An aerial photograph of a dense urban skyline, likely Chicago, with numerous skyscrapers and a body of water visible in the distance. A semi-transparent dark gray rectangular box is overlaid on the center of the image, containing the title text in white.

Where is a mobile map used in map-assisted pedestrian navigation?

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When using a mobile map to navigate to a new place, where do you need to unlock the phone screen and check the map?



To understand where people check the map, we need to know why people check the map.

Related research: motivations behind checking map

Wayfinding behavioral actions are those linked to

- ***orientation,***
- ***route decision,***
- ***route monitoring,***
- ***destination recognition***

(Carpman & Grant, 2002)



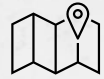
Checking map assists people in making decision during navigation.

Related research: decision making during navigation

Pedestrians tend to make decisions **before** reaching intersections.

People with **higher** spatial ability, **earlier** to make decisions.

(Brunyé et al., 2018)



Map use strategies help us understand where people check map.

Related research: types of map use strategies during navigation



constant
support

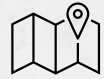


independent and
attentive



least effort and
inattentive

(Webber et al., 2012)

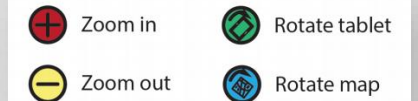
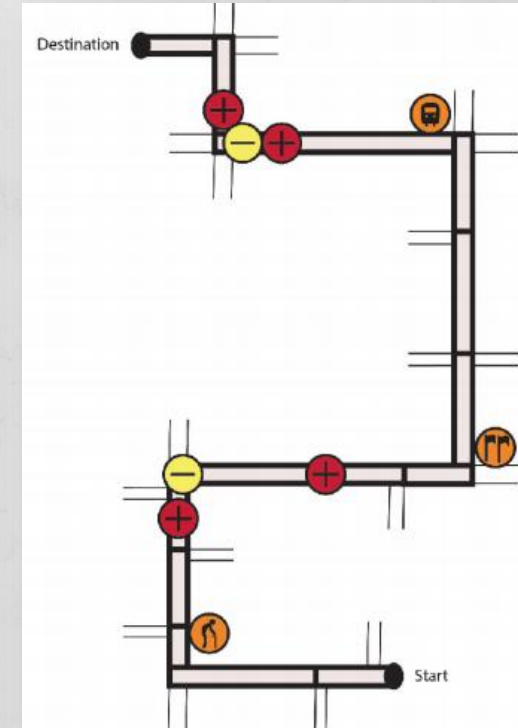
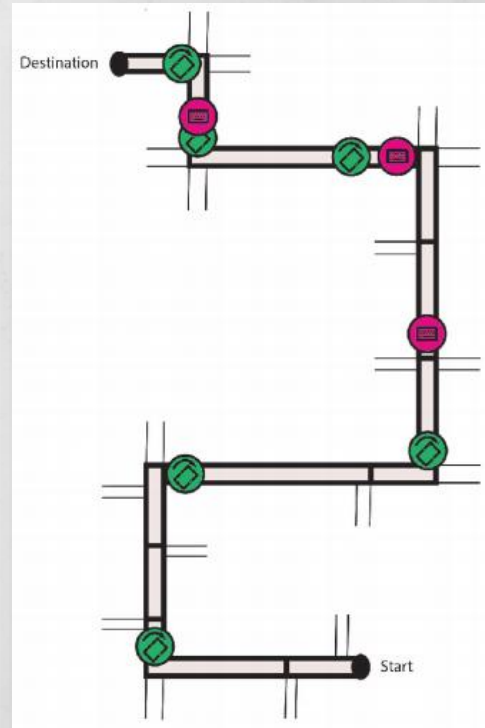


Map use strategies help us understand where people check map.

Related research: types of map use strategies during navigation

Taking specific map interaction types into consideration.

(Brügger, 2020)



Research Gap:

The existing research on map checking primarily focuses on intersections, with fewer studies investigating other trajectory factors (*e.g., road length, turns, landmarks, shortcuts etc.*).

Most studies use predetermined route for research and seldom consider the impact of route variations.
Example: The map checking behavior around intersections differs between first one and last one.

Little research explored how environmental changes such as traffic density affect people's map-checking behavior.

