Integration of ETH collections : 2018  
Constant growth since 2018



# Snapshot news

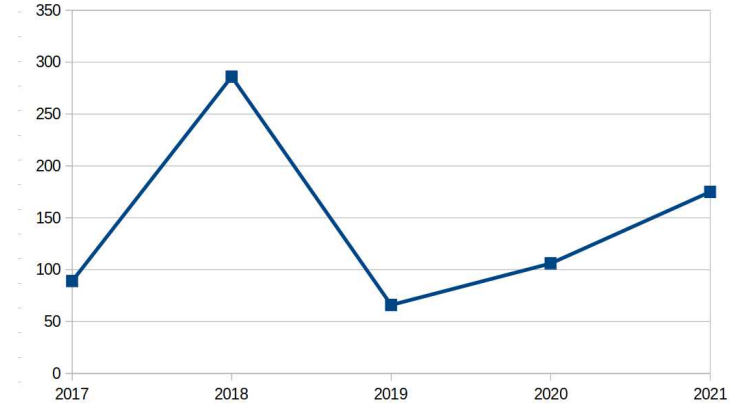
728 members since 2017

## Participants

From 01 / 01 / 2017 to 11 / 08 / 2021 All collections

Rank	Name	Geolocalised images	Observations	Corrected titles or captions
1	Walter Zweifel	31168	135	655
2	Hans Zumbühl	22549	13	189
3	Sigi Heggli	18457	4	47
4	Urs Witmer	16994	210	4954
5	anton heer	11789	1	493

Number of participants per year



# Snapshot news

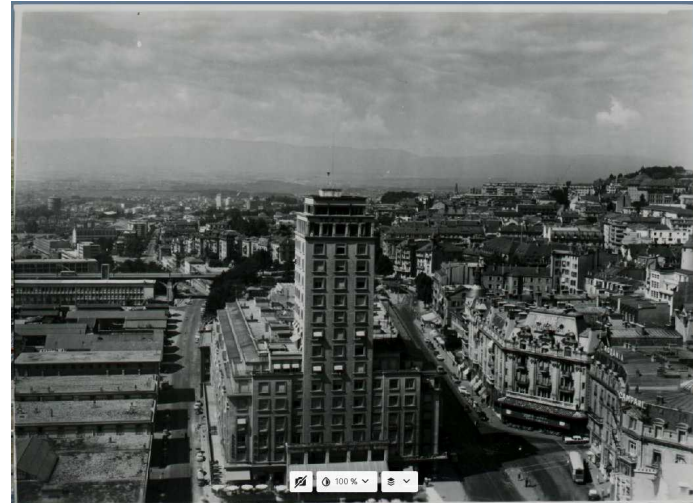
2017 :

Integration of the EPFL – ACM collection

Library of congress

Swiss National Library

Swiss Federal Archives





# Snapshot news

Since end of 2017 : Integration of ETHZ collections



- Aerial images by Walter Mittelholzer
- Aerial images by Werner Friedli
- Swissair images
- Views of Zurich
- Glaciers
- Comet Photo
- WILD Archive
- Documenta Natura

