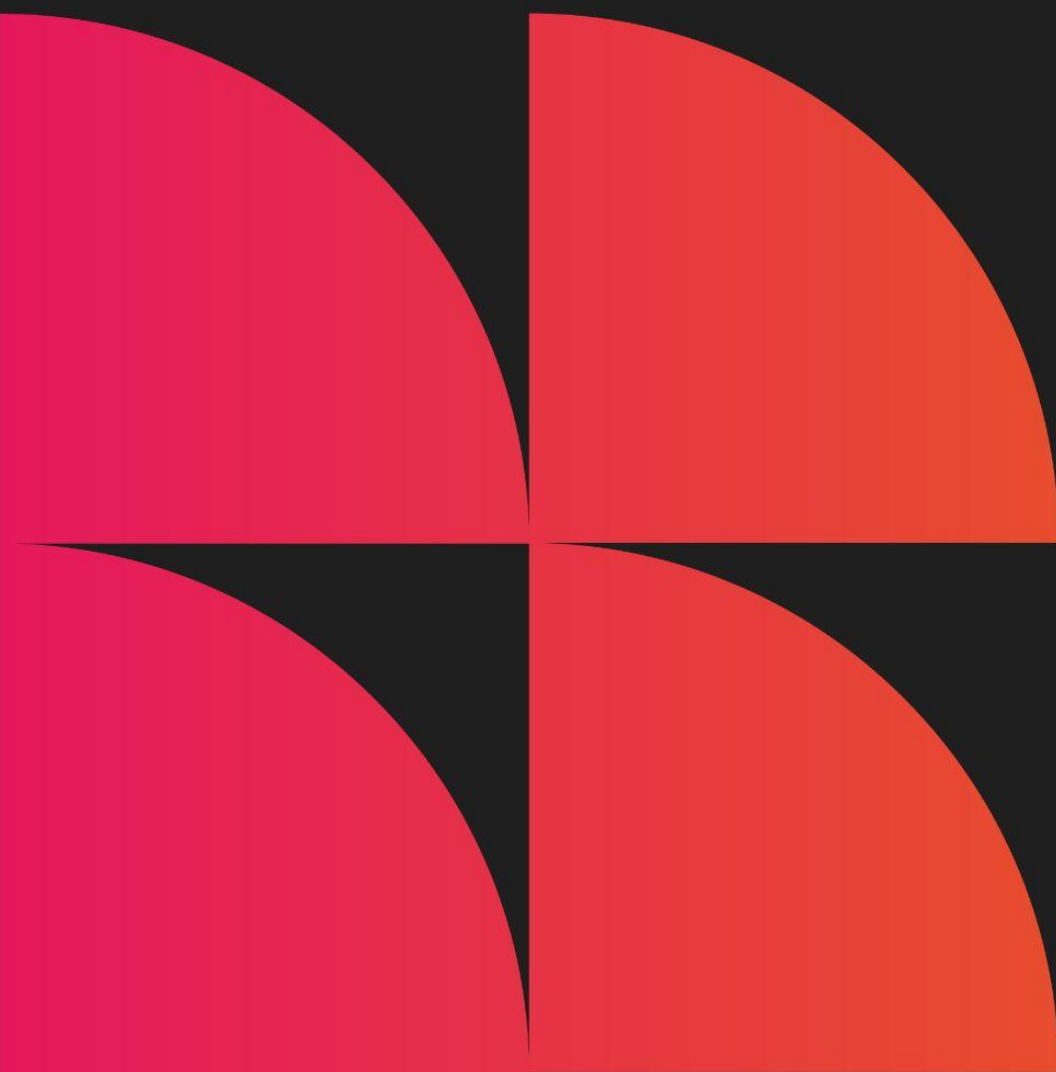




# Introduction to Inception

## Vault Fundamentals

Course ebook





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## Course Description

This course provides an introduction to our internal Smart Contract and Workflow Product Development team called Inception. Inception builds generic and regional financial products to be used by Clients and Partners. This session introduces the purpose of Inception, walks through the Inception Library, provides information on the Inception structure and finally provides some upcoming roadmap principles.

## Course Objectives

1. Understand the Purpose of our Inception Team.
2. Be Introduced to the available Inception Library.
3. Understand the Resources Required to build the library.

## Course Agenda

1. Introduction to the Inception Team.
2. Inception Library Walkthrough.
3. Inception Library Deposit and Lending Products.
4. Inception Library Team Structure.
5. Inception Library Roadmap Overview.



# Goals and Format

We will be covering the following topics in your digital learning session

1. Introduction to the Inception Team.
2. Walking through the Inception Library.
3. Showcasing Inception Library Deposit Products.
4. We'll then showcase Inception Library Lending Products.
5. Finally we'll provide an overview of the Inception Library Roadmap, and you'll be able to find a roadmap within your course materials.

By the end of the session you will have achieved 3 goals:

1. You will understand the Purpose of our Inception Team.
2. You will be Introduced to the available Inception Library.
3. You will understand the Resources Required to build the library.

At the end of this session we recommend you to:

1. Request the relevant Inception Library documentation, either on our Client and Partner Portal or by reaching out directly to your Thought Machine liaison contact.
2. Complete further Vault Fundamentals Training.
3. Contact Thought Machine if you have any queries.





# Inception Introduction

## Inception Origins

Inception was created in April 2019 with a mission to accelerate Clients going live on Vault.

