Pharmaccess

The future of 24/7 medication access

Beta Test plan

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1. Introduction

Project Context

PharmaXcess is a 24/7 automated medication dispenser that enables patients to access their medications at any time.
It works like an ATM and safeguards medications, which are delivered from the pharmacy's internal stock through a pneumatic system when it is installed outside pharmacies. In addition, a companion mobile application allows users to monitor their medication intake, manage prescriptions (e.g., renewal dates), locate the nearest dispensers, use a Click & Collect system by sending their prescriptions to a pharmacist, and benefit from real-time chat with a healthcare professional.

The goals of the Beta Test Plan

The goal of this beta test plan is to evaluate the stability, efficiency, and user-friendliness of the PharmaXcess dispenser and its mobile application.
The identification of potential errors and product adaptation will be easier with this approach before deployment on a large scale.

2. The background and key figures

Inequality in accessing medications remains a problem in France, particularly in rural areas and outside of regular opening hours. The following important data highlights the problem:

Limited Access and Closures

- For the past few years, the number of pharmacies in France has been decreasing, reaching 19,966 in 2023.
- Approximately 210 pharmacies close every year, with 236 in 2023 being the highest number. Rural areas are being affected by the majority of closures, leaving some villages without pharmacies.
- Approximately 5% of French municipalities (about 1,701) do not have a pharmacy, despite having a sufficient population to justify one.

- On Saturday afternoons, approximately 30% of pharmacies are closed, while only a select number of on-call pharmacies are open at night or during public holidays.

Geographical Accessibility

- In rural regions, the typical distance between two pharmacies is between 15 and 20 kilometers.
- Nationally, the average distance to reach a pharmacy is 3.8km.
- Patients requiring going to an on-call pharmacy must make round trips that go beyond 40km.
- Due to the absence of an on-call pharmacy in certain rural hospitals, patients may have to travel long distances to collect medications after discharge.

Impact on Patients

- About one in five French people decided not to pick up a medication due to the closure or remoteness of a pharmacy.
- The negative effects of this situation are evident:
    - Elderly people,
    - People without transportation,
    - Urgent needs outside regular business hours.

These figures reinforce the necessity for a solution like PharmaXcess, which provides 24/7 access to medications through connected dispensers located on pharmacy facades, along with a mobile app for geolocation, prescription management, and personalized tracking.

3. Key Functionalities

Dispenser

- Extracting the required information from the scanned prescription.
- Verifying the authenticity of the prescription.
- The process of validating and authorizing medication dispensing.
- Managing medications that are not available (reordering or directing them to another pharmacy).

Mobile App

- Click & Collect is a method to obtain a QR code by taking a photo of the prescription and sending it to the pharmacist.
- Find dispensers and calculate directions.
- Provide medication management reminders.
- Display prescription history and renewal alerts.
- A healthcare professional can be chatted with in real-time.

4. User Journey Coverage

Journey 1: Patient

- Launches the PharmaXcess application.
- Takes a picture of their prescription by employing Click & Collect.
- Submits the image to the pharmacist.
- A validation notification and a QR code have been received.
- Visits the nearest dispenser.
- Scans the QR code.
- Medications are delivered.

Edge cases:

- If the prescription is blurry, the system will request a clearer photo.
- If there is an unrecognized prescription, alert and contact the pharmacist.
- If there is no medicine available, it will be directed to the pharmacy or postponed.

Journey 2: Pharmacist

- Receives a prescription via the app.
- Examine the authenticity of the prescription.
- Decides on whether to accept or reject the request.
- In the event of rejection, a comment will be provided.
- Approval has been given for dispensing through the dispenser.

Journey 3: Error Case (Unreadable Prescription)

- A prescription that is not clear is being utilized.

- The image was not accepted by the system, and it asked for another attempt.
- An alert will be sent to the pharmacy if it remains incomprehensible after several attempts.

Journey 4: Non-reimbursed or Payable Medication

- The user is free to choose between scanning a prescription for a medication that is not covered by insurance or selecting an over-the-counter option.
- The app/dispenser displays a clear indication of the payment amount.
- The dispenser is equipped with a secured payment system that is integrated.
- Medication is retrieved after payment confirmation.

