

# PROBLEM

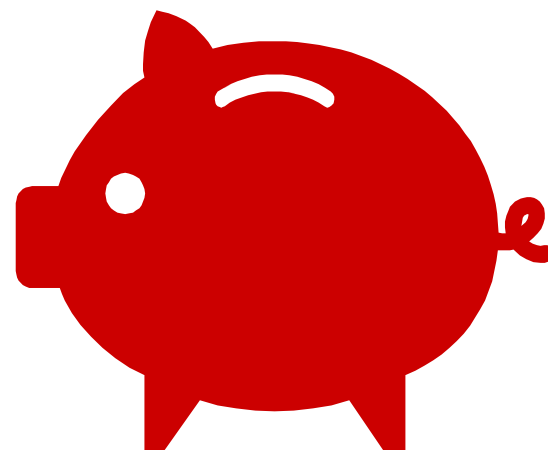
**Getting vaccinated is a common experience for most of us. But how do we keep accurate, verifiable and privacy-preserving proof of our vaccinations?**



Vast majority of records are in paper form, incomplete, and unverifiable



Weak recognition of vaccination records across country borders, with a wide range in vaccination standards



Current methods to validate records wastes time, money and medical resources



Recent scandals involving counterfeit and expired vaccines have shaken public trust

## SOLUTION

**A portable vaccine “passport” built on a blockchain platform,  
accessible on a user’s mobile phone.**



Immutable,  
permanent,  
decentralized,  
verifiable  
records



Privacy  
protected  
using  
blockchain  
technology



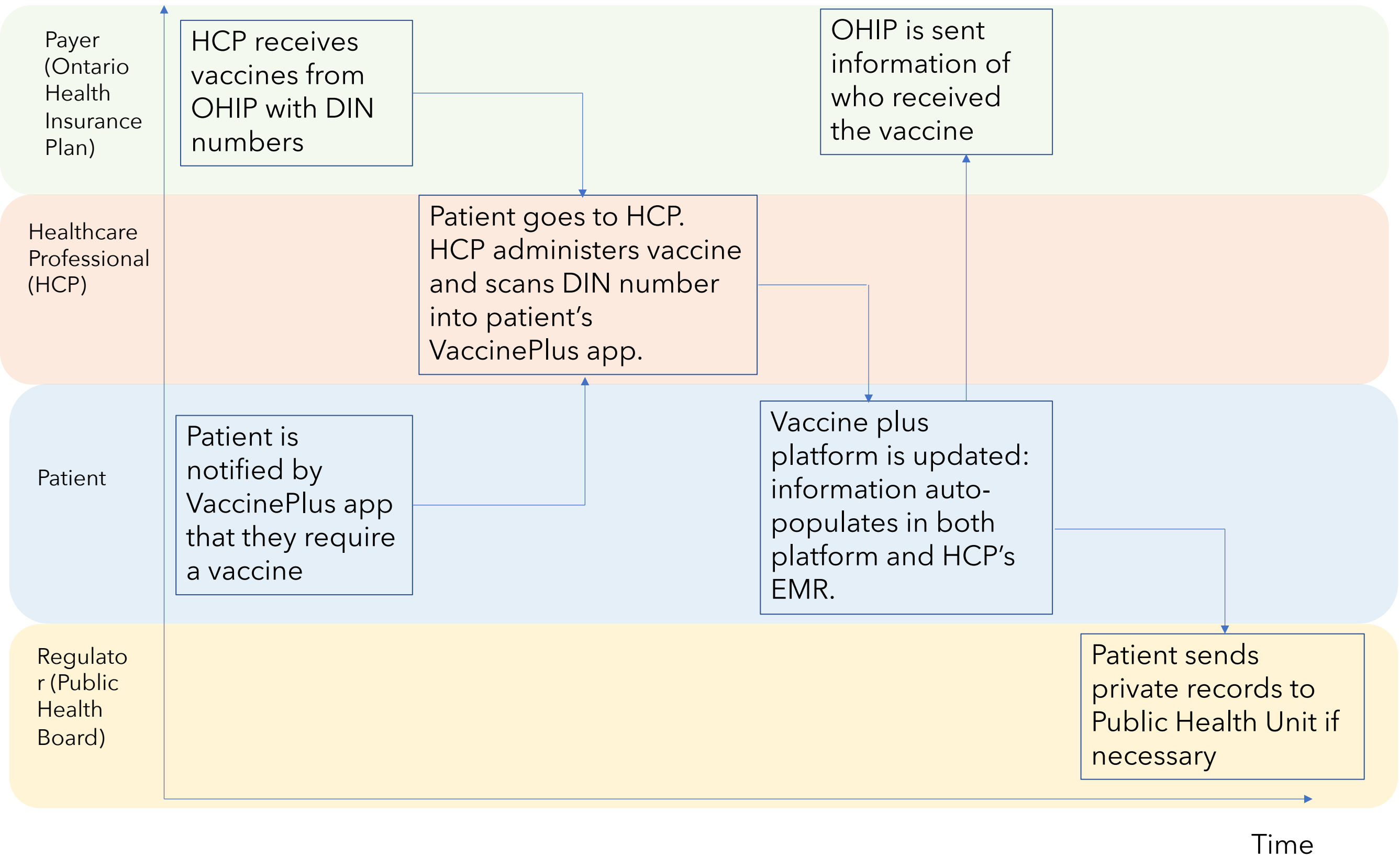
Fraud reduced  
through origin  
tracing and  
verifiable  
provider  
signatures



