Semi-automated pipeline to produce customizable tactile maps of street intersections for people with visual impairments

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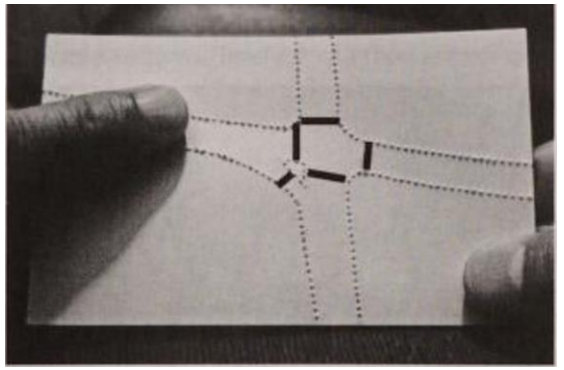
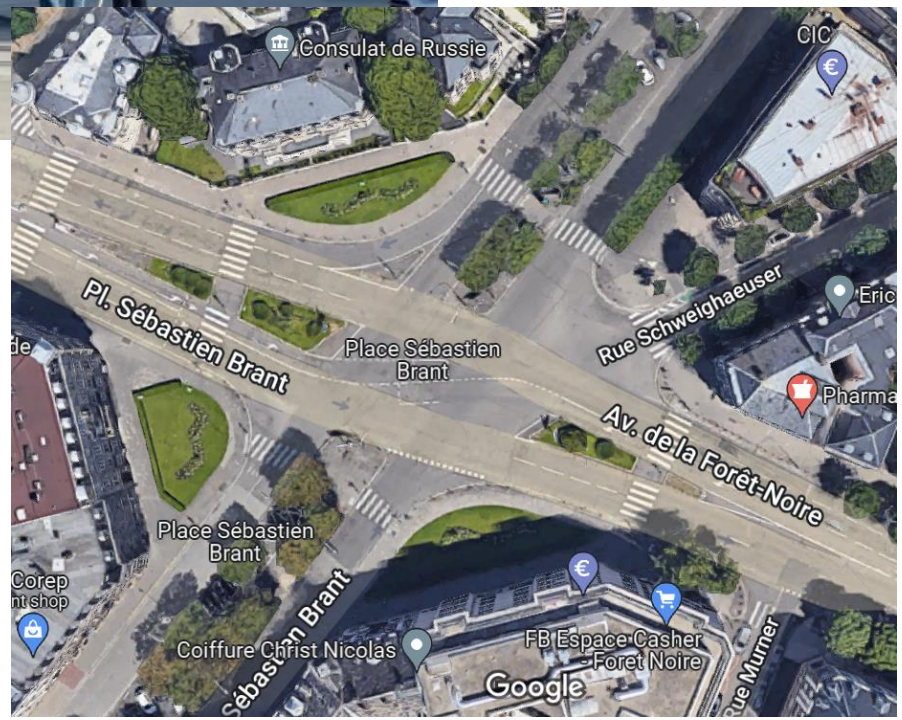
June 2023

Context: assisting street crossing with tactile maps

(Wiener et al., 2010)

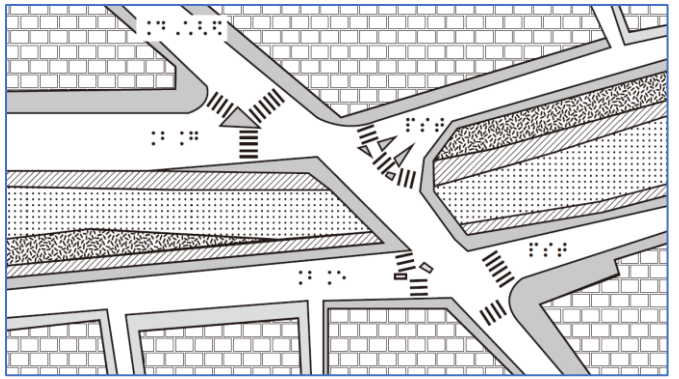


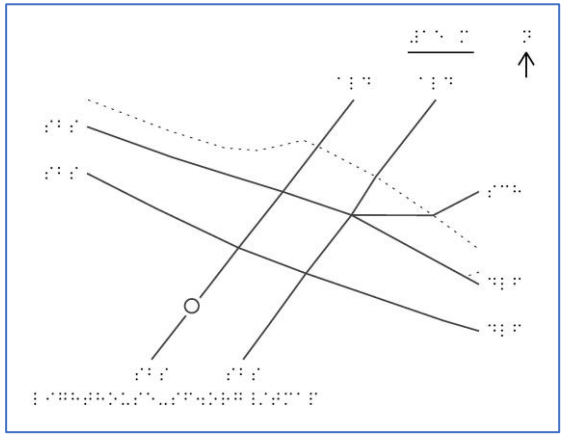
Fazzi, D. L. ., & Barlow, J. M. (2017).

