DevvTrace

Infectious Disease Tracking System

Devvio's Infectious Disease Tracker

Accurately and immediately tracks contact events and biometrics to prevent the spread of infectious diseases such as Covid-19, therefore protecting employees and patrons. The system addresses the primary challenges for effective digital contact tracing:

The Two Biggest Challenges of Digital Contact Tracing

Privacy

- With DevvTrace, all data is encrypted, private, and self-sovereign for users.
- Privacy is mathematically guaranteed.
- Users are in full control of the use of their data.

User Participation

- Used by businesses deploying wearables.
- High levels of participation across meaningful interactions.
- Business support at a physical location ensures a high participation percentage.

Devvio's Unique Approach

Devvio focuses on working with businesses
This is where most meaningful contact tracing events happen

Our approach to the two primary challenges demonstrates the uniqueness of our solution.

Privacy, Given Blockchain

Our privacy solution is built on over 4 years of leading edge proprietary blockchain research and development of Byzantine fault tolerant security and self-sovereign identity.

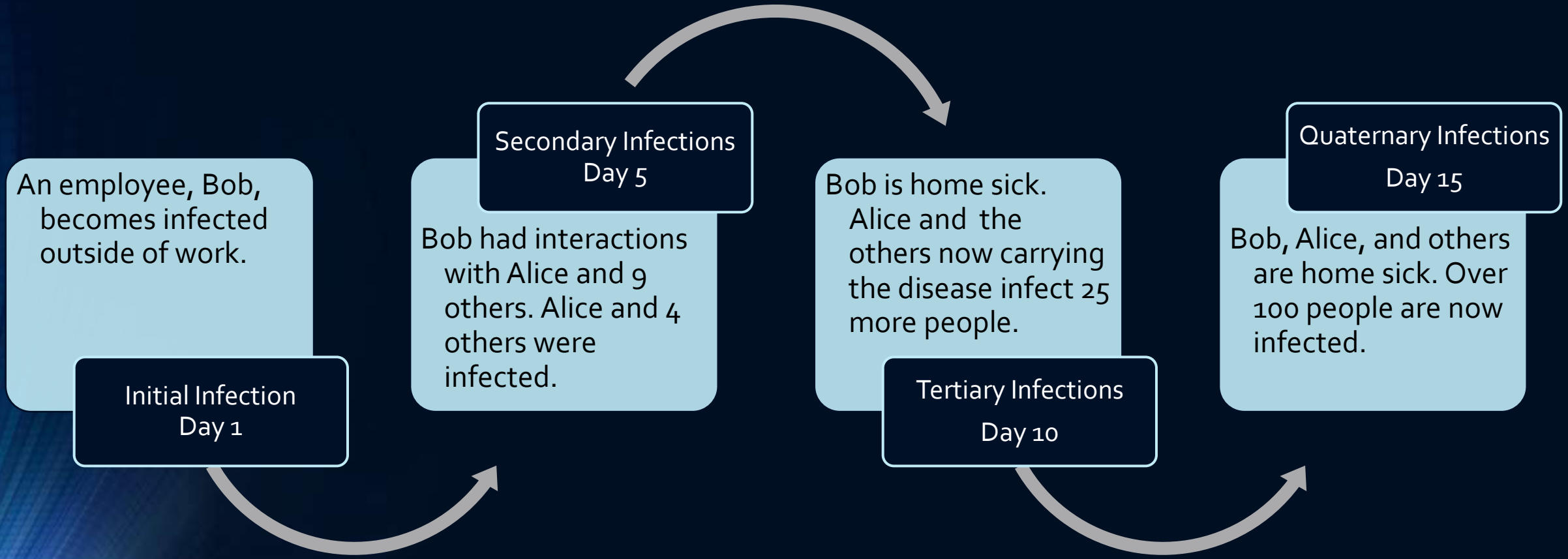
User Participation, Given Hardware

Our user participation solution is founded on the inclusion of hardware. By relying on hardware, businesses can assure enough people are using the system to make it useful and worthwhile.