Research Question:

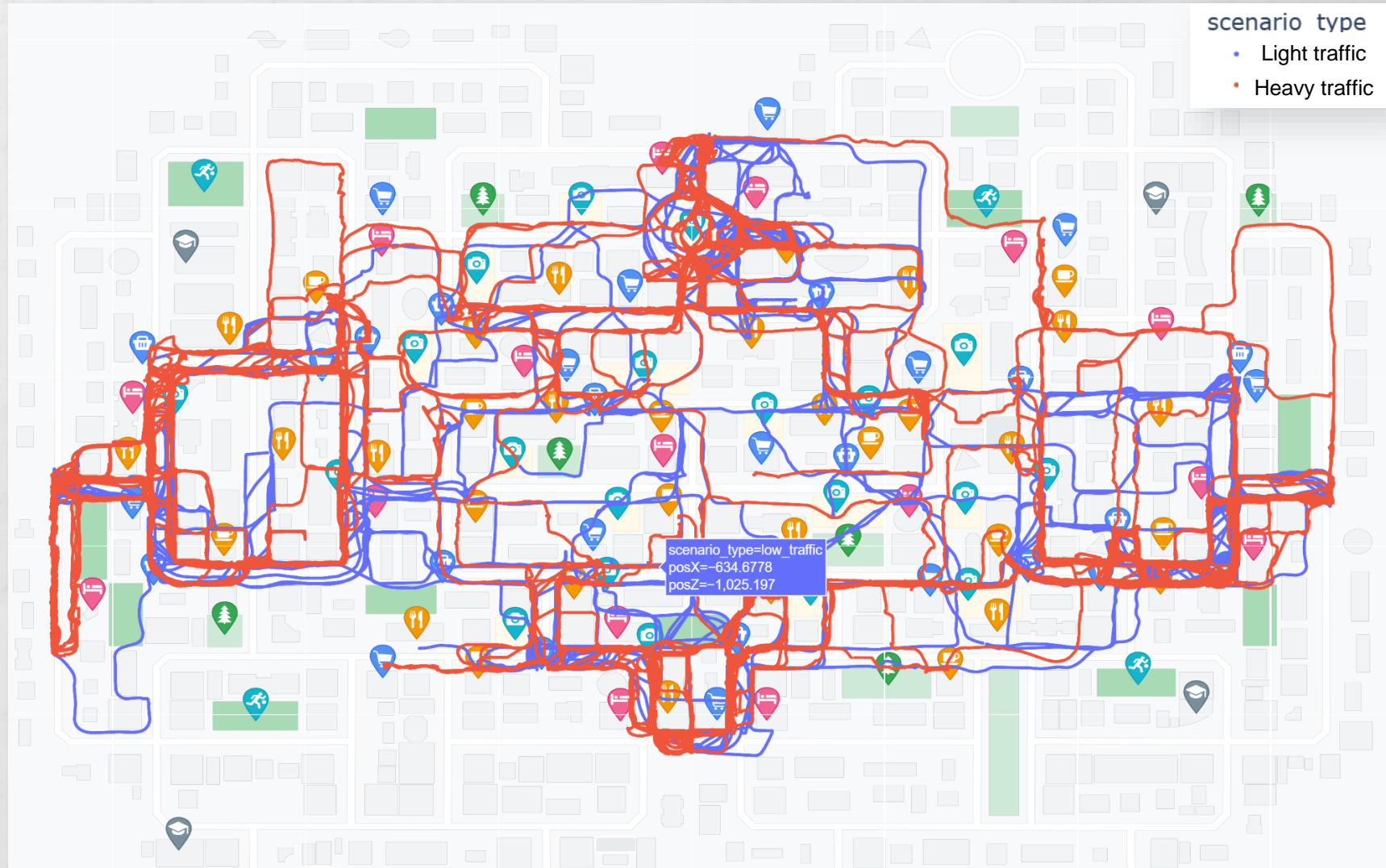
- 1. What are factors (e.g., intersections, turns, length etc.) that influence pedestrian map checking behavior, and how these factors affect it?**
- 2. What are the differences in map-checking behavior between heavy and light traffic density environments?**