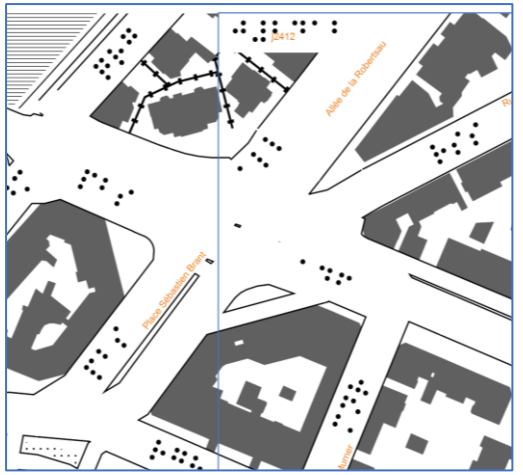


Handmade / toolkits

Townki







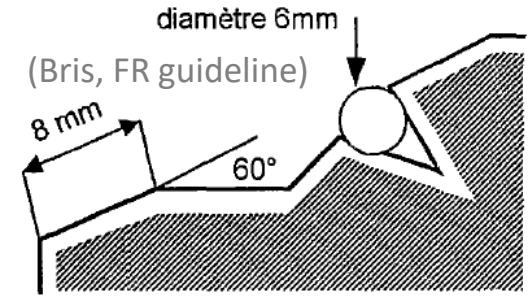
Automated services

TMAP

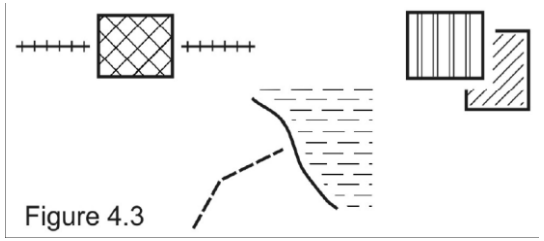
Mapy.cz

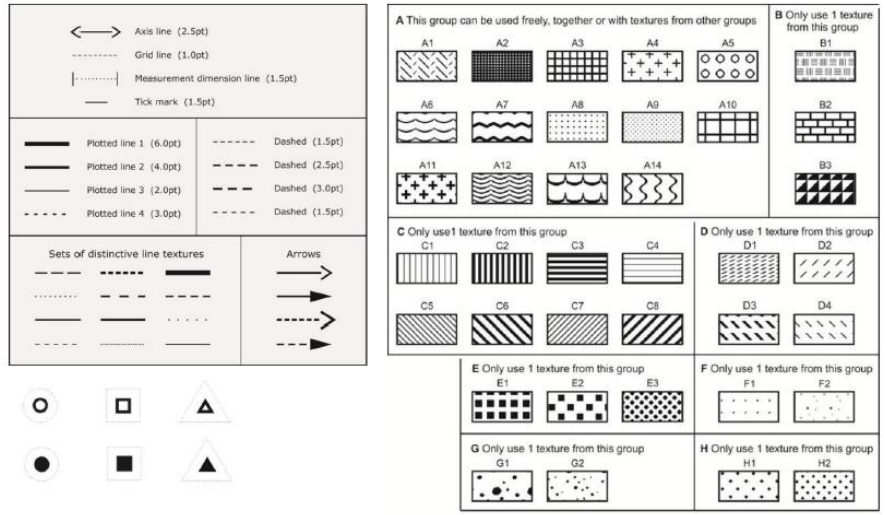
Designing a tactile map and automation: constrains, flexibilities, and diversity

Tactile graphics guidelines give the “basics”



