



# HASH-HIRE ORGANIZATION

Trusted Human Resource Solutions

Dave Newman • Farhana Owens  
Jeremy Wang • Matthew Tan

Blockchain Team 2  
IBM i.am.vitalize  
Cyber Security 1201  
12 November 2021

# Our Roles



**Jeremy Wang**  
Chief Strategy Officer

Primary responsibilities include making major corporate decisions, setting the strategy of the company, and prioritization.



**Farhana Owens**  
Chief Project Lead

Plan, develop, put into place and evaluate requirements and communicate strategies that present a client's (an individual or company) needs' assessment.



**Dave Newman**  
Chief Architect

Ensure that a company's technology solutions match their overall business structure, process, and goals. Systems architects are in charge of designing and planning blockchain solutions.



**Matthew Tan**  
Chief Designer

Responsible for how a product or website feels. The UX designer's job is to zero in on users' underlying emotional and functional needs — then help execute on those discoveries to create an enjoyable experience.

# Content Page



## [A] Use Case

- Real World Problem Today
- Use Case Selection
- Blockchain Technology
- Blockchain Fit
- Business Network



## [C] Hills

- Build Hills & Check Fit
- Prototype



## [B] User

- HMW Statement
- Persona
- Empathy Mapping
- As-if Experience
- Explore Possibilities
- Focus Outcome



## [D] Modelling and Prototype

- MVE Roadmap
- Blockchain Modelling
- System Design and Architecture
- Demo

### [A] Use Case

- Real World Problem Today
- Use Case Selection
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# Real World Problem Today

Résumé fraud is any act that involves intentionally providing fictitious, exaggerated, or otherwise misleading information on a job application or résumé in hopes of persuading a potential employer to hire an applicant for a job for which they may be unqualified or less qualified than other applicants

- Almost half (48%) of organizations with fewer than 100 staff experienced problems with vetted employees.
- 39% of UK organizations have experienced a situation where their vetting procedures have allowed an employee to be hired who was later found to have lied or misrepresented themselves in their application.
- Younger, more junior people are more likely to have a discrepancy on their CV. Someone in a junior administrative position is 23% more likely to have a discrepancy on their CV than in a managerial role.
- A 2008 study found a discrepancy in the CVs of 14% of those that had graduated from top 20 universities compared to 43% of those that had graduated from a low rank university.



More often than not, pre-employment screening often takes more time than the rest of the recruitment process.

# Technology In HR

## Talent management

HR technology vendors have developed various forms of applications and SaaS platforms to recruit job candidates, evaluate candidates pre-interview and track them during the hiring cycle. Applicant tracking system (ATS) used to post job openings on a corporate website or job board, screen resumes, and generate interview requests to potential candidates by email. Employee assessment software helps an organization decide whether a job candidate is suited for an open position.



## Travel and expense management

Some organizations use expense report software to provide managers with a clear picture of the organization's spending through automated analytics and reporting. Mobile expense management tools provide usage and cost information about the mobile devices and services the organization provides to employees, and which are often administered by HR.



Technology has changed how both organizations and job candidates deal with employment. It has allowed organizations to make drastic improvements in the hiring process over the last 20 years, from allowing organizations to expand their reach in searching for candidates to scheduling and conducting interviews.

## WHAT ABOUT EMPLOYMENT HISTORY?

# Why Does Employment History Matters

The overall purpose of vetting is to investigate whether the right individual is selected for the right position

According to Glassdoor, the average organization in the U.S. spends about \$4,000 and 24 days to fill a position. It is detrimental to hire a candidate only to learn that they had stated invalid information

These checks reveal information about a job candidate's character, reputation, and experience by reviewing data such as financial information, civil records, education, licensing, criminal records, and employment history.



# Tedious Employment Checks



In the Hiring process, companies often need to check if candidates indeed worked in a company for the dates that they mentioned in their resume.

- 1 HR needs to contact each past company to verify Candidates records
- 2 Search for the company mainline and speak to HR
- 3 Request for information on employment, date and reason of leaving, job title



Slow and Repetitive

Lengthy Manual Process

Time Dependant



# the answer lies in...

# Blockchain Technology

A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain.

Each block in the chain contains a number of transactions, and every time a new transaction occurs on the blockchain, a record of that transaction is added to every participant's ledger in a public or peer to peer network

This system of recording information makes it impossible to change the employment history in the ledger



# Why Blockchain is the ANSWER

## Consensus

- *Agreement that a transaction occurred*
- *Candidate did work in a certain organisation*



## Immutability

- *An append only data structure*
- *Chronological addition to Candidate employment history*

## Finality

- *An agreed source of truth*
- *Both Hirer and Candidate verified entries*

Blockchain provides irrefutable proof that a transaction occurred

# Blockchain - Trust on a Trustless Network

## TRUSTLESS

A trustless network means the participants involved do not need to know or trust each other or the need for a trusted third party.



## DISTRIBUTED TRUST

An automatic, decentralized system which establishes trust by mechanism in place so that all parties in the network can reach a consensus on the canonical truth

For a transaction to be validated, it has to be registered in a block.

Once validation has taken place, the block is added to privately maintained chains.

Data is synchronized across the board.

And once a transaction is registered on the chain, it cannot be tampered with as tampering would show up as an inconsistency between the block hashes

Therefore Blockchain can be TRUSTED

# So... What do we need on Blockchain for Employment History



*Blockchain allows the concept of a distributed database to be deployed across an untrusted network*

## Enables Trust

Hirers and Candidates can verify entries on the ledger without central authority

## Provides Privacy

Candidates shared-only information is disclosed to Hirers

## Provides Scale

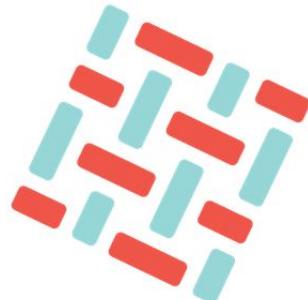
Removal of centralized database allows scalability on a global network

# Blockchain for Employment History

**Hyperledger Fabric**  
is an open source enterprise-grade distributed ledger technology (DLT) platform, a multi-party database with no central trusted authority



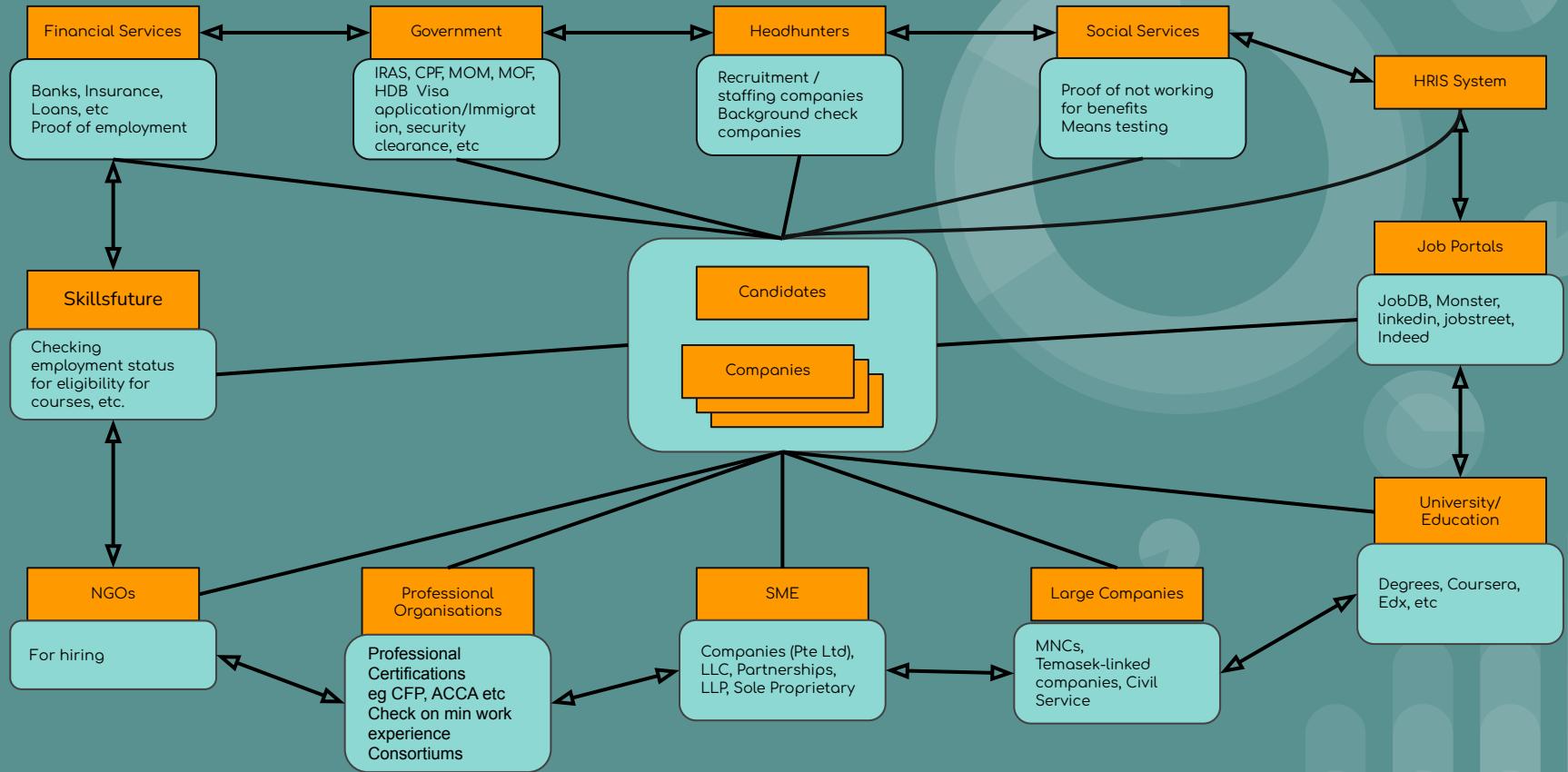
**Hyperledger Fabric** promotes a range of business blockchain technologies including smart contract engines, client libraries, graphical interfaces etc...