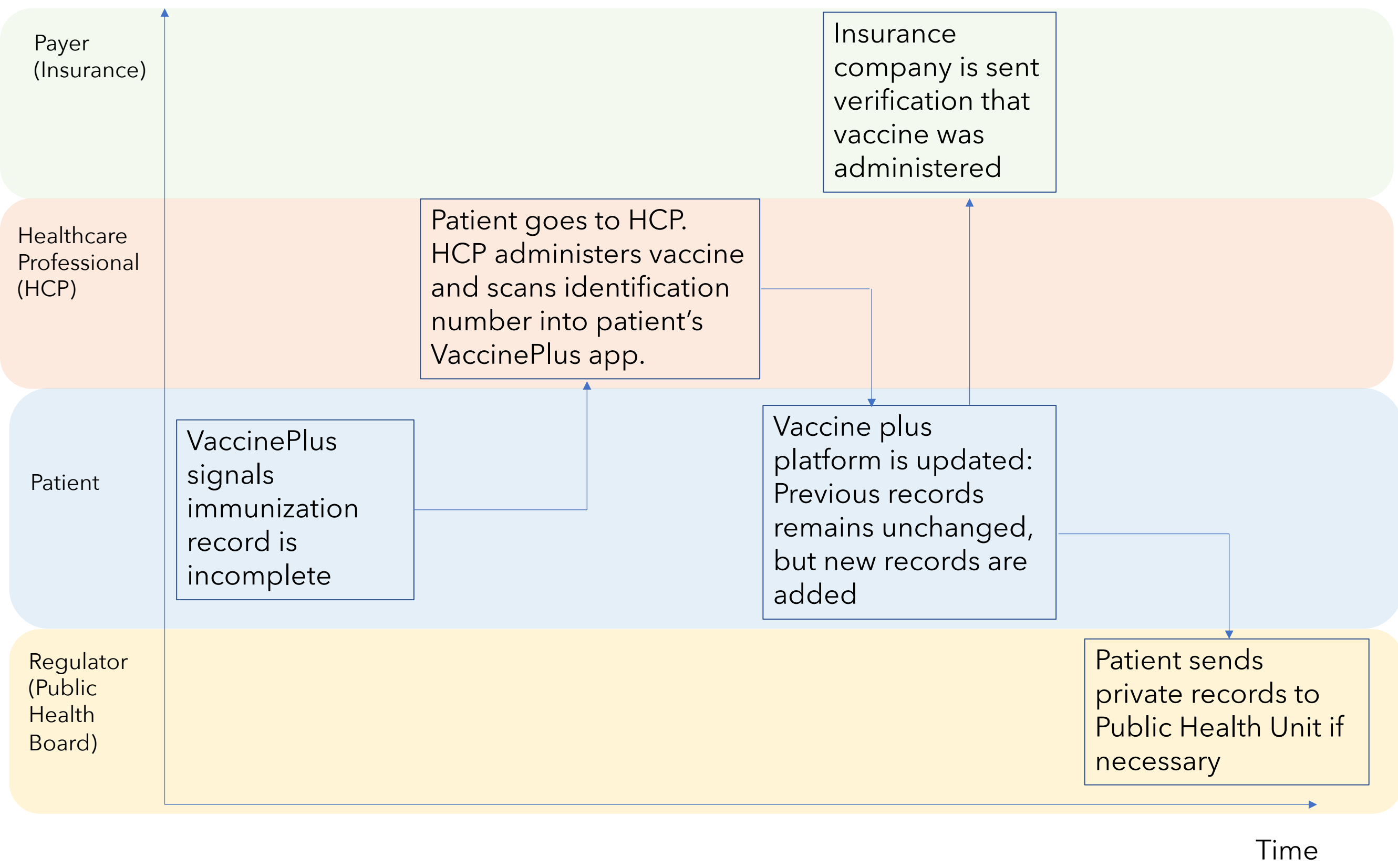
Record accuracy  
and completeness  
improved due to  
scanned vaccine  
identifiers