# Snapshot news

Since end of 2017 : Integration of Swisstopo collections

- Terrestrial images
- Aerial images Directorate of cadastral surveying



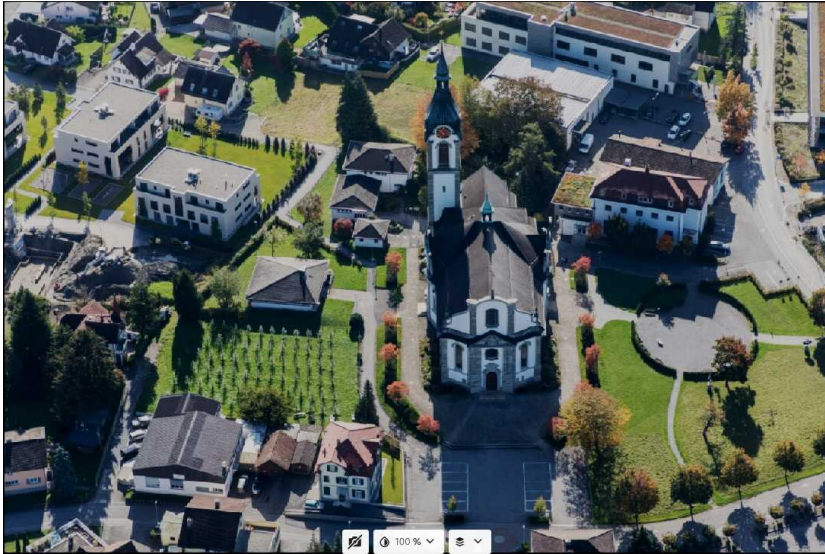
# Snapshot news

2018 : State of Vaud  
- Aeroport de Lausanne



# Snapshot news

2019 : State of Vorarlberg, Austria



- Aerial photographs of the Helmut Klapper collection
- Inclined aerial photos of spatial planning
- Alpine Luftbild

# Snapshot news

2020 : Imagine Rio, Brazil  
- Imagine Rio collection

- Integration of IIF resources
- Integration of dynamic DEM selection



# Snapshot news

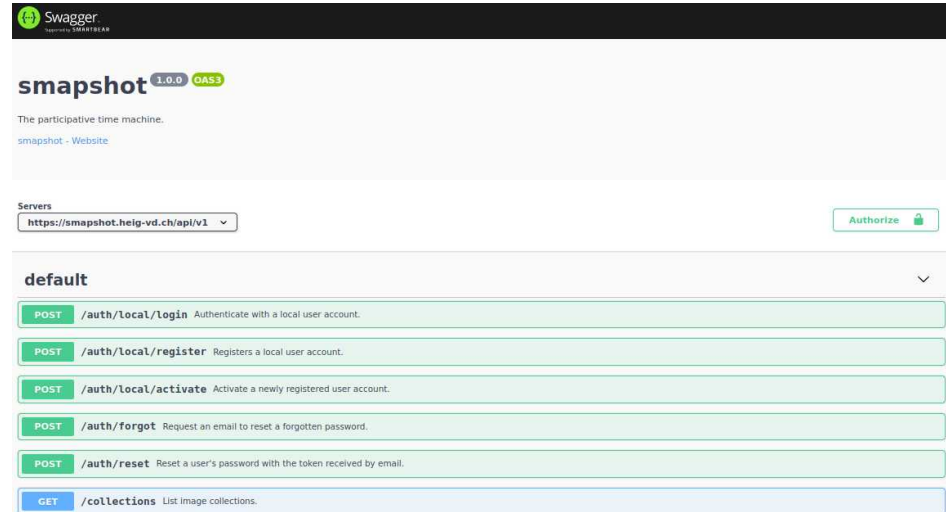
2021 : Bilder der Schweiz, SARI, UNIZH  
- Integration of paintings in smapshot



# Snapshot news

Development of an infrastructure for georeferenced photographs

- NGDI / INDG project: Swisstopo
- Development of an API for the integration of snapshot contents in other systems
- Investigation of standards for sharing georeferenced photos (e.g. OGC Geopose)
- Investigation of different use-cases: Photographic observatories



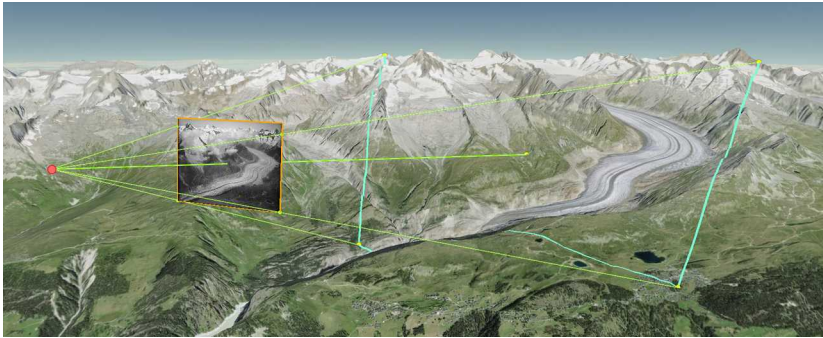
The screenshot displays the Swagger UI for the 'smapshot' API. At the top, the Swagger logo is visible, followed by the API title 'smapshot' with version '1.0.0' and 'OAS3' specification. Below the title, a tagline reads 'The participative time machine.' and a link to the 'smapshot - Website' is provided. A 'Servers' section shows the selected server URL: 'https://smapshot.heig-vd.ch/api/v1'. An 'Authorize' button is present next to the URL. The main content area lists several API endpoints under the 'default' schema:

- POST /auth/local/login**: Authenticate with a local user account.
- POST /auth/local/register**: Registers a local user account.
- POST /auth/local/activate**: Activate a newly registered user account.
- POST /auth/forgot**: Request an email to reset a forgotten password.
- POST /auth/reset**: Reset a user's password with the token received by email.
- GET /collections**: List image collections.