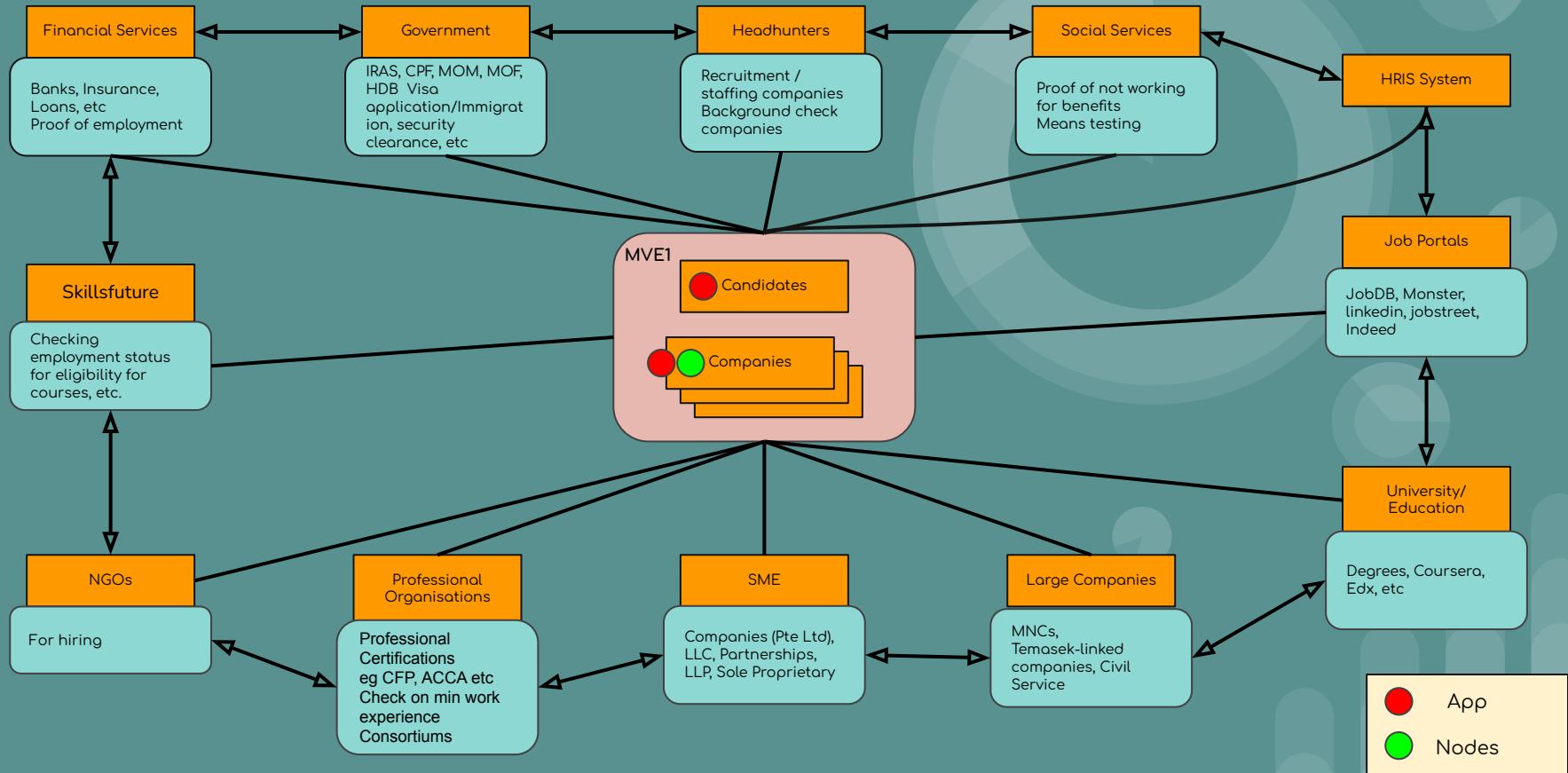
# HYPERLEDGER FABRIC

- #distributed ledger
- #smart contracts
- #consensus
- #confidentiality
- #resiliency
- #scalability
- #plug-and play
- #modular architecture

# Business Network



# Business Network - Minimum Viable Ecosystem



### [B] User



- HMW Statement
- Persona
- Empathy Mapping
- As-if Experience
- Explore Possibilities
- Focus Outcome



Provide a trusted record of employment

For employers and employees

So that employment history can be quickly, easily and cheaply verified.