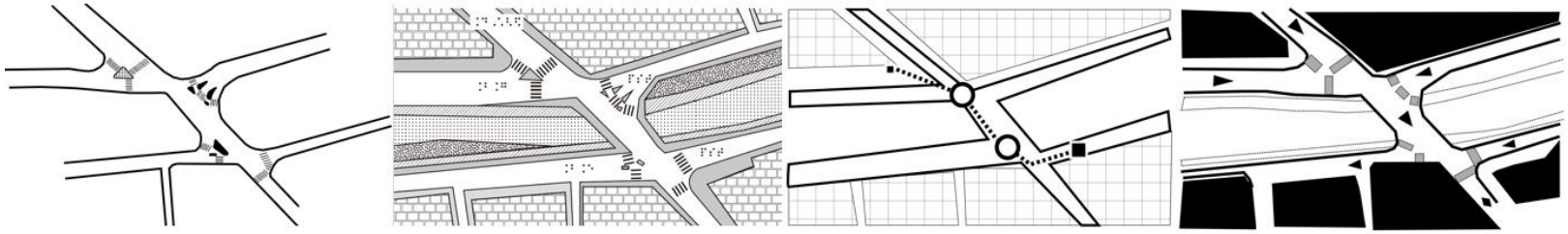
(Bris, FR guideline)





The N.S.W. Tactile and Bold Print Mapping Committee. (2006).
Braille Authority of North America (2010)

Practice is always flexible and diverse



IRIT / University of Toulouse

Tactile graphics guidelines say,

- Line width
- Point size
- Gap requirements
- Reduce detail to reduce clutter
- Available symbols
- Layouts on standard page
- …

They don’t say,

- What objects to choose
- Level of detail (“how much is too much”)
- Conflict solving strategies
- Associating symbol with objects
- Bigger / smaller pages
- …

“ it depends on the person ”

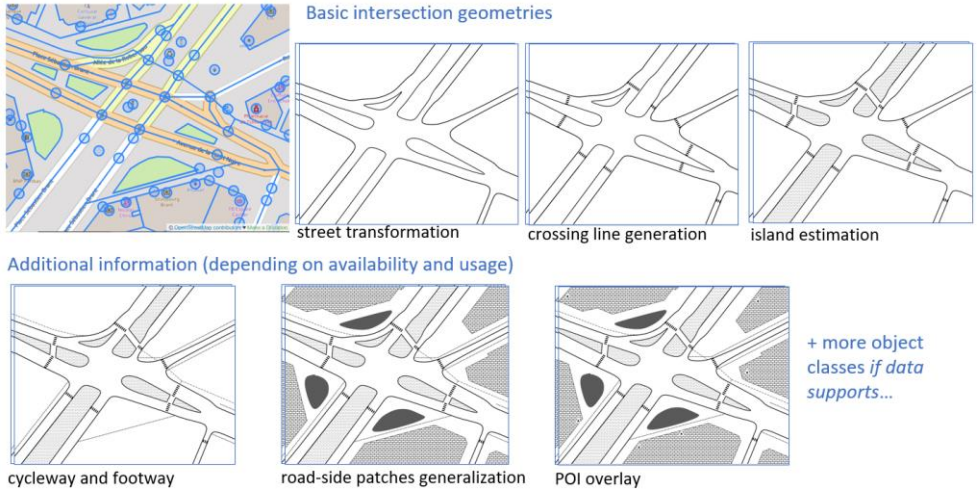
A semi-automated pipeline: from OpenStreetMap to swell paper prints

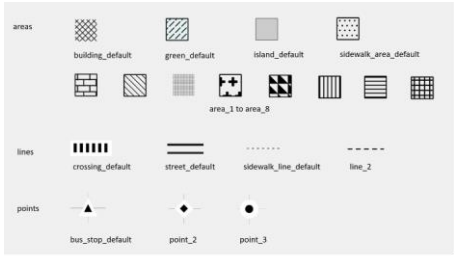
parameters:

Carto process + tactile adaptions + possibilities to customize

- map basics (location / size / scale)
- object choice
- tactile graphic params (line width, gaps etc)
- styling choices
- specific geometry processing choice

data preparation → geometry → styling, layout, assembly, export → print and produce relief





