



Multi-Factor Intelligent Packaging Solution to Prevent Opioid Abuse and Misuse

Principal Investigator (PI): Bahar Aliakbarian

Co-PIs: Prem Chahal, Arun Ross, Mohammad Rabnawaz, Ali Tamayol, Susan Selke

Point of Contact: The Axia Institute at axia@msu.edu

1. Research Project and Axia Theme

The Pharmaceutical Smart Packaging research aligns with the Axia Institute's strategic plan through its focus on developing new smart packaging solutions for the management of prescription drug's crisis. This smart pill bottle limits unauthorized access to prescription medications by biometric authentication, tracks medication distribution via Radio-Frequency Identification (RFID) technology and reduces overdose risk by dispersion of anti-tampering materials when necessary.

This platform has the potential to reduce drug thief and diversion by enabling monitoring the patient's medication adherence and enhancing supply chain item level traceability.

This research fosters collaboration and an integrated systems approach to value chain optimization, and it can help industries understanding packaging trends and adapt their packaging and their supply chain to meet changing demands.



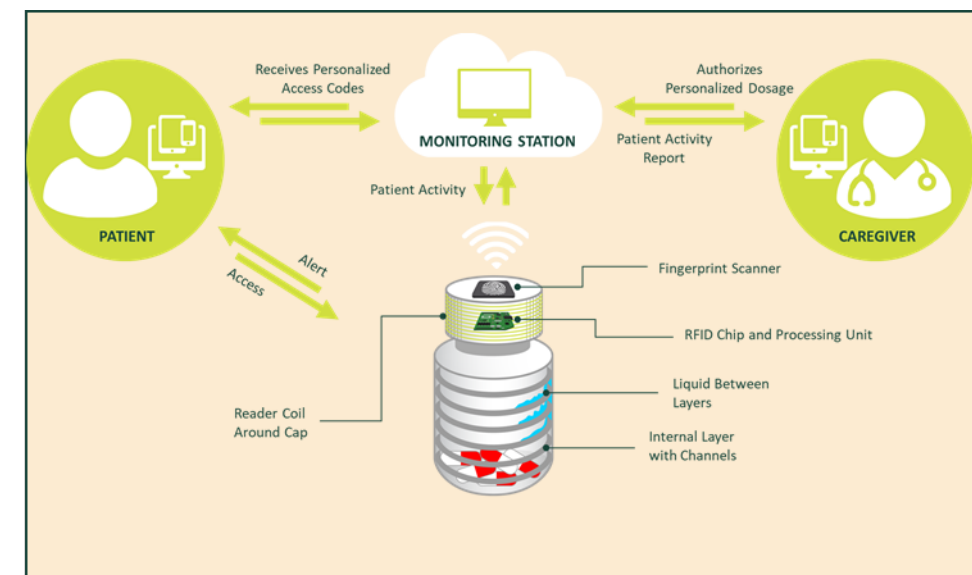
3. Results and Future Directions

The proposed intelligent packaging is an innovative concept focusing on the integration of the following unique technologies:

RFID technology for traceability;

Biometric sensors for safety;

Anti-tampering feature to reduce overdose risk.



PORTABLE It is easy to carry.	TRACEABILITY data on the frequency of use is captured within the device's chip and can be downloaded and stored.	
TAMPER-PROOF any attempt to breach or damage the package will result in the release of an aversive compound.	AUTHENTICATION the fingerprints of each patient is captured in the device itself and is required for each dispensing of the dose.	ADHERENCE TO TREATMENT the patient's prescription is programmed. Patient can be notified and the adherence can be monitored by health care providers.

Future directions:

Clinical tests to support the claims;