# Snapshot news

## Vector digitization in 3D

- digitization of vector-data in 3D on top of historic images
- comparison of the contents with recent imagery





# Snapshot news

Rephotography of snapshot-images

- positionnning of a drone at the exact location



# Snapshot news

Dynamic calculation of toponyms: improvements



- Footprint improvements
- Taking into account parameters such as :
  - Distance to toponym (from the camera)
  - Type of the toponym (and importance)

In collaboration with the Image Archive of the ETH Library

# SmAPSHOT news

DINACon Award 2021

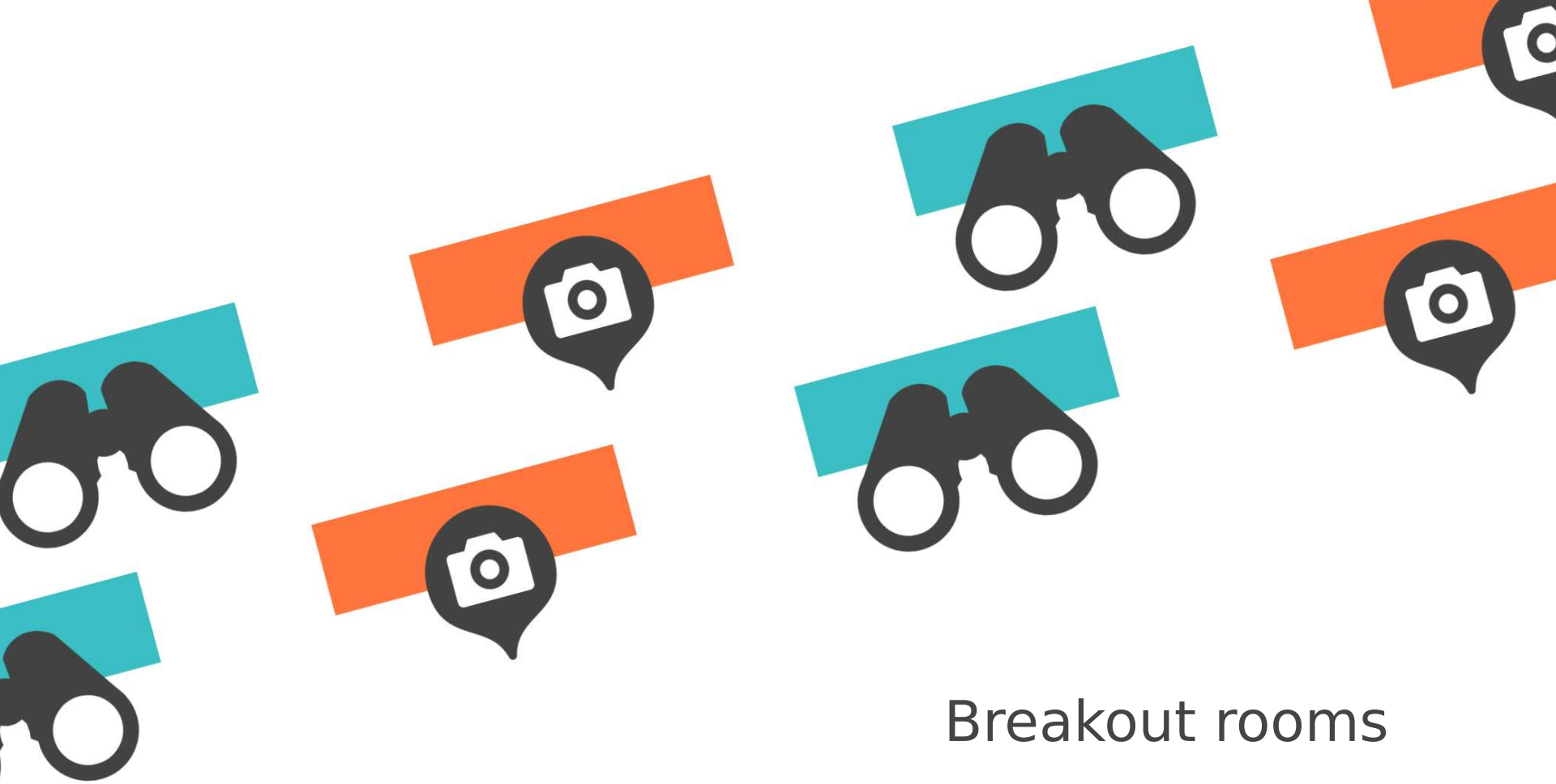
→ Open Data Award



## SmAPSHOT and an open API for georeferenced images

Open-Data Award

sMapShot is a participative time machine and a virtual globe created from historic photographs. Volunteers help finding the exact position of the photographs in 3D using a virtual globe. These photographs are then made available to citizens and researchers to analyze urban and landscape developments - e.g. melting glaciers, natural hazards, urbanization. Up to now more than 180'000 photographs have been georeferenced in smAPSHOT. SmAPSHOT is developed by HEIG-VD. In the context of a project with Swisstopo the API of smAPSHOT has been made available to the public. The goal is to create an infrastructure for georeferenced pictures in 3D. Here are some sample URL's : Aletsch Glacier : <https://smAPSHOT.heig-VD.ch/visit/98691> Basel : <https://smAPSHOT.heig-VD.ch/visit/5262>



Breakout rooms

# Breakout rooms – room 2

Alfred Hirschfeld, M.Sc. in Engineering, Surveying and Land Management