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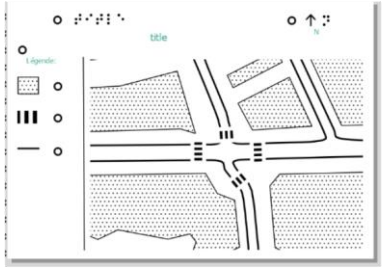
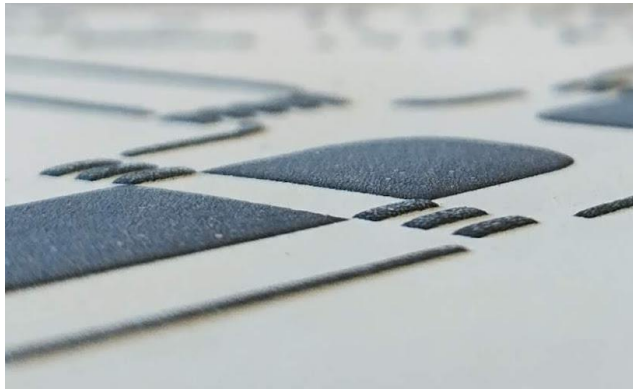




Implementation: py geos + pyqgis + binder example, https://github.com/myhjiang/human_crossing

OSM file

inspection, curation

param.json

processing extents

pedestrian crossing (point)

lane count estimation

street (line)

bus stop (point)

sidewalks (line or area)

buildings / green areas

displacement

- scale
- point size
- point gap
- overlay mode

bus stops

simplification and displacment

- scale
- line gap
- line width

inspection, curation

dilation-erosion-simplification

- line-area gap
- area gap
- min area
- level of detail

pedestrian crossing (line)

inspection, curation

- map extent
- scale
- line width
- line gap

- map extent

street (area)

traffic island (area)

smoothing, to line

sidewalks (line or area)

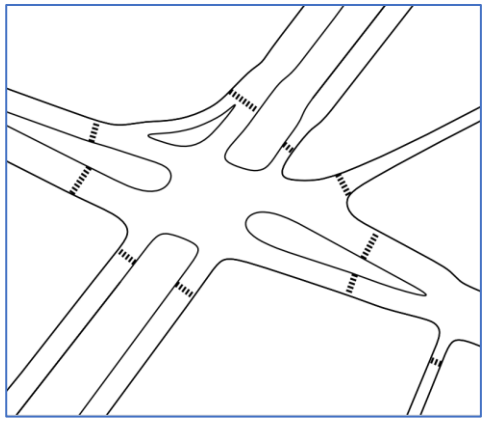
generalized patches

- area gap
- min area

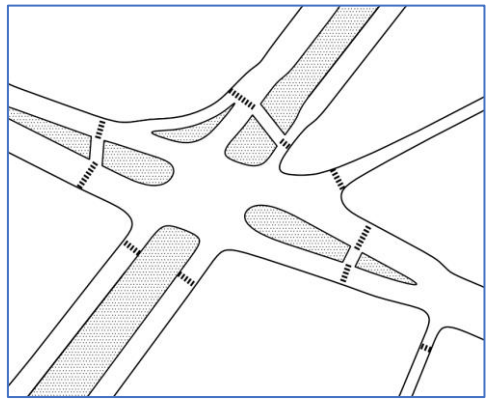
attribute input

street boundary / curb (line)

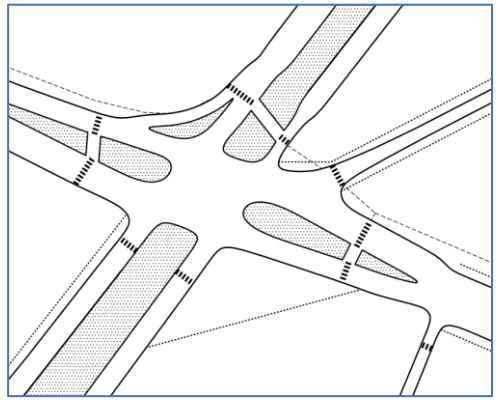
traffic islands with splits (area)