# Record Attestation Process

Legend:  
HCP: Healthcare Provider  
OHIP: Ontario Health Insurance Plan  
DIN: Drug Identification Number  
EMR: Electronic Medical Record



# Record Verification Process: e.g. New country, new HCP



# STAKEHOLDERS

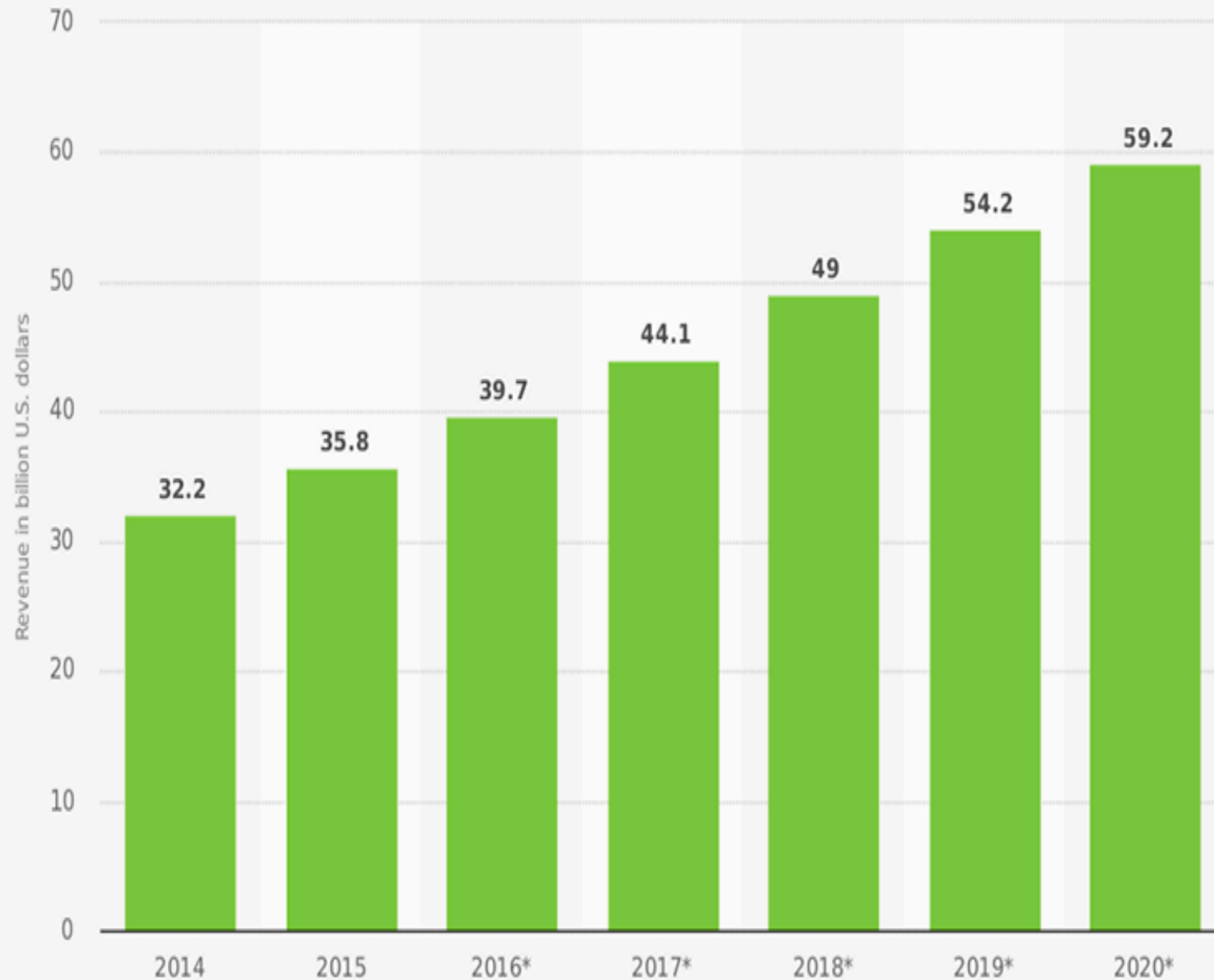
Stakeholder (Users)	Incentives	Risks
Travelers	Business & leisure travelers have records that are trusted worldwide; different vaccination standards are clear and accessible	Very low
Parents	Many countries legally require children to be vaccinated. VaccinePlus provides accurate, complete records that are easily retrievable compared to paper records	Anti-vaxxer parents may be against this technology as it identifies them more clearly to governing parties. However, VaccinePlus aims to enable those who want better records rather than force users to get vaccines
Professionals/ volunteers requiring proof of immunization	Time and resources saved. Each time these users start work in a new facility, they must show proof of immunization. In a new country/area, paper records are not trusted and users must pay out of pocket for blood test proof or be re-vaccinated	Very low