Data Resource: VR Experiment

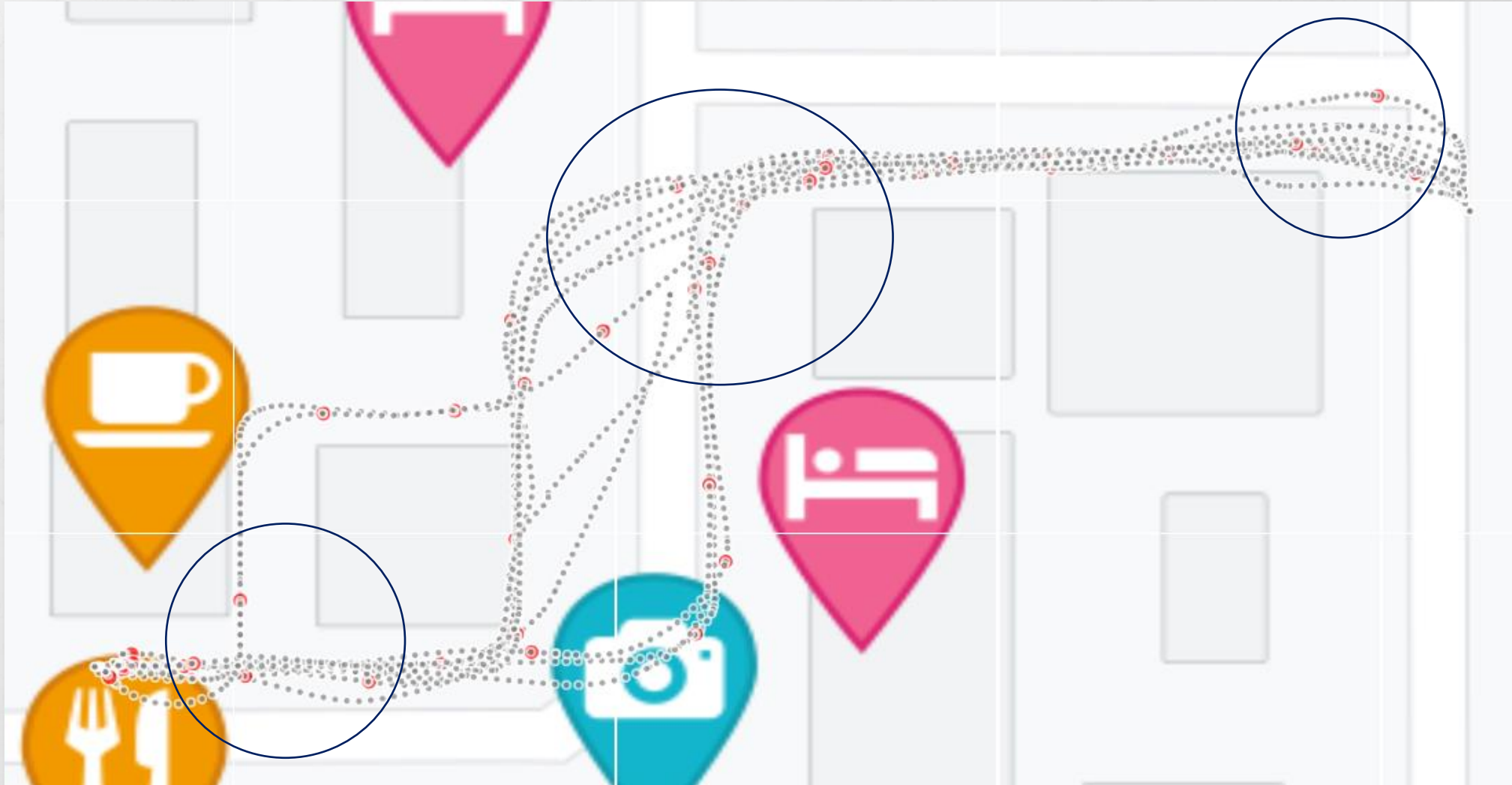
- Study on mobile map assisted wayfinding
- **Total study participants: 54**
- **Environmental conditions:**
Light and heavy traffic density
- **Number of recorded wayfinding task trajectories: 863**



Data Display:



Data Display:



Method:

From the perspective of **the number of map checking**:

- **Exploratory data analysis on potential factors**

Length, number of turns, number of intersections, shortcut involvement, numbers of landmarks, etc.

- **Regression analysis on potential factors against the number of map checking**
- **Build model to predict the number of map checking**
- **Comparative analysis**