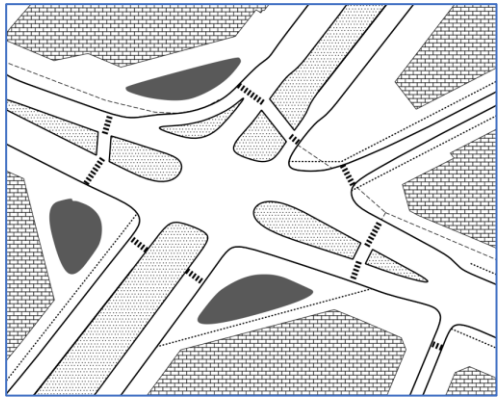
Street and crossing transformation



Island estimation

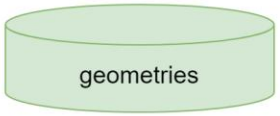


Sidewalks



Patches generalization

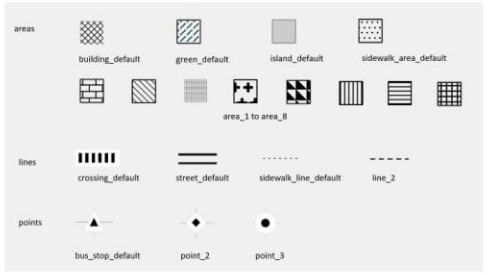
Map export



(json)

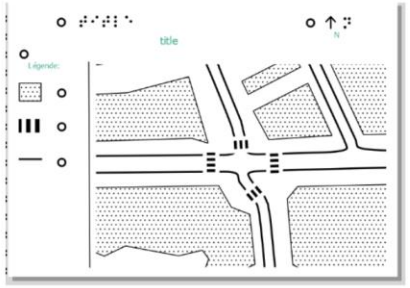
+

param.json



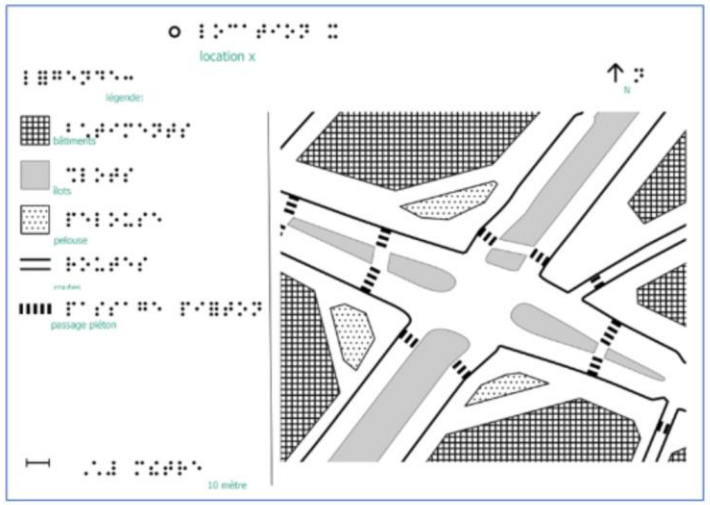
styles (qml)

+

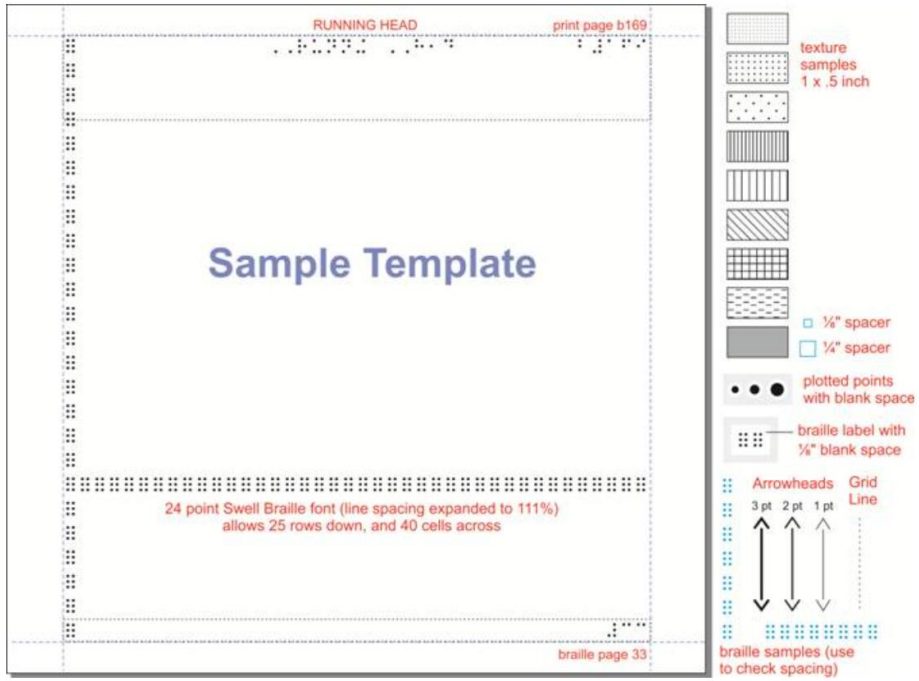


templates (qpt)