5. Test Scenarios

Dispenser Scenarios

Scenario	Steps	Expected Result
Verification and validation check for prescriptions	Insert -> scan -> OCR + authenticity check	Prescription is validated
Unreadable prescription	A prescription that is unclear or has been damaged	There is a message that indicates an error Request to retry
Unavailable medication	Valid prescription, but out of stock	Suggest order or refer to another pharmacy
Medication retrieval	Scan the QR code and release the medicine	The medication and prescription are given to the user
Guidance display	When the drug is recognized, a message is displayed	The message that is displayed has been approved beforehand by a healthcare professional

App Scenarios

Scenario	Steps	Expected Result
Click & Collect	Capture a picture -> forward it to the pharmacist -> generate a QR code	Validation of the prescription results in generation of a QR code
Blurry photo	Blurry images trigger rejection	Retry requested
Locate dispensers	Search, display, and direction	The nearest dispenser is displayed with its location and pathway
Chat with specialist	The message has been sent and the response has been received	Messages and replies transmit instantly
Medication payment	Receive prescription -> non-covered drug -> payment	Secure payment confirmed

6. Success Criteria

Dispenser Success Criteria

- Achieves high accuracy in prescription scanning and analysis.
- Falsified prescriptions are not accepted due to effective authentication verification.
- Guaranteed delivery and dispensing without any mistakes.
- In the event that medication is not accessible, it is suggested to use a suitable substitute.

App Success Criteria

- In a reasonable time frame, the prescription will be sent and validated.
- The dispenser is capable of recognizing the QR code that was produced.
- A user interface that is both simple and intuitive.
- The functionality of geolocation and chat features is present.

7. Metrics for measuring performance and quality

Processing Time

- For OCR and software validation, it is necessary to process 95% of prescriptions within 5 minutes.
- The average processing times will be monitored, even if pharmacist validation cannot be time-constrained.

Software Responsiveness

- The response time for app actions must be within 500 milliseconds.
- The primary features (Click & Collect, Chat, and History) require a quick opening time of under 1 second.

Acceptable Error Rate (Beta Phase)

- The error rate must not exceed 10%.
- Includes:
    - OCR reading errors.
    - Unrecognized prescriptions due to incompleteness or non-conformity.
    - Automatic rejections of non-compliant documents.

8. Designing for accessibility and inclusivity

Our commitment is to follow the RGAA (General Accessibility Improvement Framework) and ensure an accessible experience for all users by designing the application and physical device interface accordingly.

Visual Impairments

- It is compatible with both VoiceOver (iOS) and TalkBack (Android).
- Buttons support voice navigation and provide audio feedback.
- An alternative description text for icons.

Color blindness and vision disorders

- Enhanced contrast was evaluated through the use of simulators.
- Indicators can be used beyond just color.

Disorders related to dyslexia and learning

- Using fonts that are both legible and adapted is necessary.
- Do not use fonts that have script, italic, or condensed characters.

Motor Disabilities

- Use of keyboard and voice commands for optimized navigation.
- Large and well-spaced touch areas.

Why it is essential:

There are 12 million people who live with a permanent or temporary disability in France. It is important for these users to have access to medication without discrimination, which is a matter of public health.
PharmaXcess is available to everyone, regardless of their situation.

9. The relationship between legal compliance and data privacy

Automated delivery using OCR

- Before dispensing prescription drugs in France, it is necessary to obtain approval from a pharmacist.
- PharmaXcess employs an OCR system that has been trained on data validated by certified pharmacists to meet this requirement while automating.

- The dispenser's software can independently verify authenticity, compliance, and validity because of this.
- The 24/7 service complies with prior validation requirements.

Automated Guidance

- In the event of assistance, the dispenser interface displays instructions based on the prescription that has been recognized.
- Pre-approval from pharmacists follows the process of automatically generating messages for each medication.
- This guarantees that information is clear and verified without the need for direct human interaction.