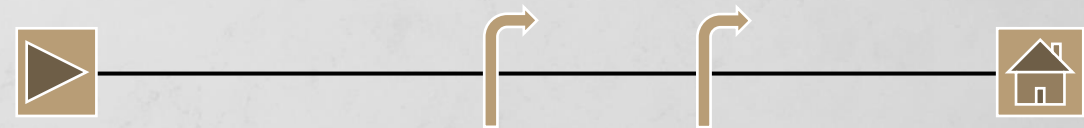
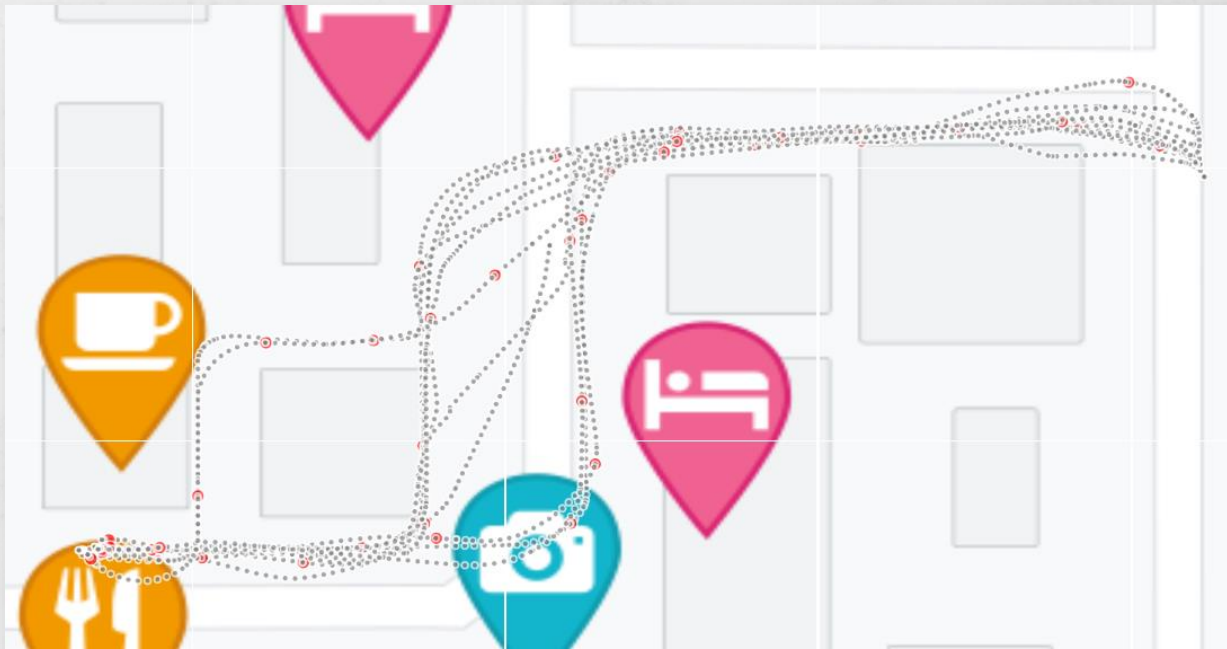
Comparing the differences between heavy traffic density and light traffic density.



Method:

From the perspective of **spatial distribution**:

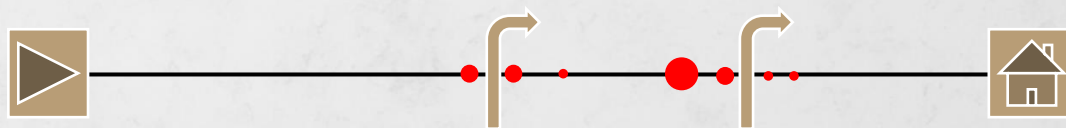
- **Abstracting trajectory**



Method:

From the perspective of **spatial distribution**:

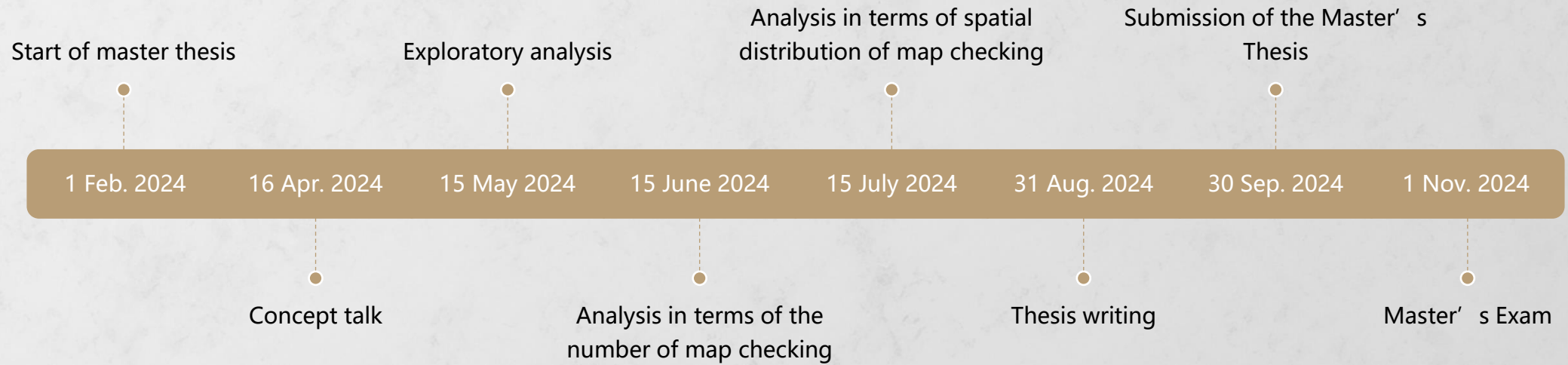
- **Cluster the abstracted routes based on the distribution of key features.**
- **Visualize map checking points on the standardized routes**



- **Comparative analysis**

Compare and analyze the distribution of map checking across different types of trajectories and traffic density.





A smartphone is shown at an angle, displaying a map application. The screen shows a street map with a blue route line and several red location pins. The phone is placed on top of a larger, physical map of a city, which also features a river and various streets. The text "Thank you very much!" is overlaid in white on a semi-transparent dark grey rectangular background in the center of the image.

Thank you very much!