Devvio's infectious disease tracking system maintains relevant user data on a highly secure system that assures privacy.

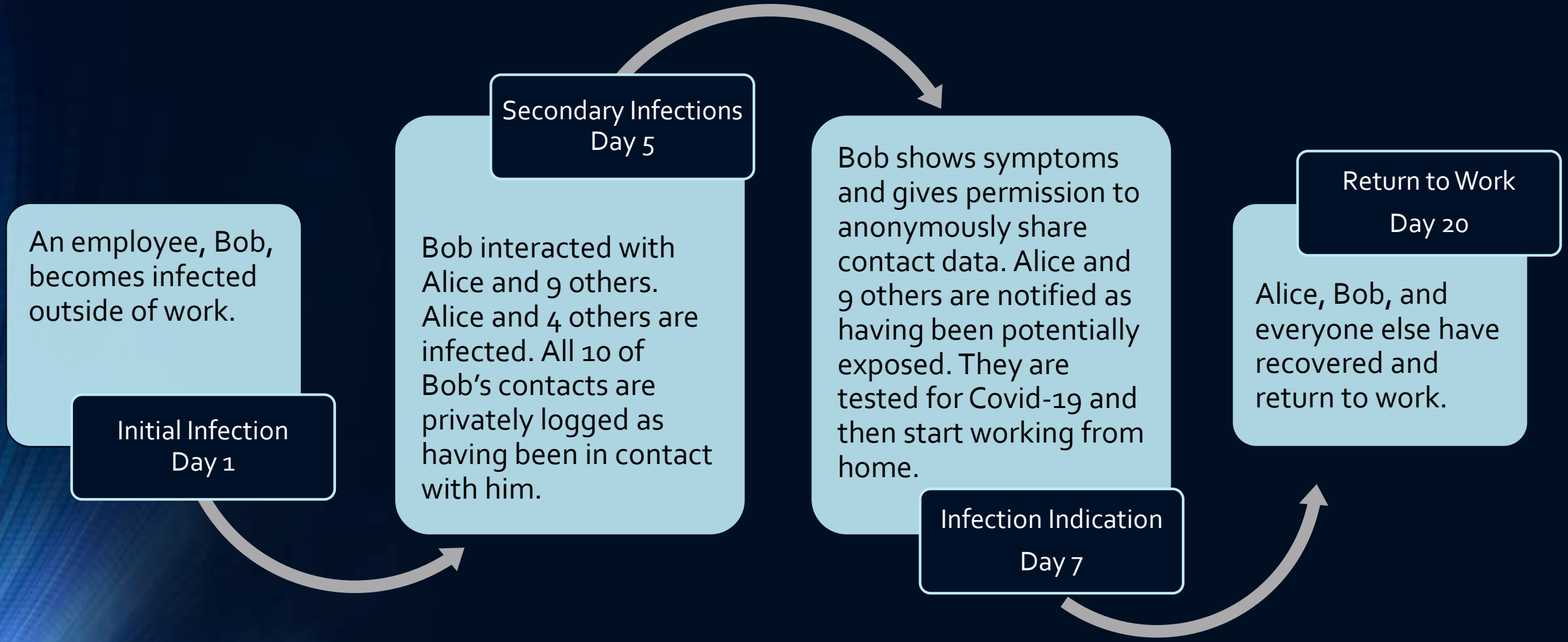
- Hardware keeps track of distances between all users near each other.
- All Personally Identifiable Information (PII) is controlled through users' private keys in a blockchain wallet.
- Data is encrypted and held on blockchain validation nodes (servers) on the Devv Blockchain. Devvio mathematically assures cryptographic privacy.
- If an employee or patron shows symptoms of having Covid-19, or if they test positive for Covid-19, they can allow recorded contact information to be anonymized and sent to a database of Hot Spots (i.e. interactions where others may have been infected, defined over time).
- All users can compare their tracked positions and contacts with the Hot Spots to see if they have potentially been exposed to an infectious disease.