# Persona 1 - Employee



Jane Tan

Late 30s

Married  
with 1  
daughter

Hobby  
Swimming

Doing part  
time degree  
studies

Strong work  
ethics

A little Tech  
Savvy

Ambitious

10 years  
total  
working  
experience

Currently  
working for  
a large  
MNC for  
past 8 years

Currently  
working as  
a Project  
Manager

Looking for  
a new  
career

## Motivation

Move up the corporate ladder and find a job that suits her

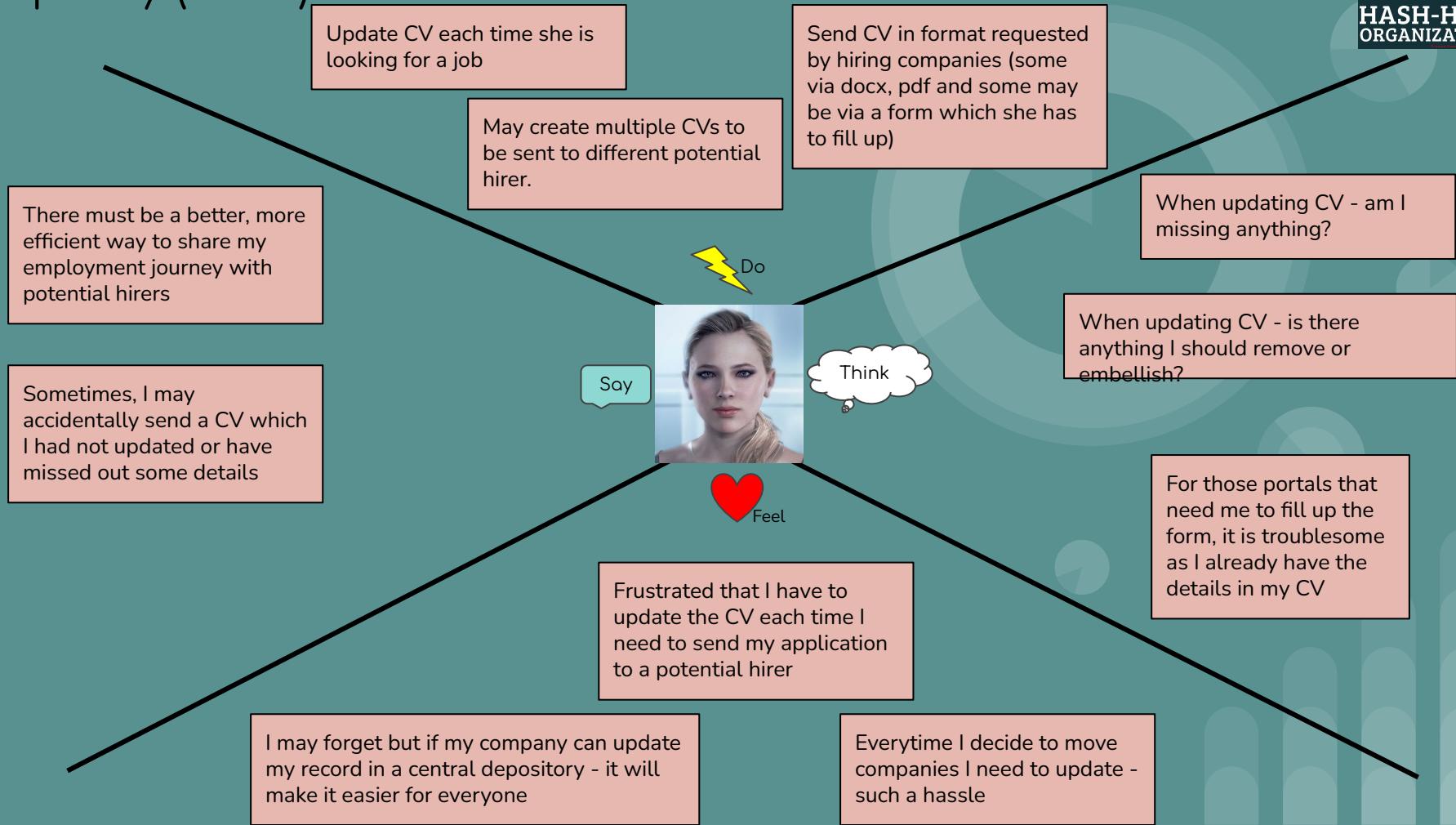
## Needs

To update her employment records into her CV and send out to potential employers

## Wants

An easier way to transmit her employment history to an updated record which she can share with potential hirers, instead of having to update her CV all the time

# Empathy (Jane)



# As - Is Scenario (Jane)

Process

1. Looking for new employment

2. Update CV with updated details if any

3. Access possible employer's website or job portal for possible jobs

4. May need to update CV to match requirements for a better chance. Or may be required to fill up a form on the portal aside from uploading CV

Pulls up past CV and update new details if any

Job portal may require to enter details in form so I have to extract details from the CV to complete the form

May need to create different versions to CVs to "appeal" to the job fit

So troublesome to have to enter details in the form if I have it in my CV already

Am I missing anything from my CV?

Are there any details I should remove from my CV to make me more a fit to the role?

So frustrating to update the CV each time

Hard to keep track if I have multiple CVs floating around

Since my employers will update my employment journey - it would be nice to have those details available in a depository that I can just point my potential hirers to.



Think



# Persona 2 - Hiring Manager (Hiring company)



Guy

Mid 40s

Married  
with 2 boys

Doing same  
process  
over and  
over again

Doing part  
time  
Blockchain

Tech Savvy

Hobby  
Night  
cycling

Desire to  
have break  
through in  
life

8 years in  
job

HR  
Recruitment  
Manager

Ambitious

Passionate  
about his  
job

Work at  
large MNC

## Motivation

Motivated in finding the right person to fit in the right job role feel sense of achievement from it.

## Needs

To validate what the candidate has put in their resume is true.

## Wants

A simplified process that is easy as ABC, skipping all the tedious manual work that can be replaced by technology.

# Empathy (Guy)



Say

Think

Is there a better way to do this process?

This is so slow

I can't find the number of the HR dept - got to call the main line

Feel frustrated that current recruitment process is inefficient

Hope that things can be much simpler

How many times my boss wants me to do this!

Call up current/previous employer of candidates manually

Repeatedly call back company to get info when person is not avail

We need a lie detector!

Google search for phone numbers and jot it down manually

Would be good to have a single platform for searches

The HR is always not avail

Validating is such a pain

# As - Is Scenario (Guy)

Process

1. Search for phone number of past companies

2. Call HR dept of past company to query if candidate worked there and dates / other info

3. Record responses

Google search for phone numbers and jot it down manually

Call up current/previous employer of candidates manually

Repeatedly call back company to get info when person is not avail



Think

I can't find the number of the HR dept - got to call the main line

Would be good to have a single platform for searches

Is there a better way to do this process?

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Hope that things can be much simpler

How many times my boss wants me to do this!

Validating is such a pain

Feel frustrated that current recruitment process is inefficient

# Pain Points



## Persona 1 - Jane

May forget details if I don't update my CV regularly

May have sent different versions of CV to different companies - confusing



## Persona 2 - Guy

Lack of a 1 stop platform

Lack of trust/clarity and transparency of employment journey

Tedious manual work

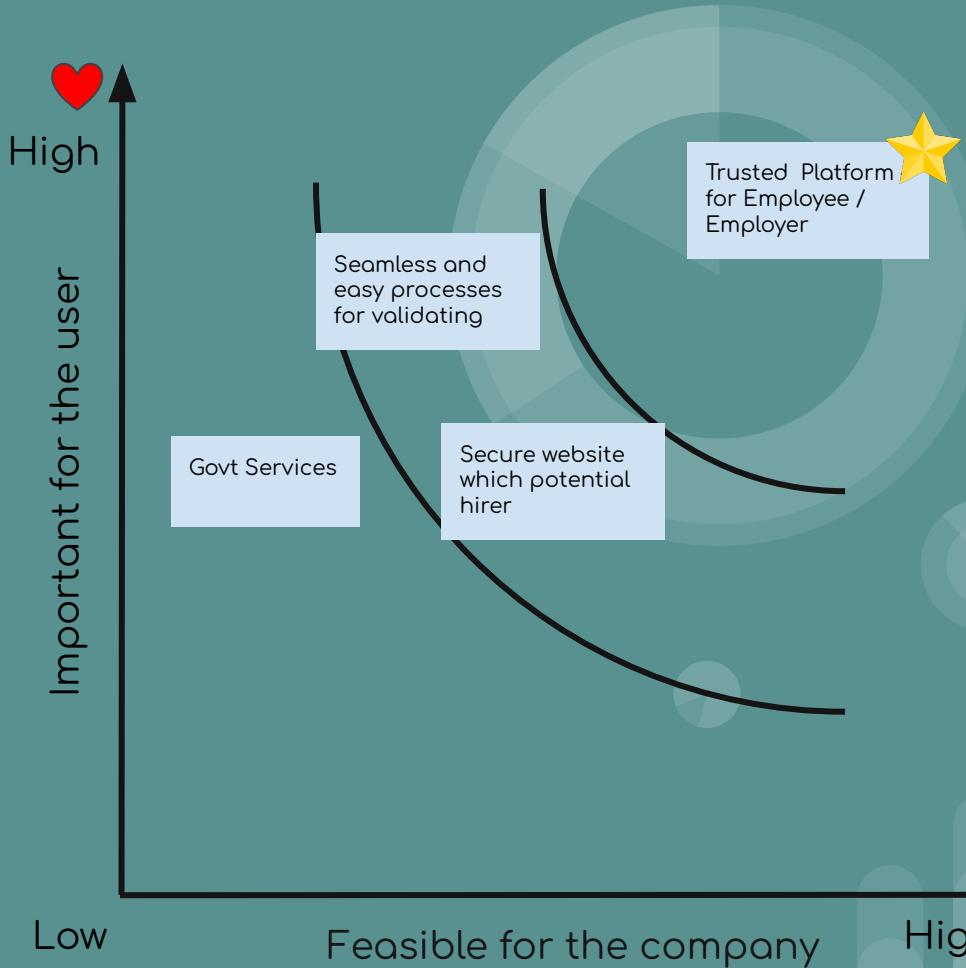
# Big Ideas

1. A trusted platform that allows employee and employer to update employment record and the other party endorses the record as validation of its accuracy and status.
2. A secure website which potential hirer or other authorised personnel can access, to view candidate's past employment history and other relevant information such as verified education and other pertinent records (testimonials, awards, criminal records, etc)
3. Linking up with govt services so that all records are seamless, eg Singpass, CPF, IRAS and Banking services.
4. Having a seamless and easy processes for validating for both employee and employer.