=



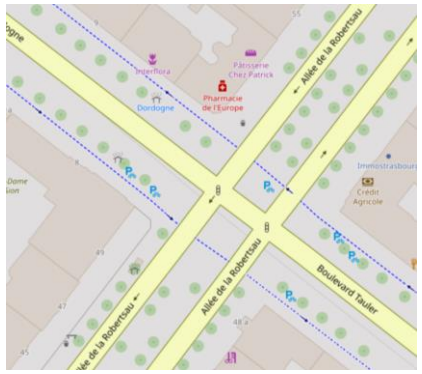
map to print on swell paper (pdf)

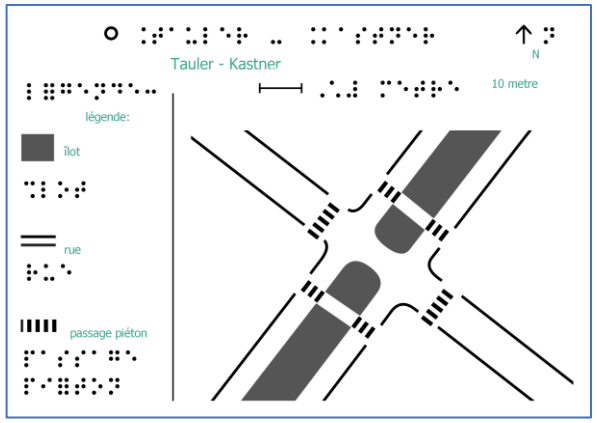


A3 / A4 / A5 + "no braille" templates, (based on guidelines + page specific adaptations)

BANA (2010)