Example Scenario Without Contact Tracing



A disease as infectious as Covid-19 can have rapid spread in a workplace where many employees interact. In this scenario dozens to hundreds of people become sick, and several people would likely die because of their job, creating liability for their employer.

Example Scenario With Devvio's Contact Tracing



By using contact tracing, Bob, Alice, and 9 others are tested for Covid-19 and sent home before they can infect others, who would have then infected many more. Significant sickness, down time, and potentially even deaths, are avoided.

Hardware

Devvio has a variety of hardware implementations that can be used to accurately and comfortably track contact events (e.g. 6’ from another user) and other data and biometrics such as geolocation tracking, temperature, coughing, pulse oximetry, ECG, GSR, etc.

Environments

DevvTrace can be used across many environments by employees and patrons.

Buildings and Offices

Factories and Warehouses

Businesses and Retail

Universities and Schools

Amusement Parks

Government

Stadiums, Trade Shows

Churches, Gatherings

Wearables can be assigned to employees, therefore keeping track of all contacts…

… or can be loaned to patrons while they are visiting a location, also recording contacts with assured privacy. Users are in full control of all of their data.

System Operation

Contact Tracing

Bob's Wallet: Private transaction: 2 feet from device 12874 at 1:02 PM, Contact ID 78134562964

Alice's Wallet: Private Transaction: 2 feet from device 37288 at 1:02 PM, Contact ID 78134562964

When two people using DevvTrace come in contact, that interaction is registered.

Covid-19 Test

Hot Spot Server: Decrypted & Anonymous: Contact ID 78134562964 registered as potential exposure.

Bob gets sick and tests positive for Covid-19 2 days later. He gives permission for his private data to be decrypted and anonymously sent to a hot spot server.

Exposure Alert

Hot Spot Server: Comparison with Contact ID 78134562964 is a match.

Alice is notified immediately, in real time, that she was near someone who tested positive for Covid-19. HR instructs her to work from home. A week later Alice also tests positive for Covid-19, but she knew to isolate and therefore didn't get others at work sick, and she avoided her elderly parents.

Interface

Users interact through a smartphone App.

Access personal data and controls including a full history of records.

Integrates with wearable measurements, or manually enter data.

Allows self reporting of symptoms and other information.

Allows for third party verification in reporting that one is sick.

Users are guaranteed privacy and full control of their data.

An algorithm takes hot spot data and determines users' exposure risk.

Includes capabilities for health passports, hot spot maps and more.

Contact Tracing Architectural Implementation

The Devv Blockchain tracks events (user locations, 6 ft contacts, etc) over time, as private transactions.

Multiple nodes (servers) run the Devv Blockchain's consensus, adding transactions to blocks over time. Devvio assures privacy by encrypting transaction data and providing each user with their own address (i.e. identity) and private key. A business therefore does not take responsibility or liability for maintaining Personally Identifiable Information (PII). Users are in full control of the use of their self-sovereign data.