Christoffer Karlsson, M.Sc. in Engineering, department of Computer Science

Development of a  
mobile application for  
rephotography



## Snapshot

Welcome, find old photos to re-capture  
in order to get started!

CHALLENGE  
OF THE DAY

FIND  
PHOTOS

HOW TO USE

YOUR  
PROFILE

WHAT IS SMAPSHOT?



## Take photo

azimuth = 259.0  
tilt = 10.0  
roll = 358.0



GO BACK

CAPTURE

# Breakout rooms – room 1

Future development of snapshot

- New functionality: ideas, planning, etc
- Utilization of artificial intelligence

# Future development



Automatic integration of images :

API development

- Integration of IIIF collections : pushing of photos within a collection to snapshot
- Hosting in one central location
- Automatic exchange of data using the IIIF protocol

# Future development

Utilization of 3D buildings for the georeferencing:

→ 3D Buildings: vector data → calculation of ground control points on vector data





# Future development

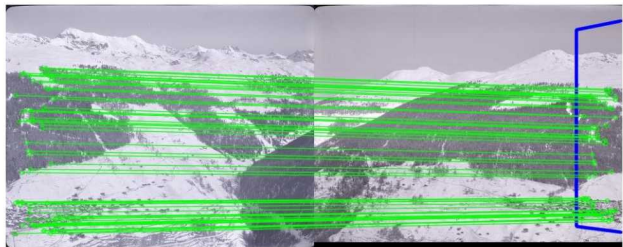
## Utilization of artificial intelligence

- For data validation; data validation is still done manually
- AI would allow us to
  - Automatically give more feedback: e.g. accuracy of georeferencing
    - to volunteers
    - to validators

# Future development

Utilization of artificial intelligence

→ For the georefencing



Under certain conditions it is possible to automatically georeference a picture

- Identify GCP on non-georeferenced pictures
- Apply georefencing from other pictures to new pictures

→ Data needs to be validated!