# Prioritization

Compile the pain point from Jane and Guy we place them against our prioritization grid

After voting we have selected on Trusted Platform - for Employee / Employer



# Storyboard - Persona 1 (Jane)



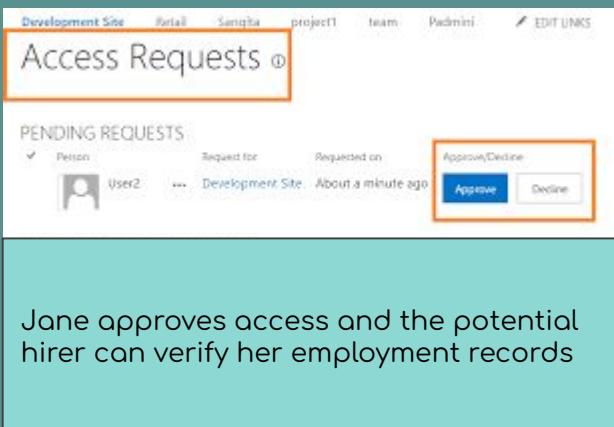
Jane decided to explore other employment after 8 years on the job and not moving up the ranks



She accessed the trusted platform to check and ensure that all her employment records has been endorsed, either by her or by her employers so it's all validated



Jane applies for a job and the potential employer requests access to her employment records



PENDING REQUESTS

Person	Requested for	Requested on	Approve/Decline
User2	Development Site	About a minute ago	<button>Approve</button> <button>Decline</button>

Jane approves access and the potential hirer can verify her employment records



New company offers her a contract and she accepts

# Storyboard - Persona 2 (Guy)



Hi everyone! My name is Guy, working as a recruitment officer for 8 years and counting. I'm passionate about my life and job.



Out of all this candidate Jane is the best fit. I need to verify what she placed in the resume is true. Let's send her a request to verify on her past employment records.



Jane receive a request to view her past employment records.

She approves the request and Guy can see that Jane's resume matches her trusted employment records.



Guy offer Jane a job and looking forward for a great candidate to join in the company.



Guy offer Jane a job and looking forward for a great candidate to join in the company.



Jane receive a request to view her past employment records.

She approves the request and Guy can see that Jane's resume matches her trusted employment records.

Hi everyone! My name is Guy, working as a recruitment officer for 8 years and counting. I'm passionate about my life and job.



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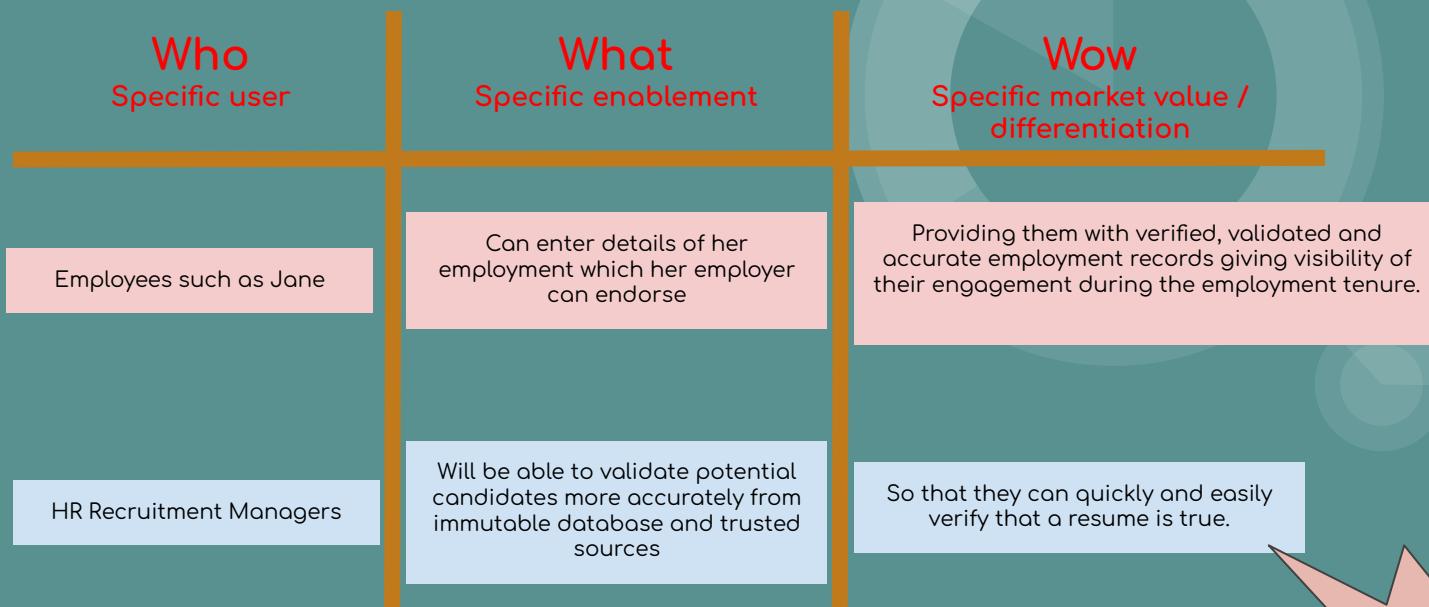


### [C] Hills



- Build Hills & Check Fit
- App Prototype

Who is going to be able to do What with a Wow experience with our solution?



Extract from  
Pain statement

Trusted Platform  
- for Employee /  
Employer

# App Prototype



# Prototype



Mobile View

The desktop homepage of Hash-Hire Organization. It features a dark header with the logo and navigation links for Home, About Us, Services, Testimonials, Contact Us, and Log-In / Sign Up. The main content area has a blue background with a digital brain graphic. It displays the same introductory text as the mobile view, followed by a section about core expertise in professional services, financial markets, technology, and outsourcing. Social media icons for Facebook, LinkedIn, and Twitter are at the bottom right, along with a 'Let's Chat!' button.

Website View

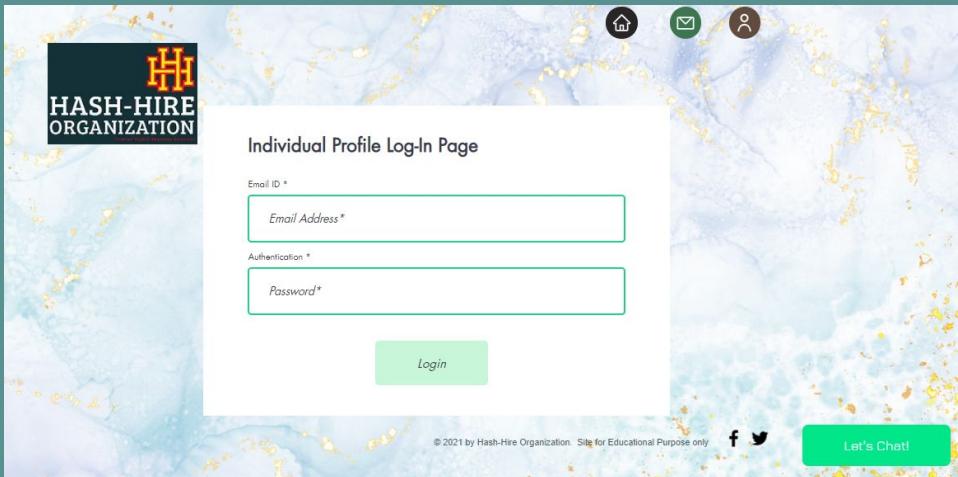
# Prototype - Individual Access



A map-based landing page with a dark blue header containing the Hash-Hire Organization logo. Below the map, there's a 'Select Profile' section with 'Individual' and 'Company' buttons. A note at the bottom states: 'By continuing on our site, you are deemed to have agreed to our Privacy Policy and Terms & Conditions'. Social media icons for Facebook and Twitter are present, along with a 'Let's Chat!' button.

An individual profile sign-up form titled 'Individual Profile'. It includes fields for 'Full Name\*' and 'Email\*', a checkbox for accepting terms & conditions, and a 'Submit' button. Navigation links for 'New Sign Up' and 'Log-In >' are also present. The background features a map with yellow highlights.

# Prototype - Individual Access



**HASH-HIRE ORGANIZATION**

### Individual Profile Log-In Page

Email ID \*

A green rectangular input field with a thin black border and a light green background.