GDPR and its implications for security and privacy

- Compliance with GDPR is mandatory for all health data.
- Ensuring the confidentiality and safety of prescriptions and personal data requires encryption, secure storage, and privacy.
- A reliable history is available in case of audit or review due to the traceability of each interaction.

10. Compatibility with distribution systems

Pneumatic tubes or chutes are used in the internal distribution systems of approximately 92% of pharmacies in France. Our solution is specifically designed to work with these two systems, making it easy and fast to integrate. Supporting other less common systems is not currently part of our plan.

11. Regulatory Monitoring & Interoperability

We actively monitor the pharmacy management software to make sure it is compatible with our solution. Our legal strategy involves collaborating with specialized associations (such as 60 Millions de Consommateurs or Que Choisir) or legal experts in healthcare law to ensure that our automated medication distribution method is legal. Professional guidance is necessary due to the specificity and complexity of healthcare law.

12. Financial & Hardware Considerations

There will be a moderate amount of initial investment required for the implementation of the prototype. The test system that is being planned for summer 2025 will be executed on a Raspberry Pi with an integrated screen that is installed inside the pharmacy, and there will not be any structural modification to the building (like wall drilling). We will be able to prove the concept in real conditions while still complying with technical and legal constraints using this approach.

Estimated Costs:

- Raspberry Pi with screen and casing: €120.
- The team is responsible for internal software development.
- The price for the display stand and mounting support is €30.
- The security level of the connection between the app and the pharmacy server is regulated by the system utilized, which will be enhanced during the monitoring phase.

13. Pharmacy Test Setup

The beta testing phase relies heavily on pharmacies.
Without the following requirements, starting the beta test phase is not possible.

- Collect the approval of a pharmacy to host the demonstration system, which includes a screen and a Raspberry Pi.
- Have a functional software prototype running on Raspberry.
- Despite the absence of a physical dispenser, it is crucial to demonstrate real prescription validation on the interface.

Beginning summer 2025, a complete functional demonstration will be presented using a simple installation plan that doesn't involve wall drilling.

14. Beta Tester Recruitment

Two methods will be employed for recruiting beta testers:

1) Confirming an agreement with one or more partner pharmacies. This is crucial because pharmacies play a crucial role in the testing phase.
2) Local publications, social media, or partner pharmacies themselves are all viable options for attracting interested patients.

The testers can validate both the embedded software and the mobile application in real conditions.

15. User Case Studies (Fictional Scenarios)

Case Study 1 – Julie, 74 years old

Julie's village is located 18km away from the nearest pharmacy. She sends her prescription for hypertension medication using PharmaXcess.
After Julie's prescription is validated by the pharmacist, she receives a QR code. She scanned the QR code at the dispenser on the wall of her village pharmacy that evening. She can receive her treatment without delays, long-distance travel, or stress.

Case Study 2 – Nicolas, 33 years old, employee

Nicolas is employed in the restaurant business and usually completes his shifts after 9:00 p.m., which is after pharmacies have closed. Until now, obtaining his prescriptions involved either rushing during his breaks or waiting until Saturday morning. PharmaXcess has made it easier for him to pick up his medications after work without any time pressure or stress.

By using fictional case studies, it is possible to demonstrate the real-life impact of the project, particularly for vulnerable or isolated populations.

16. Identify the test organization and deliverables

Testing Methodology

- The responsibility of testing will be divided between pharmacists and volunteer patients.
- Google Forms will be utilized for the collection of feedback.
- The product's enhancement will be determined by analyzing collected data before its official launch.

Key Dates

- The testing process will begin during the summer of 2025.
- The testing is expected to be finished by the end of 2025.
- During the testing phases, it will be important to analyze the results and adjust.

17. Expected Outcomes

- Evaluating the reliability of prescription scanning and validation systems.
- Evaluation of necessary improvements to the user interface.
- Examining the dispenser's durability under real-world conditions.
- Confirmation that the Click & Collect system operates correctly, and that the user has had a satisfactory experience.
- Ensuring that all systems are optimized and ready for the official launch.