# STAKEHOLDERS

Stakeholder (Partners)	Incentives	Risks
Facilities requiring immunization proof from workers	Workers' proof of immunization is verifiable and trustworthy. Time and resources saved.	If a user's HCP fakes the vaccination record on the app, the facility risks exposing vulnerable parties to a worker who is unvaccinated. Liability increases for facility.
Vaccine Manufacturers	They may be able to obtain usage data on their sold vaccines. Vaccination schedules and booster shots are often confusing, causing shots to be missed. VaccinePlus increases the chances of patients actually following the prescribed vaccination schedule	Fraudulent vaccine manufacturers will not be able to get away with issuing bad vaccines
Healthcare Providers	Easy retrieval of accurate and trustable vaccination records, even with new patients.	They may have to adapt to a new system, which decreases efficiency during the adaptation phase.
Governments	An immunized community decreases disease occurrences and spending can be focused on other issues	
Payers/Insurance companies	Having immunized customers has been proven to translate to a lower chance of disease → less reimbursement → higher profits	Very low
WHO and Health Organizations	Helps them achieve their goal of increasing vaccination rates	Must adapt to this new system and learn to use and 'regulate' it

## Is this project worth solving?

Global vaccine market revenues from 2014 to 2020 (in billion U.S. dollars)\*



**Sources**

Zion Market Research; Statista estimates

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**Additional Information:**

Worldwide; Zion Market Research; Statista estimates; 2016

statista

- ✓ In Hong Kong, medical records retrieval costs \$780HKD
- ✓ Bloodwork to prove vaccination record costs ~\$200HKD
- ✓ Re-immunizing costs range from \$500-2000HKD and up

## LEGAL

- ✓ **Access control:** users can access their records anytime, and are able to send a verified copy of records to required parties
- ✓ **Privacy:** records are stored off-chain, only proofs stored on-chain
- ✓ **Compliance:** VaccinePlus will have regulatory standards for each country available on the app, pulled from the official published guidelines of each country. It can check each country's standards against user's existing vaccination status and notify user of any outstanding requirements. User can then send verifiable updated records to regulatory bodies.