Maps for prints: 3 sizes with flexibilities



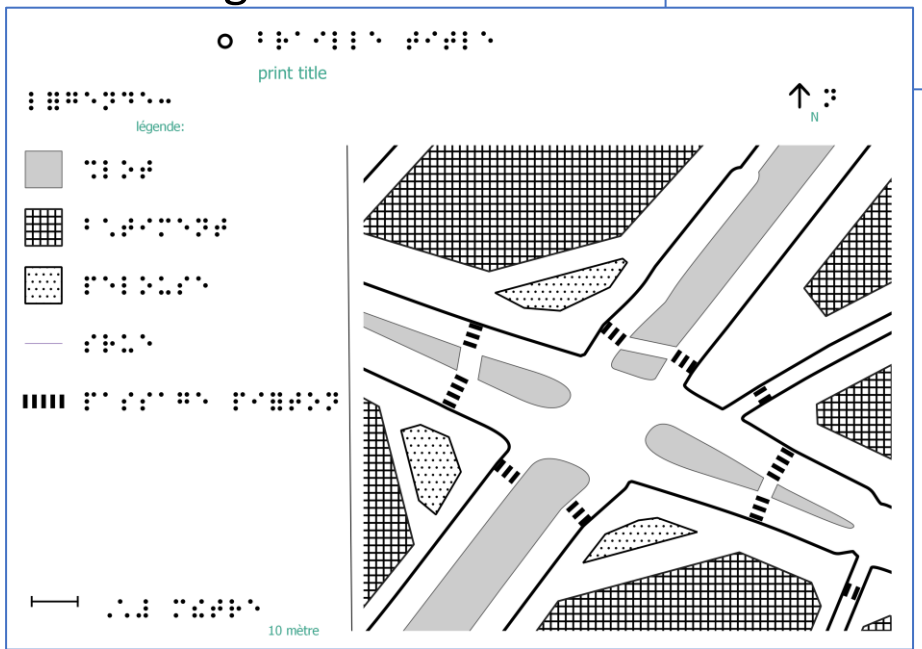


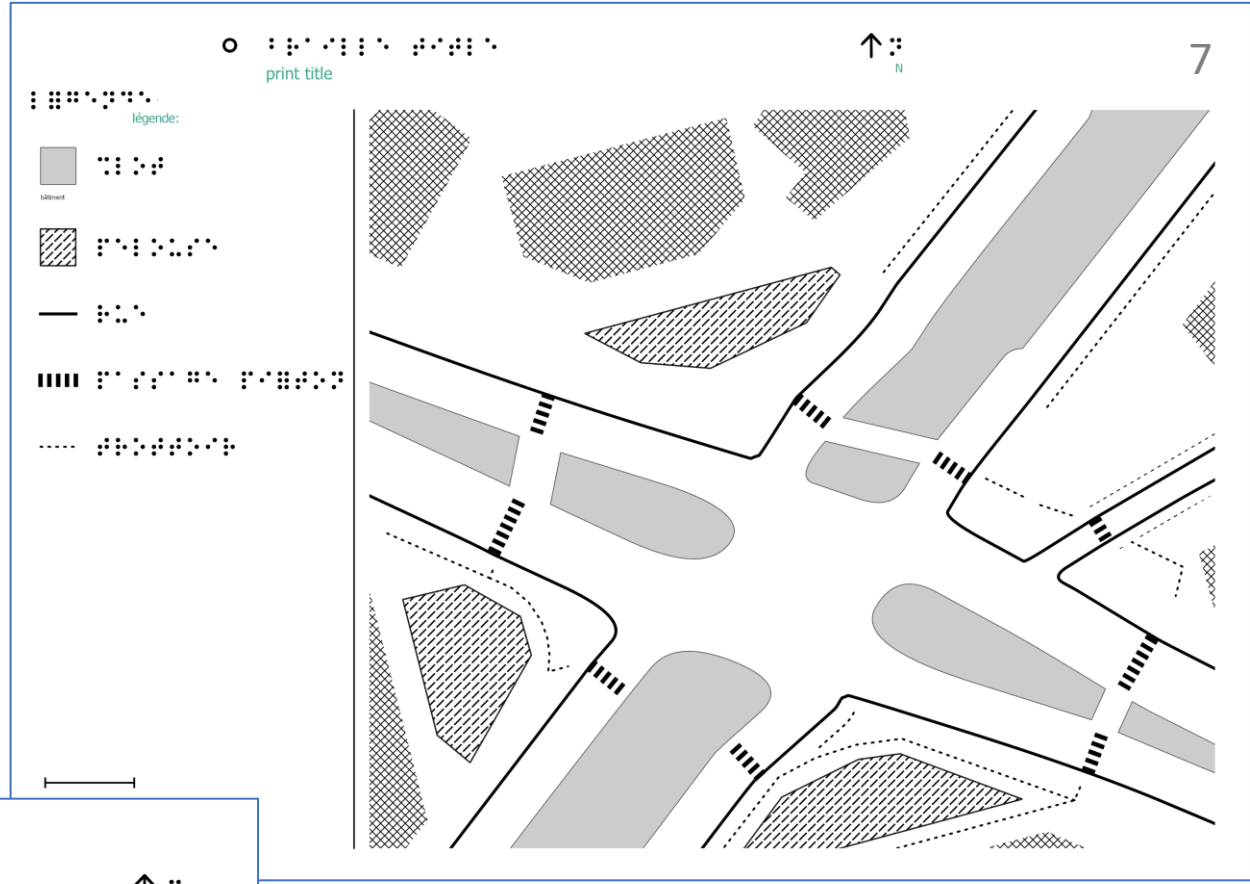
A5 1:1000

"on the road" / small interactive device

A4 1:1000

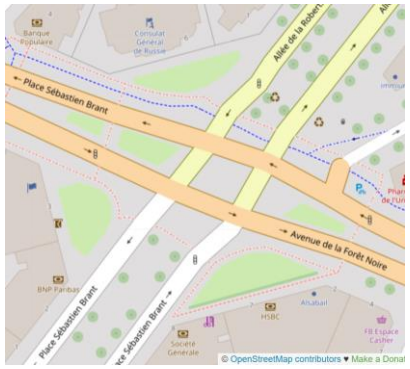
Balancing info & size





A3 1:500

Space for details and exploration



“Future” work: from making the maps to evaluating them

Map being “correct” / “acceptable”

Evaluation aspects:

- **Graphics:** is the map design acceptable? / how do you measure the clutter of a tactile map?
- Printing & production: will it eventually feel like what the design intents to?