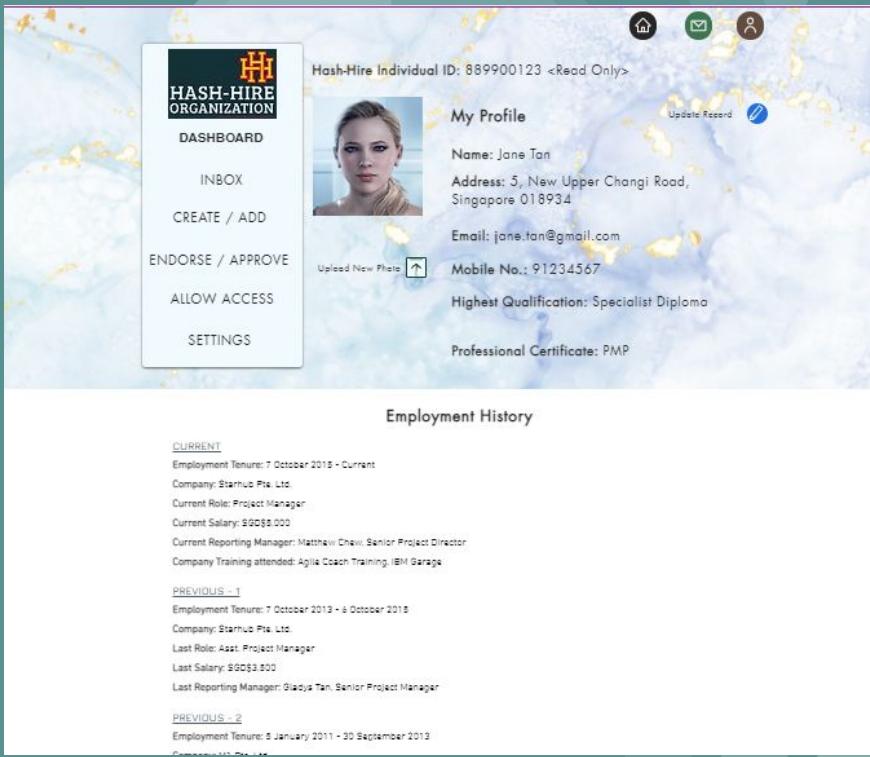
Authentication \*

A green rectangular input field with a thin black border and a light green background.

**Login**

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[f](#) [t](#) [Let's Chat!](#)



Hash-Hire Individual ID: 889900123 <Read Only>

**My Profile**

Name: Jane Tan  
Address: 5, New Upper Changi Road, Singapore 018934  
Email: jane.tan@gmail.com  
Mobile No.: 91234567  
Highest Qualification: Specialist Diploma  
Professional Certificate: PMP

**Dashboard**

**Inbox**

**Create / Add**

**Endorse / Approve**

**Allow Access**

**Settings**

**Upload New Photo**

**Employment History**

**CURRENT**

Employment Tenure: 7 October 2018 - Current  
Company: Starmus Pte. Ltd.  
Current Role: Project Manager  
Current Salary: \$9000.00  
Current Reporting Manager: Matthew Chew, Senior Project Director  
Company Training attended: Agila Coach Training, IBM Garage

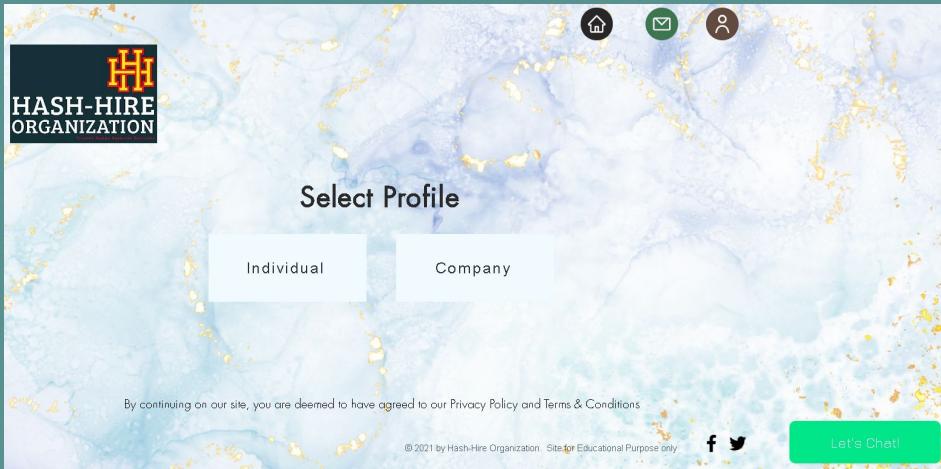
**PREVIOUS - 1**

Employment Tenure: 7 October 2013 - 6 October 2015  
Company: Starmus Pte. Ltd.  
Last Role: Asst. Project Manager  
Last Salary: \$6000.00  
Last Reporting Manager: Gladys Tan, Senior Project Manager

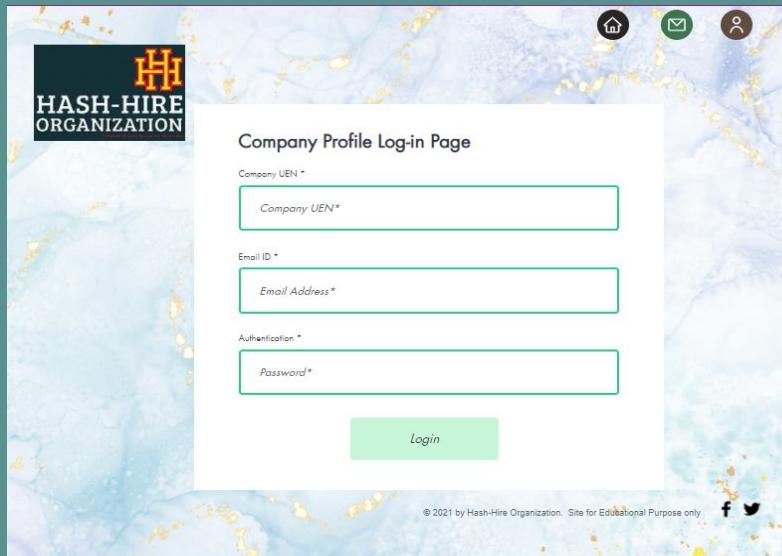
**PREVIOUS - 2**

Employment Tenure: 5 January 2011 - 30 September 2012  
Company: Starmus Pte. Ltd.

# Prototype - Company Access

A screenshot of a 'Company Profile' form. At the top left is the Hash-Hire Organization logo. In the top right corner are three icons: a house (Home), an envelope (Email), and a person (User). Below these icons is a large, semi-transparent circular graphic. The main form area has a title 'Company Profile' and two buttons: 'New Sign Up' and 'Log-In >'. There are four input fields with labels: 'Company Name per ACRA \*', 'Company UEN \*', 'Admin Email \*', and 'Admin Email \*'. Below these fields is a checkbox labeled 'I accept terms & conditions'. At the bottom right is a green 'Submit' button. A green 'Let's Chat!' button is located at the bottom right of the main content area.