## COMPETITION

- ❖ Vaccine record blockchains are still in the theoretical stages. **None exist in Asia.**
- ❖ Companies launching recently involving vaccines and blockchain focus on the vaccine supply chain management and production, but **not records management.**



# BLOCKCHAIN

- ✓ Shared ledger provides trust among regulating parties and parties who require proof of immunization
  - ✓ Users are able to prove that they are employable and it is safe for them to work with vulnerable populations
  - ✓ Users can prove to payers their vaccination status

- ✓ Data will not be stored on the ledger to maintain HIPAA standards.
  - ✓ Only proofs will be stored on the chain
  - ✓ P2P two way encryption implemented

- ✓ Blockchain is ideal for VaccinePlus because of the peer-to-peer ledger concept
  - ✓ Stakeholders can be added or given access as needed → flexible for different types of vaccination events (required/travel/booster)

- ✓ A permissioned blockchain will be used
- ✓ Cardano will be used to build this platform

# CASE EXAMPLE



Hi! I'm Danielle. I was born in Canada but raised in Hong Kong.

- I have about **6 paper booklets** of vaccination records
- I returned to Canada when I was 15. My paper vaccination records at that point were checked and I was **given three extra vaccines** because the categories on my paper record wasn't "clear".

I travelled to over 20 countries in the past two years, for work and academic exchanges.

- Before I left, I went to two different doctors to get my travel shots. I didn't have my old vaccination booklets, so **each time the doctor gave me new ones!**
- In France, I cut my toe on a barnacle. I had to have a tetanus shot, but **France didn't give me any record** to prove that I got it.

This September, I'm heading to Ireland to begin medical school.

- Ireland **refuses to accept** any of my paper vaccination records. Their risk of exposing a non-vaccinated student to vulnerable parties at the hospital is too high to trust my paper records
- I will have to pay **300 euros (\$3000HKD)** to receive all necessary vaccines (**10+ needles**)
- Doctors would rather re-vaccinate me than check my blood to see what's missing

## DISTRIBUTION

- The location to start this network could be the GTA in Ontario, Canada, or a small jurisdiction like HKSAR or Macau SAR.
  - Ontario's vaccination record system is simpler and there are less stakeholders. However, the region is geographically large and diverse.
  - The Ontario government buys and distributes all vaccines to HCPs, and pays for vaccinations.
  - It is legally required for children in Ontario to have a number of vaccines, which increases the need for VaccinePlus in that region
  - HKSAR is a small region, and has a fair number of hospital networks that are already used by regulators, auditors, financiers etc.

## STARTUP RISKS

- 1. Adoption rate** is the biggest risk, due to the number of non-commercial entities involved. National governments and international health agencies are particularly risky to involve, as they are often risk averse, bureaucratic and slow.
- 2. Regulatory risk** is also high, due to the political nature of immunization hesitancy. In addition, recent fraudulent incidents have plagued the industry. If DIN numbers and its associated information are faked by trusted manufacturers, VaccinePlus has no other way of verifying the source. International organizations like the Center for Disease Control (CDC) are needed to mitigate these risks.

# REVENUE MODEL



VaccinePlus benefits **verifiers** of vaccine records:

- Employers in hospitals and schools
- Governments if they have laws surrounding required vaccinations
- Insurance companies when they must reimburse costs

*There are two possible models that would work well:*

## **Transaction-based, Tier-based Membership**

- Patients pay per vaccination record kept in VaccinePlus. This may be beneficial during the transition from paper records to blockchain based record keeping
- There will be different tiers costing different amounts: each tier will provide more benefits than the previous tier

## **Subscription Model**

- Both everyday users (patients) and verifiers can be charged a usage fee for access to the app
- Verifiers buy yearly access for their entire entity, while patients will pay a low monthly fee, e.g. \$20HKD/month, with cheaper bundles for year-long/decade-long access