- **Automated evaluations**

- **Tactile transcribers**
- Mobility instructors

Map being “usable”

Use contexts:

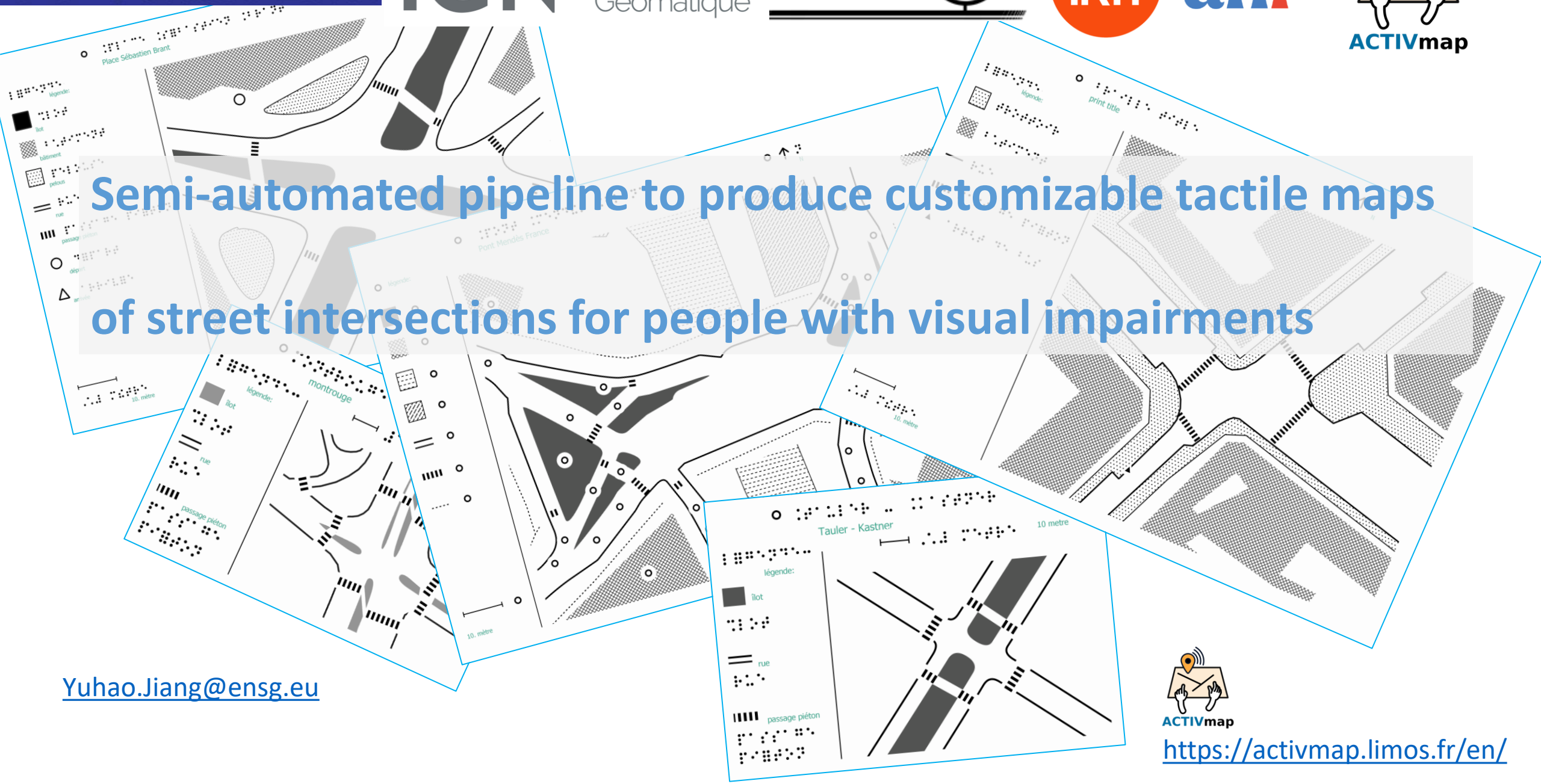
- with instructors / independently

Evaluation aspects:

- **Reading the map**
- Applying the map in reality (⚠)

- Mobility instructors
- **PVIs**

Semi-automated pipeline to produce customizable tactile maps of street intersections for people with visual impairments



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https://activmap.limos.fr/en/