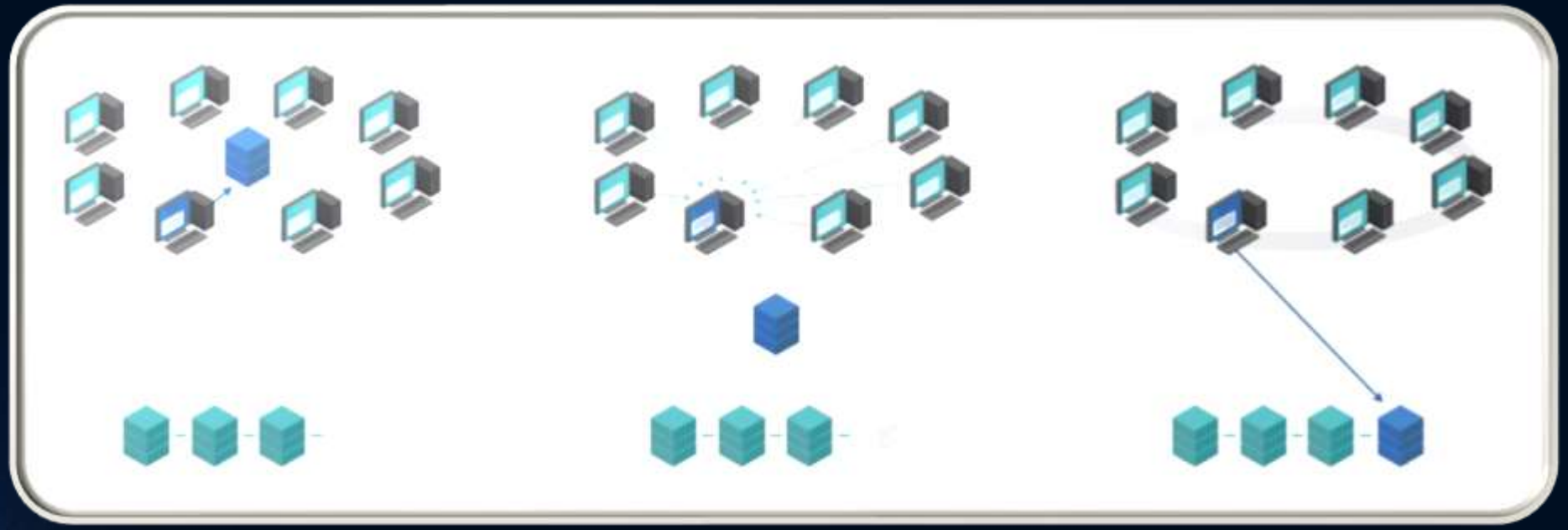
Users can anonymously share data if they become sick.

Devvio's infectious disease tracking system allows users to share relevant contact-tracing data when they become sick. When a user elects to share data, a blockchain transaction is initiated that decrypts and then anonymizes the data (using the user's private key) and transfers that information to a server that maintains a list of anonymous Hot Spots (areas and contacts where disease transmission can take place over time).

Users can use Hot Spot information to determine if they have likely been near an infected contact.

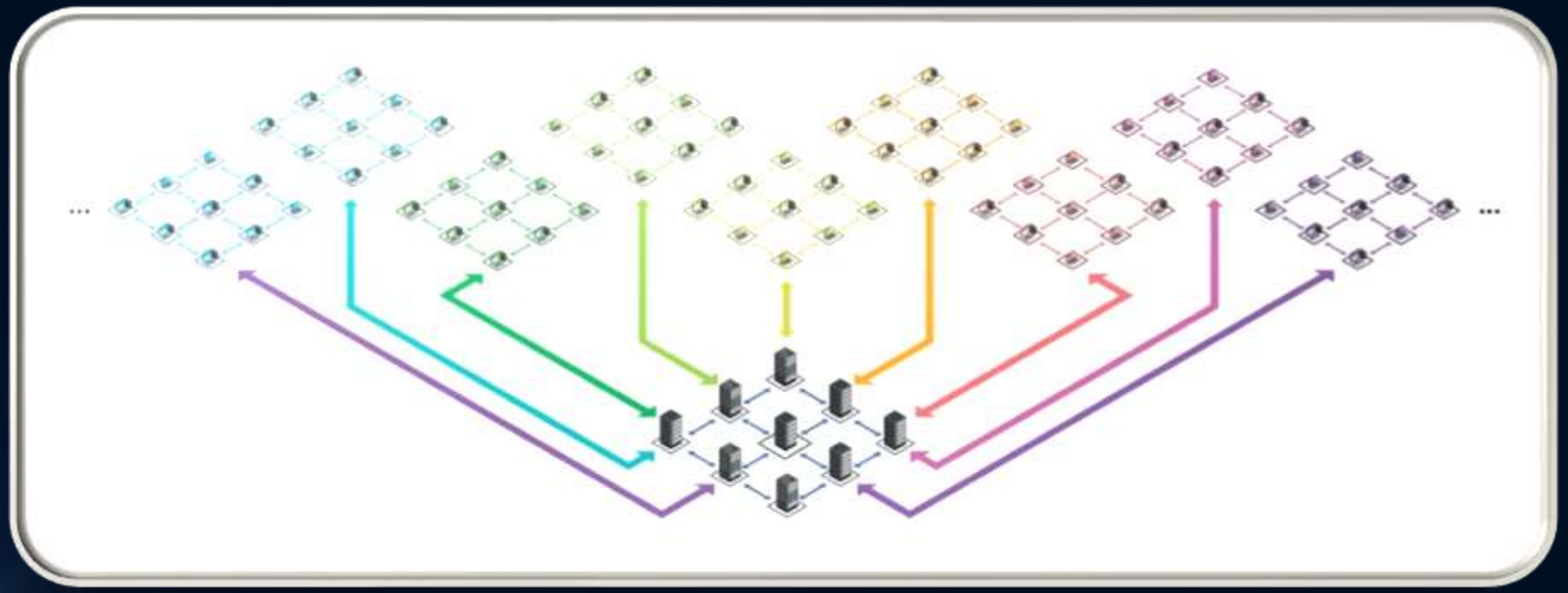
Using Devvio's infectious disease tracking system, users can query the Hot Spot database to see if they were near someone who was likely to have been infectious. This process can be automated, and warnings can be pushed to users. Employers can put policies in place where employees that have likely been near an infectious contact, should be tested and work from home to avoid further spread of the disease.