# Prototype - Company Access



Company Profile Log-in Page

Company UEN \*

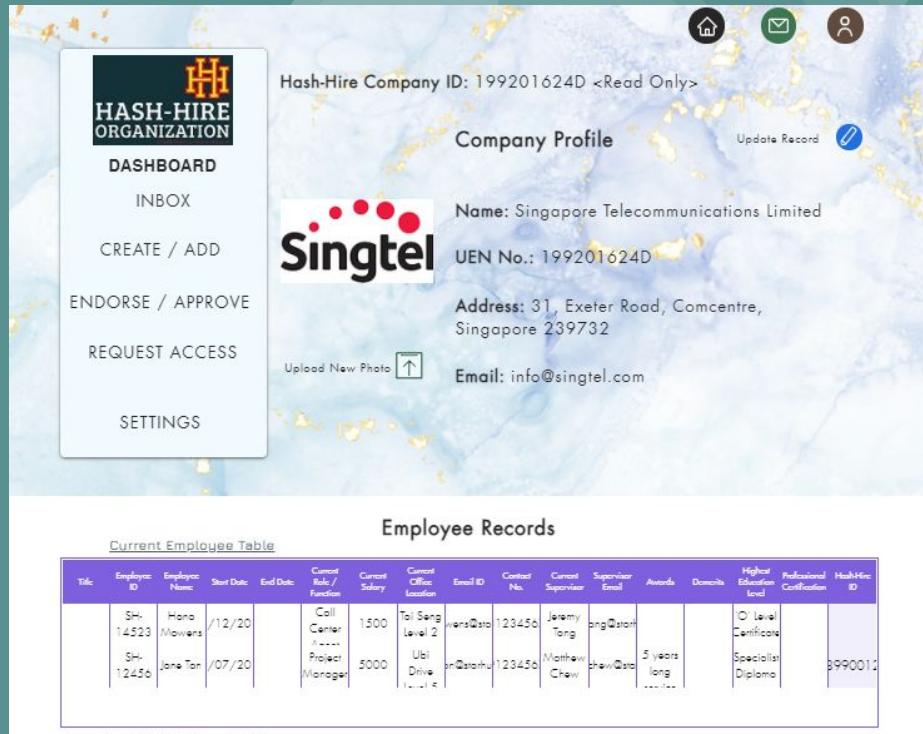
Email ID \*

Authentication \*

**Login**

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f t



Hash-Hire Company ID: 199201624D <Read Only>

**Company Profile** Update Record

**Singtel**

Name: Singapore Telecommunications Limited  
UEN No.: 199201624D  
Address: 31, Exeter Road, Comcentre, Singapore 239732  
Email: info@singtel.com

**DASHBOARD**

**INBOX**

**CREATE / ADD**

**ENDORSE / APPROVE**

**REQUEST ACCESS**

**SETTINGS**

**Employee Records**

Current Employee Table

ID	Employee ID	Employee Name	Start Date	End Date	Current Role / Function	Current Salary	Current Office Location	Email ID	Contact No.	Current Supervisor	Supervisor Email	Awards	Domains	Highest Education Level	Professional Certification	Hash-Hire ID
Sh-	14523	Hana Mowers	/12/20		Call Center Agent	1500	Tel Sing Level 2	hans@qso	123456	Jeremy Tang	jeremytang@qso			O Level Certificate		
Sh-	12456	Jane Tan	/07/20		Project Manager	5000	Ubi Drive	jane@qso	123456	Matthew Chew	matthewchew@qso	5 years long	*****	Specialist Diploma		399001

Deselected Employee Table

### [D] Modeling & Prototype

- MVE Roadmap
- Blockchain Modelling
- System Design and Architecture
- Demo



# Roadmap for future plans

## MVE 1

- App for employee / employer
- Endorsement process
  - Request and validate
- To create trusted Platform - for Employee / Employer



## MVE 2

- MVE 1 plus the following;
- Increase node to include Finance Services and welfare services



Eg Bank will now have access to check whether an individual is holding a job

To create seamless and easy processes for validating.



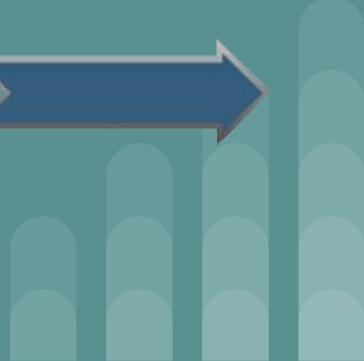
## MVE 3

- MVE 2 plus the following;
- Increase node to Government services and Education Sectors



Eg IRAS to compute total number of employees contributing to CPF and education certificates will now be part of the ecosystem

To link up with more services to form up a more robust ecosystem.



# Modeling of Blockchain Solution - Participants

## Companies (many of them)

Past employer of an employee. Will create (and endorse) employment records showing that an employee worked for them.

## Employee

A person who worked for a Company. Will create (and endorse) employment records showing that they worked for a company.

## New Employer

A Company who wants to verify the employment history of an Employee.

# Modeling of Blockchain Solution - Assets

"Physical" Asset	Attributes	Model definition	Instances	World state
Employment record on resume	Company Name: Starhub Pte Ltd Company ID: 199802208C Employee Name: Jane Tan Hashhire ID: 889900123 Job Title: Project Manager Start Date: 2015-10-07 End Date: Salary: \$5000 SGD monthly Location: 67 Ubi Avenue 1, Singapore 408942	<pre> "employmentRecord" : {   "id": "string",   "recordDate": "timestamp",   "companyName": "string",   "companyID": "string",   "employeeName": "string",   "hashhireID": "string",   "jobTitle": "string",   "startDate": "date",   "endDate": "date",   "salary": "decimal",   "salaryPeriod": "string",   "salaryCurrency": "string",   "location": "string" } </pre>	<pre> {"112233456",  "2021-11-12 09:00:00",  "Starhub Pte Ltd",  "199802208C",  "Jane Tan",  "889900123",  "Project Manager",  "2015-10-07",  null,  "5000.00",  "monthly",  "SGD",  "67 Ubi Avenue 1, Singapore 408942" } </pre>	<pre> {"112233456",  "2021-11-12 09:00:00",  "Starhub Pte Ltd",  "199802208C",  "Jane Tan",  "889900123",  "Project Manager",  "2015-10-07",  null,  "5000.00",  "monthly",  "SGD",  "67 Ubi Avenue 1, Singapore 408942" } </pre>

# Modeling of Blockchain Solution - Read / Write Transactions

## Create Employment Record

Creates a new employment record

Inputs: Company ID, Company Name, Employee ID, Employee Name, Job Title, Start Date, End Date (opt), Salary (opt), Salary Period (opt), Salary Currency (opt), Location (opt)

Outputs: None

Design: Both Company and Employee need to endorse this transaction. Once endorsed then the new employment record is stored in the ledger.

## Update Employment Record

Updates an existing employment record

Inputs: Company ID, Company Name, Employee ID, Employee Name, Job Title, Start Date, End Date (opt), Salary (opt), Salary Period (opt), Salary Currency (opt), Location (opt)

Outputs: None

Design: Both Company and Employee need to endorse this transaction. Once endorsed then a replacement employment record is stored in the ledger. Usually used for updating End Dates when an Employee leaves a company or changes role.

# Modeling of Blockchain Solution - Read-only Query

## Verify Employment Record

Reads one employment record from the ledger

Inputs: ID, Desired Fields

Outputs: The Desired Fields of the employment record

Design: Employee needs to endorse this transaction. Once endorsed then the employment record's desired fields are returned.

## Verify Employment History

Reads the entire employment records from the ledger

Inputs: HashhireID, Desired Fields

Outputs: The Desired Fields of the employment records

Design: Employee needs to endorse this transaction. Once endorsed then the full history of all employment records and their desired fields are returned.

## Is Currently Employed

Returns True if the Employee is currently employed

Inputs: HashireID

Outputs: Employment status

Design: Employee needs to endorse this transaction. Returns True if the Employee is currently employed (no End Date or End Date in the future for an employment record).

## Get All Employees History

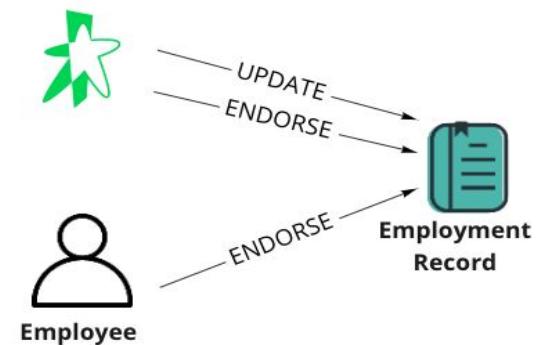
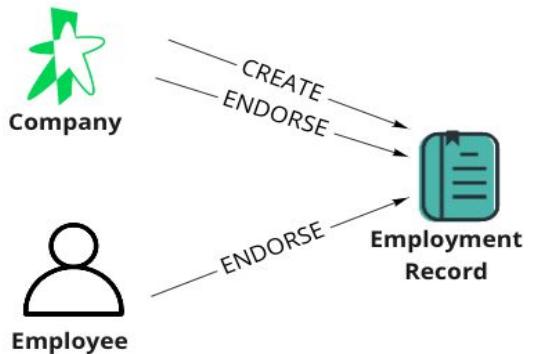
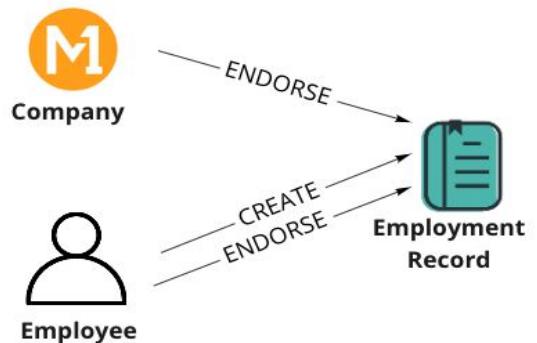
Reads all of the Employees for a Company