N. Blanc, T. Produit, J.Ingensand : A semi-automatic tool to georeference historical landscape images. PeerJ Preprints 6:e27204v1

# Future development

## Utilization of artificial intelligence

→ For the improvement of the georeferencing mechanism → help identify GCP

Idea: about 1 million existing GCP

- categorization of GCP with reference data: e.g. type of a GCP such as churches, mountain peaks, etc
- identification of potential GCP in pictures (using AI and image segmentation)
- help for volunteers



# Discussion

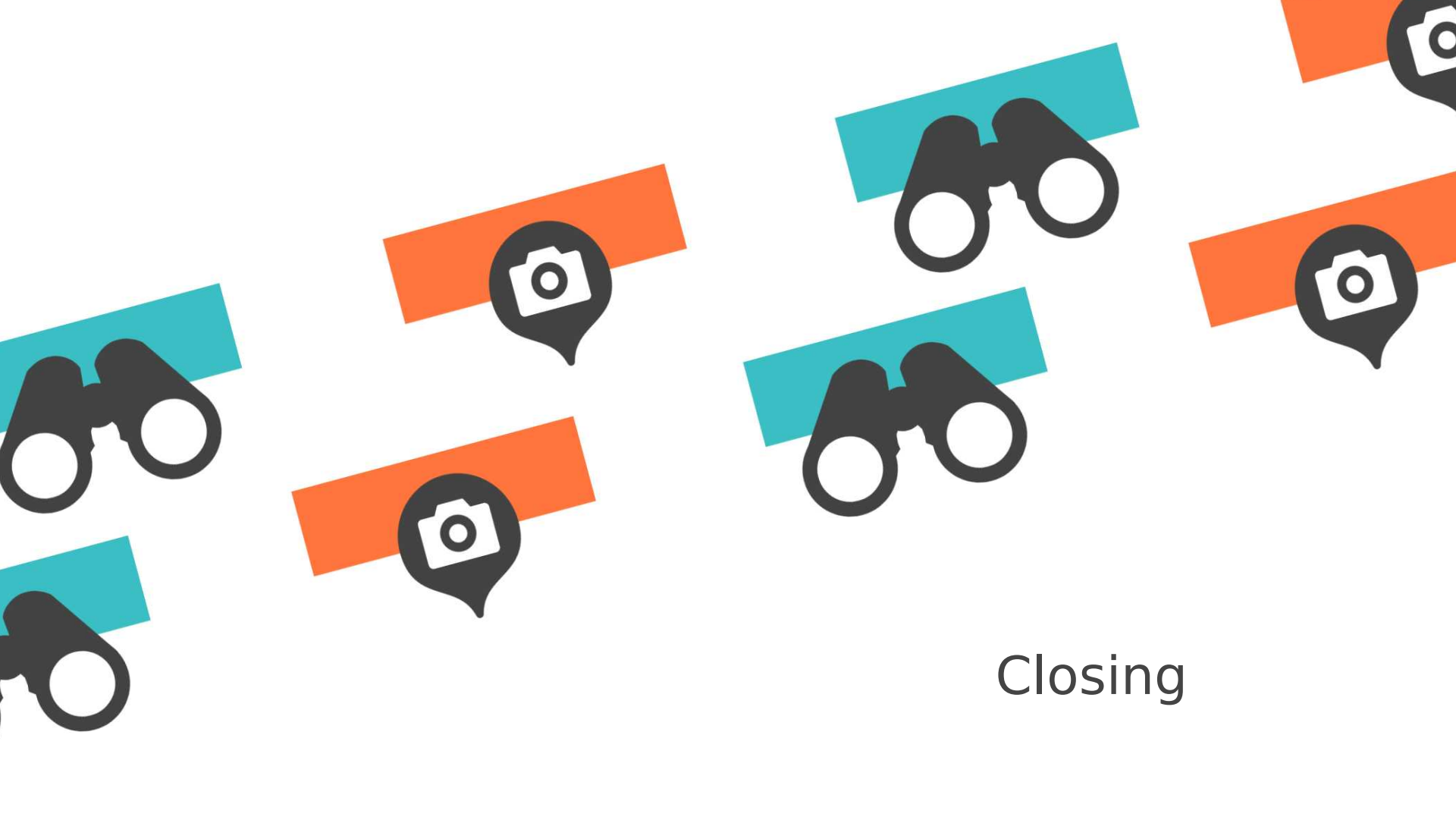
Goal: smapshot is a crowdsourcing-tool  
**Without the community there is no smapshot!**

Utilization of AI

- (Semi-) automatic georeferencing
- (Semi-) automatic validation
- Automatic GCP suggestion

Other ideas?





Closing

Thank you

[smapshot.heig-vd.ch](https://smapshot.heig-vd.ch)

[smapshot@heig-vd.ch](mailto:smapshot@heig-vd.ch)