Applying PIA Heuristics to Case 3: Last-Mile Autonomous Delivery App

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INTRODUCTION

To ensure a seamless experience across multiple channels, Pervasive Information Architecture (PIA) is applied [1]. PIA focuses on delivering consistent, meaningful experiences across apps, physical interfaces and messages.

This evaluation applies five heuristics: placemaking, consistency, resilience, reduction and correlation - based on Resmini & Rosati [1], focusing on Case 3: A Cross-Channel Autonomous Delivery Service for Malmö citizens.

CROSS-CHANNEL THINKING

In Case 3, at least three channels are involved:
1. **App:** Users track their placed orders on the delivery vehicle.
2. **Physical vehicle:** Vehicle must be easily identifiable.
3. **Messages or notifications:** Inform users about delivery status.

According to PIA, all channels should be visually and functionally interconnected, ensuring a cohesive, trustworthy and easy-to-use experience.

Heuristics, as Wikipedia [2] explains, offer practical and experience-based approaches rather than exact guarantees. They help address real-world issues across multiple touchpoints without requiring optimal or mathematical solutions [2].

PLACEMAKING

Placemaking: users must easily understand where they are and what actions are possible. While the app shows the vehicle's GPS location, this could be improved with clearer instructions. This relates to the heuristic nature described by Wikipedia [2], where guidance rather than exact answers helps users orient themselves across touchpoints.

Question: Does the system help users understand their location and next steps, both digitally and physically?

Suggested improvement: Add textual location description, e.g., "By Norra Neptunigatan 1".
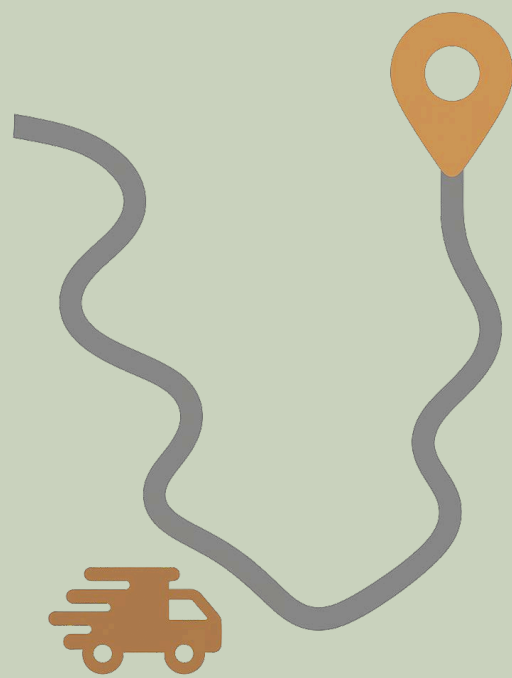
By Norra Neptunigatan 1

CONSISTENCY

2. Consistency across channels: It is important to ensure consistent language, behavior and visuals across all channels (app, vehicle and notifications) to build trust and avoid confusion. For example, if the vehicle displays "Scan to open", the app and notifications should use the same phrase. Similarly, notifications and app messages should align, e.g., always say "Pickup your delivery" [3]. Consistency is strongly supported by Shneiderman's Golden Rules, particularly as outlined by the Interaction Design Foundation [3], emphasizing that consistent interfaces reduce user confusion and cognitive load.

Question: Is language, visual design and functionality consistent across app, push notifications and the vehicle interface?

Suggested improvement: Use the same phrases, icons and style across app, notifications and on the vehicle.

RESILIENCE

3. Resilience, the Last-Mile Autonomous Delivery App should be built to be robust. Even when things go wrong or the conditions are less ideal the system should be able to support users. In this case a user could have a broken camera on their phone, or the QR-code could be damaged or dirty, so the user cannot scan it. What would happen then? A manual code entry could help solve this particular issue [3]. Following Wong's [4] recommendations for heuristic evaluation, resilience should be considered in designing systems robust enough to handle failure scenarios, without disrupting user goals.

Question: Does the system support the user in case of failure or unexpected situations (e.g. poor connectivity, failed QR-scan or late vehicle)?

Suggested improvement: Add the possibility to manually enter the code given in the app, as well as emergency support both in app and on the vehicle.

REDUCTION

4. Reduction, focusing on minimizing unnecessary steps improves customer satisfaction [3]. Avoiding extra options prevents frustration. Although Case 3 already has a simple flow (notification → open app → scan code → unlock → confirm), efficiency could be increased by features like auto-login or a direct link from the notification to the scan page. Inspired by Shneiderman's Eight Golden Rules [3], reducing unnecessary cognitive and physical steps enhances the user's ability to complete tasks efficiently across channels.

However, combining steps like "unlock" and "confirm" could be risky, as users should verify their order before confirming.

Question: Is the user journey streamlined by removing unnecessary steps, information or interactions that could cause friction?

Suggested improvement: Add a direct link from the push notification to the QR-code scanning page in the app.

CORRELATION

5. Correlation aims to the fact that strong, clear links should exist between digital and physical touchpoints. Users must easily connect what they see in the app with what happens in the real world. For example, if the app says "Your delivery is ready" but the vehicle gives no feedback, it causes confusion. Similarly, if the app says "unlocked", but the vehicle shows no physical confirmation, the experience breaks [4].

Question: Is there clear connection between the digital environment and the user's physical experience?

Suggested improvement: Add animations in the app and light and/or sound feedback from the vehicle when unlocking.

CONCLUSION

In applying PIA heuristics to the Last-Mile Autonomous Delivery App, it becomes evident that successful information architecture depends on consistent, meaningful cross-channel experiences [1]. Placemaking was partially achieved through GPS in the app but lacked physical confirmation on-site. Consistency was strong in intent but weakened by minor differences in phrasing and visual cues between app, notifications and vehicle interface. Resilience was moderately addressed, however, critical scenarios like failed QR-scans lacked backup solutions [5]. Reduction was relatively well implemented but could still be improved with direct notification-to-scan flows [3]. Correlation needed reinforcement through synchronized feedback across channels.

An information architect can design more resilient and coherent environments by deeply embedding these heuristics from early design phases [1]. In particular, cross-channel consistency and clear, supportive feedback loops are essential for building trust and easy use [3]. Future improvements should prioritize closing the gap between digital signals and physical confirmations, as well as ensure alternative flows for error solutions [5]. Applying PIA principles robustly across channels ensures a seamless, reliable and user-centered experience [1].

SCAN FOR MIRO-BOARD

REFERENCES

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