Inputs: CompanyID, Date

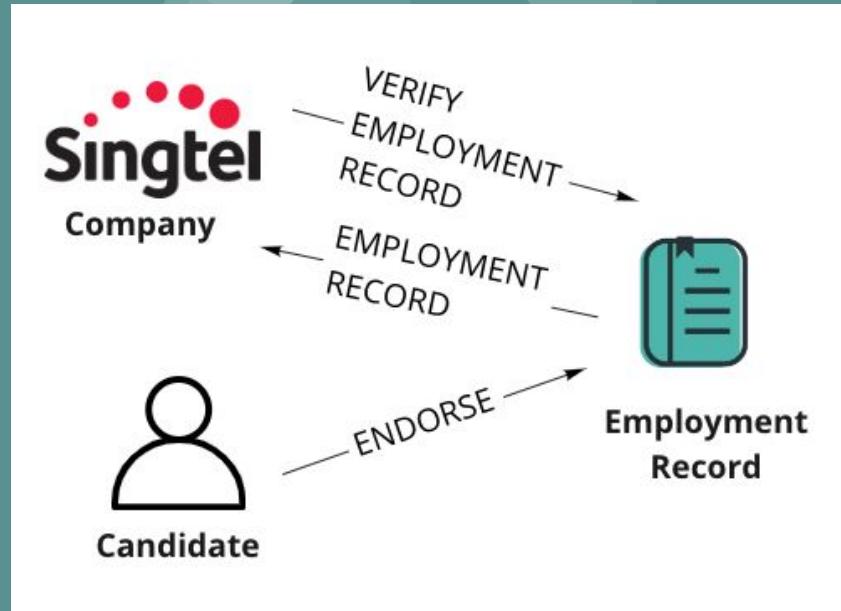
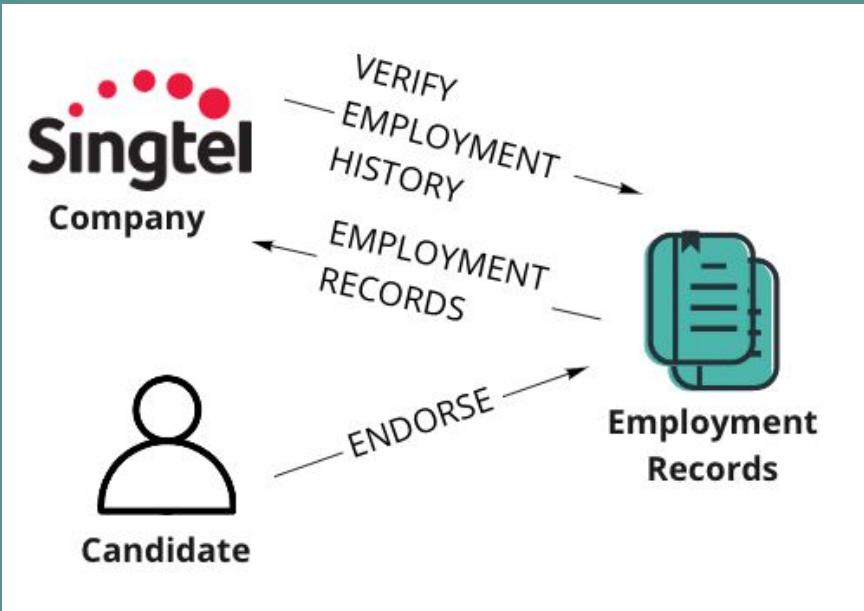
Outputs: Employment records of Employees that work in that Company during that timeframe

Design: Company needs to endorse this transaction. Returns all of the employment records for that company of employees who are employed at that company during that timeframe.

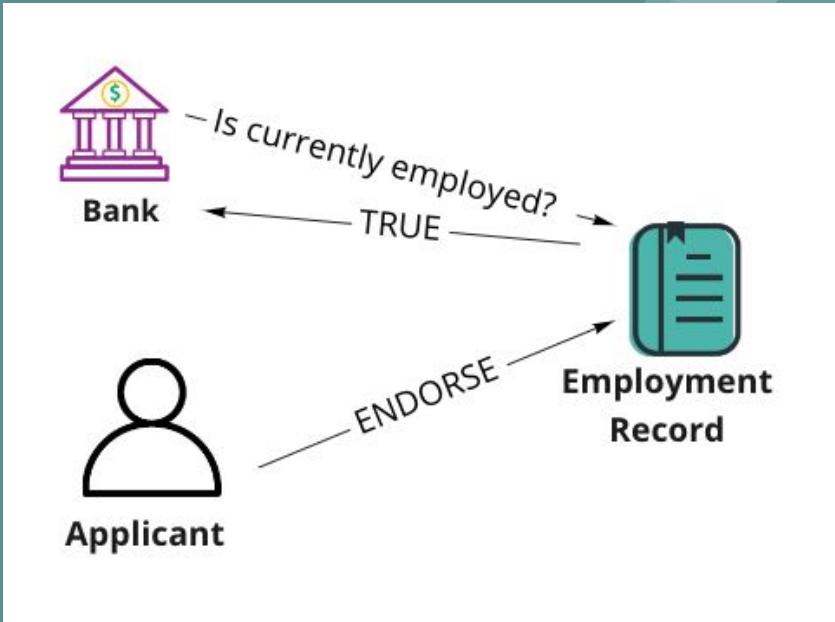
# Modeling of Blockchain Solution - Asset Lifecycle 1



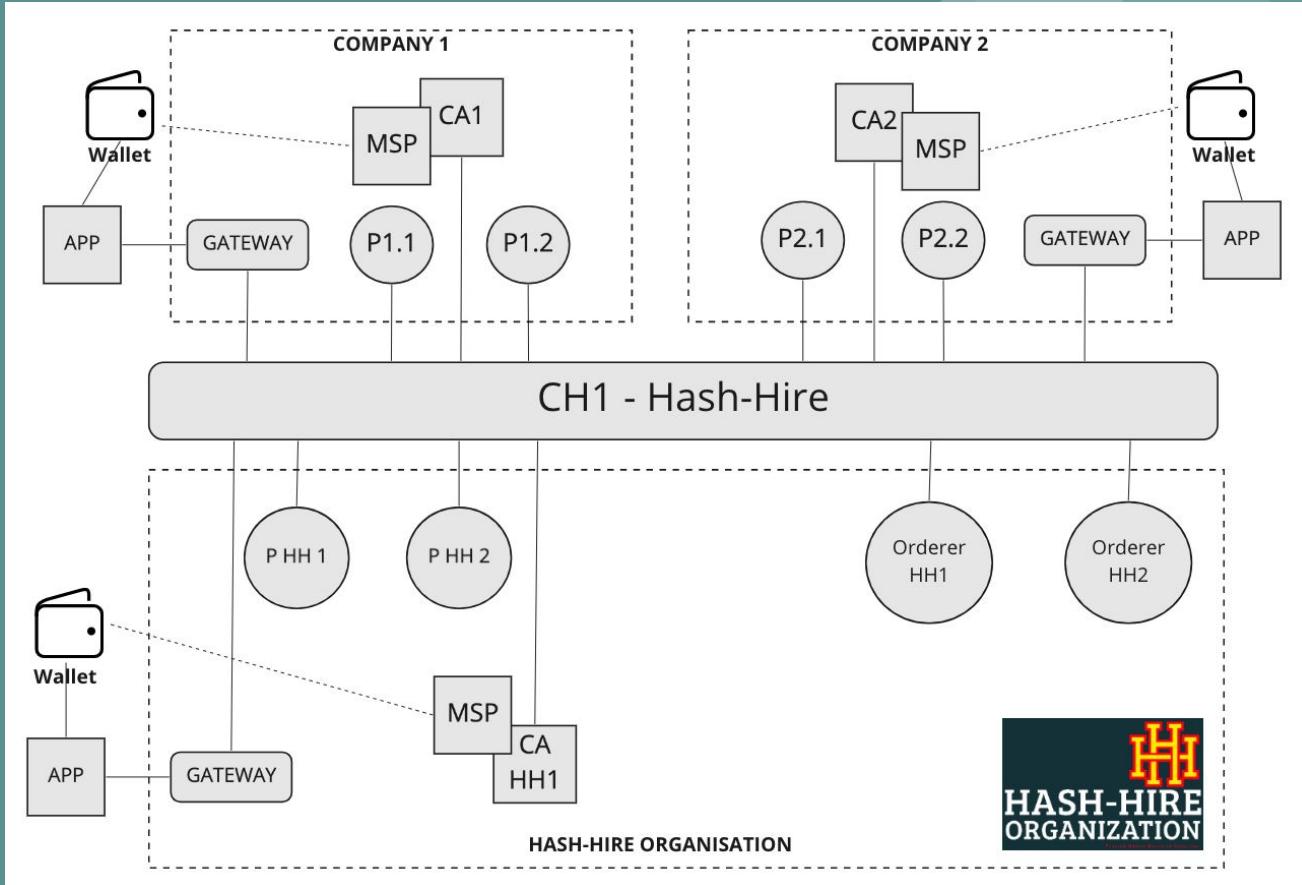
# Modeling of Blockchain Solution - Asset Lifecycle 2