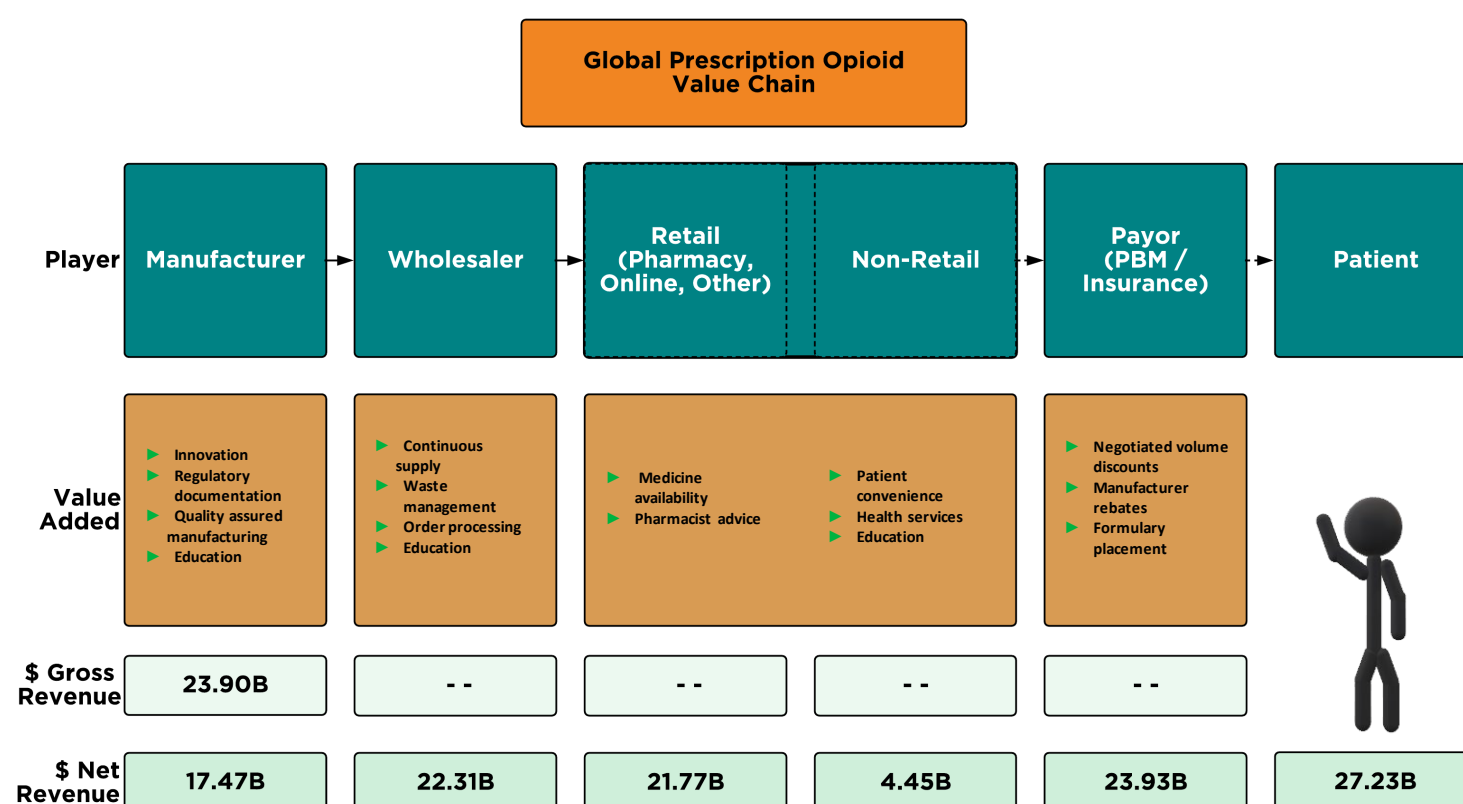
Complementor Technology Profiling;

Value Proposition Map for Key Influencers;

Define Potential Partners.

2. Value Created

The success of this initiative will (1) improve global health outcomes by reduction in the prevalence of opioid misuse and abuse; (2) progress toward the generation of intellectual properties; (3) move towards commercial plans; (4) sustain the research activities beyond the the Axia Institute funding timeline by applying for external federal and private industry grants.



4. Project Plan

Year 1 (2018-2019)

The first year of the project will be planned for feasibility studies. The results from this stage will be used for publication, congress presentation and submit proposals to federal agencies such as DOD (e.g., Army), NSF, and NIH.

Year 2 (2019-2020)

The optimized strategy confirmed in Year 1 will be used in the second year to demonstrate the applicability of the proposed technology to be integrated to design a prototype of an intelligent package that can prevent opioid abuse. In collaboration with the Axia Institute members, intellectual property license strategy will be developed and the potential to form a start-up firm and commercialization phase will be investigated. At least 6 months are needed for bringing the solutions to the market.