Devv Blockchain Consensus



Consensus on the Devv Blockchain is implemented by multiple validation nodes using Proof of Validation. A proposing node collects time-ordered transactions and proposes a block containing those transactions to be added to the blockchain. The other nodes send validation transactions to the proposer. Once the proposer reaches a defined percentage of validations, it includes those validation messages in the block and then adds the block to the blockchain.

Devv Blockchain Sharding



The Devv blockchain can implement any number of independent blockchain networks, called shards, to process blockchain transactions in parallel. Shards can be configured for particular use cases (shards can be HIPAA compliant, emphasize security, throughput, data volume, etc).

Contact Tracing Features

- Location information and contact events can be continuously recorded (as private data), using either a mobile phone or a wearable device.
- Events where any employee or customer is within a defined distance (i.e. 6 feet) of another person can be recorded as transactions on the blockchain. Distance events can be implemented with mobile phones or wearables.
- Other relevant health data, such as temperature measurements, heart rate, or cough detection can be recorded as well.
- Real-time indicators, such as proximity of another person, can be presented to users through visual or haptic feedback.
- The level of control and privacy for employees can be defined by a business in order to meet any desired regulatory requirements.
- Devvio can implement any number of needed blockchain networks, each flexibly defined. Blockchain networks can vary in their implementations across geographies and regulatory environments.

Solutions for Different Businesses

	Starter	Standard	Enterprise
Employees	Up to 50	50 - 200	200+
Perfect for:	Retail Locations, Restaurants, Bars, Wineries, Gyms, Small Businesses	Small to Medium Sized Businesses	Enterprise Customers
Pricing Philosophy:	Smaller upfront costs and reasonable rates in running a small business	Standard Rates	Volume Discounts
Usage:	Use wearables to protect employees and patrons. Hardware can be lent to customers while visiting so that employees and customers know who has been exposed, preventing expensive business shutdowns.	Protect a workforce so that sickness does not cause major interruptions.	Protect a workforce to prevent major outbreaks, plant shutdowns, manufacturing and distribution disruptions, and significant liability.

Future Use

An investment in the Infectious Disease Tracker has many future uses and value

- Self-Sovereign Identity can be applied to enhanced operations and business efficiencies while protecting the privacy of employees and customers.
- Hardware can be tied into many other uses.
  - Wearables can be tied into business optimizations such as determining points of congestion or operational inefficiencies.
  - Wearables can allow physical access control such as doors, elevators, and computers.
  - Additional safety protections can be added in potentially dangerous locations. Users can be alerted to unsafe situations.
  - Wearables can be used for secure payments.
  - Compelling advertising and marketing interactions can be added for customers.
  - The system can be used for any other smart city/building/office interactions while maintaining privacy.