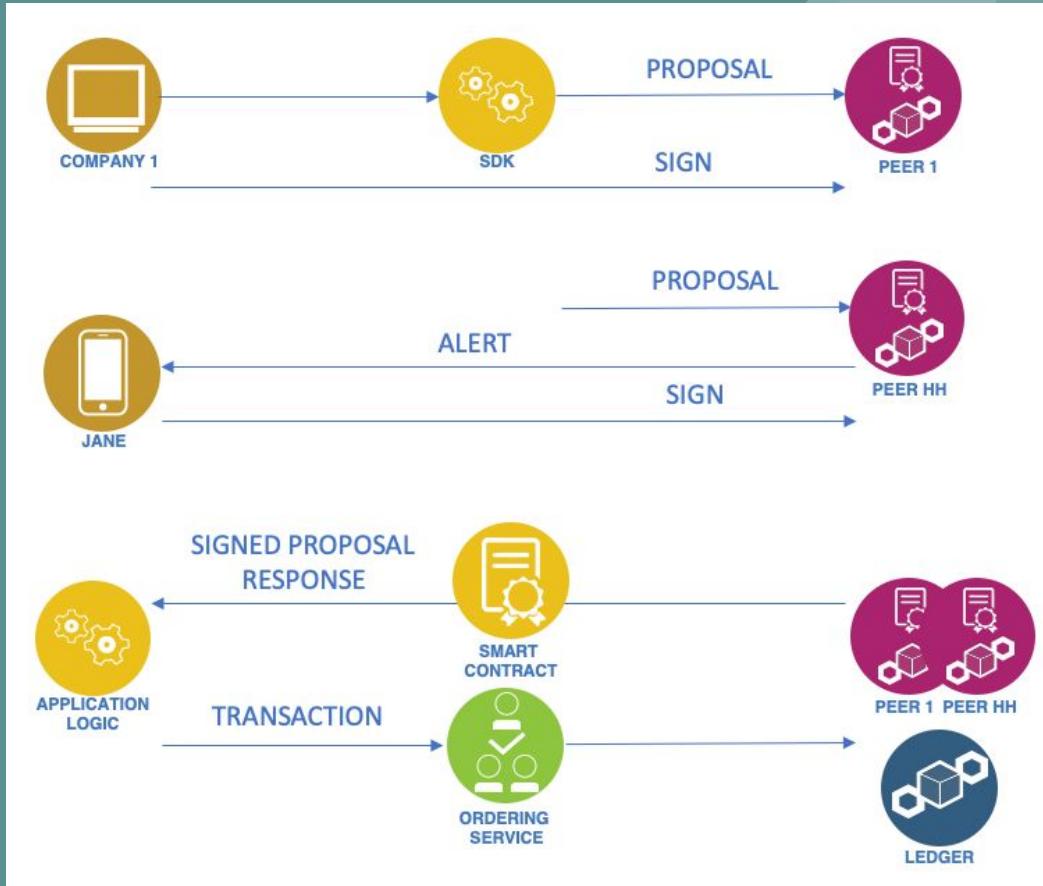
# Modeling of Blockchain Solution - Asset Lifecycle 3



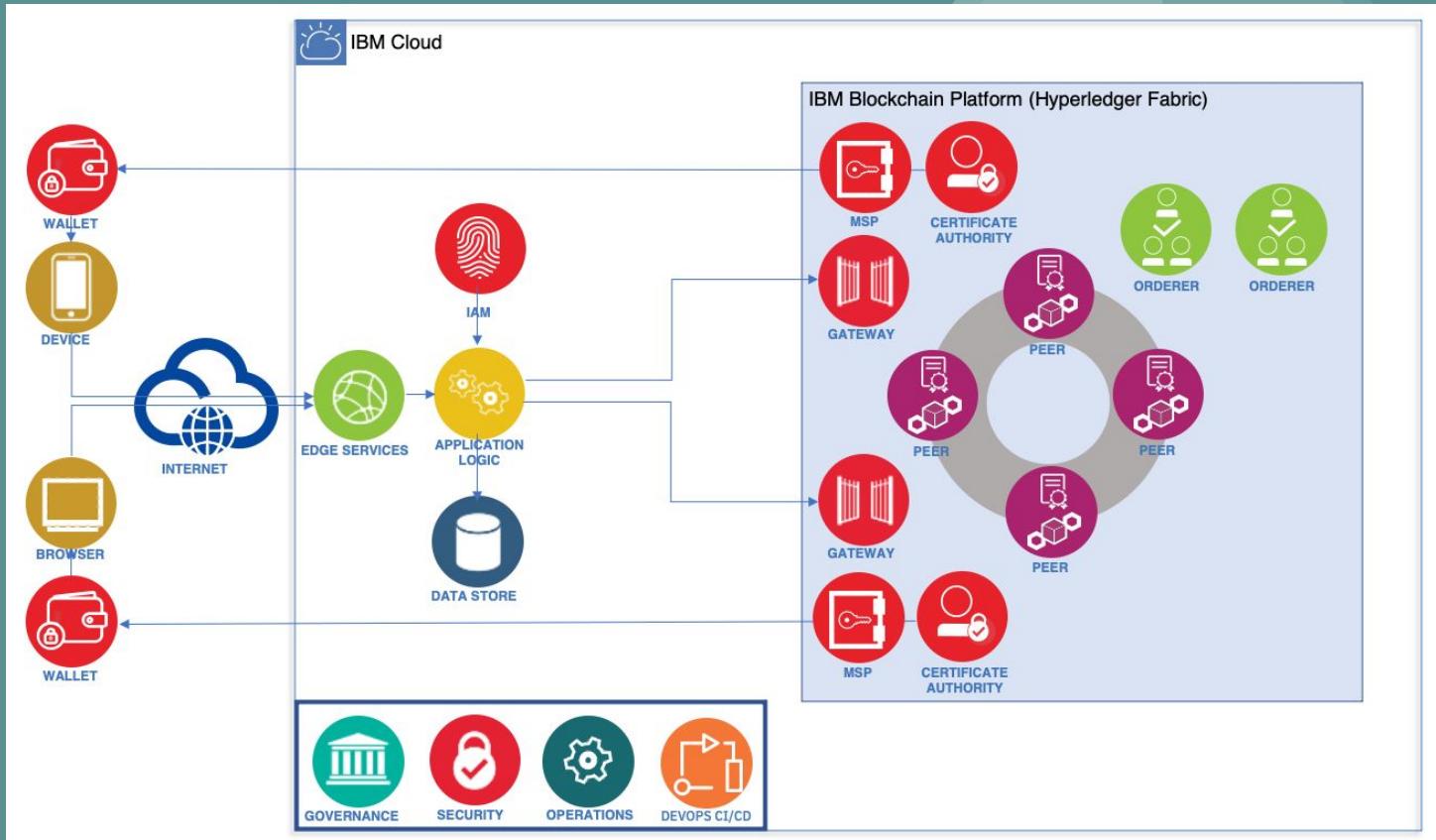
# Modeling of Blockchain Solution - Solution Architecture



# Modeling of Blockchain Solution - Transaction Flow



# Modeling of Blockchain Solution - Cloud Architecture





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# Demo

# Q&A