Inception three pillar approach to success is:

1. Build a suite of preconfigured market standard core financial products, enabling easier integration onto our Vault platform.
2. Drive continuous improvement of developer experience, client tooling and documentation, empowering our clients to self-serve.
3. Build a scalable team of experts skilled in configuration layer delivery, training and delivering POCs “The Inception Way”.

## Inception Library

### Inception Product Library: Purpose

The Product Library provides a set of smart contracts, workflows and tests to accelerate client programmes.

To enable faster onboarding of Vault clients onto Configuration Layer development, and to accelerate the launch of financial products on Vault, Thought Machine optionally provides the Inception Product Library as part of a Vault deployment.

The product library contains:

- Contracts, Workflows and tests (all tests are included to additionally accelerate our clients).
- Documentation (product specs describing functional behaviour and use cases + technical docs for integration and architecture).
- Test utilities (we also provide tooling that we use to develop and test our products).



## Inception Product Library: Function

The Inception Product Library is built in the Configuration Layer.

The Inception Product Library is:

- A tested and documented set of templates that demonstrate how financial products and processes can be configured, tested and deployed in Vault.
- Smart Contracts written in Python which capture the financial logic of a given banking product such as a Savings Account or Personal Loan.
- Workflows written in YAML & Starlark which capture business processes related to a given product or banking function.

The Inception Product Library is not:

Production ready. The responsibility for determining whether the product is ready for production remains with the client.

- Regulatory Compliance : The library may provide some examples of features built to meet regulation, but we do not provide validation of regulatory compliance.
- Static. We intend for our products to be subject to constant iterative development as we bring in new features aligned to demand.

## Inception Product Library: Available Products

The Inception Library consists of a suite of mostly regionally generic typical lending and deposit products. The aim here being that we could provide these products to partners/banks in any of our strategic regions and the customer bank would recognise the product as having at least 80% of the features they would require for their own needs in production.

However, we do also provide regional variants where there is a significant deviation from what's typically on offer in a market, for example our US Checking & Savings Account has been specifically designed for the US Market.

Our goal with this library has not been to build hundreds of products, but instead to provide a set of highly configurable products that deliver a wide range of product variants.

The Product Library includes smart contracts and workflows designed to enable common deposit and lending products.





## Inception Product Library: Available Products - *Continued*

Deposits		Lending	
<b>Current Account</b>	A transactional account with interest rates, account tiers, auto-save, multicurrency pots, withdrawal limits, overdraft line of credit plus lending rate & fees.	<b>Line of Credit</b>	A single smart contract that enables the holder to take out multiple loans under an overall line of credit. Individual loans can vary by amount, term and rate.
<b>Savings</b>	The <b>Time Deposit</b> is a fixed maturity account with configurable term, interest, deposit window, and limits. <b>Easy Access Saver</b> is a transactional Savings account with configural withdrawal limits and maximum balance limits.	<b>Mortgage + Offset</b>	Ability to configure as interest plus principal repayment or interest only and supports fixed and non-fixed interest rates over a defined mortgage term. Supervisor functionality can be used to offset loan against a deposit account.
<b>Wallet</b>	A transactional account that can hold multiple currencies, enables configurable spending/balance limits plus manual and auto top ups.	<b>Credit Card</b>	A revolving line of credit with configurable transaction types and interest rates, fees (annual, overlimit, and late payment fees) and repayment hierarchy
<b>US Products</b>	US Checking and Savings account that uses Supervisor functionality to deliver US regional features like Overdraft Protection.	<b>Loan</b>	A fixed tenor loan with configurable interest rate tiers based on principal amounts plus support for overpayment and early repayment

## Inception Deposit Products

### Current Account

#### What Is a Current Account?

Inception Current Account s is the everyday banking transactional account where customers can make deposits and withdrawals. It is typically the account that a customer would use to set up recurring payments such as standing orders and direct debits, and where a customer will receive their salary. Most consumer facing retail banks will have a current account offering for their customers, because it is a way to elicit deposits from customers which can be used to make money by lending to other customers.

To summarise:

- Current account is a type of deposit account.
- Daily transactional account which facilitates the making of payments such as direct debit and standing order.
- Businesses and organisations can pay employees easily.



## Inception Deposit Products: *Continued*

There are a number of key advantages of these products to a customer:

- They provide the infrastructure for making and taking payments.
- Most employers require a current account for their employees to deposit their payments.
- Paying via debit cards or cheques.
- Transferring or withdrawing money without fee.

## Inception Current Account - Product Features

Current account features are grouped into six categories:

1. Interest.
2. Overdraft.
3. Transactions.
4. Limits.
5. Fees.
6. Accounting.

### **Interest:**

- The Current Account product supports positive interest accrual and application. This means that customers can receive money on their deposited amount. Accrual is done on a daily basis and application on a monthly basis.
- This product also supports negative interest. Negative interest is used when an economy wants to stimulate spending. It does the reverse of the positive interest. Therefore, the customer pays for keeping money at the bank rather than gaining.
- We also support tiered interest balances, which means interest rate can be different per a certain range of balance in the account, so for example, if an account has 0 to \$3000 then interest rate is at 3% but if account has more than \$3000 then interest rate is 4%.
- Next feature is configurable interest accrual and application time, this means banks can configure the time for the hour, minute and seconds that these jobs need to run so that there is no conflict with reconciliation times or other activities that banks may want to consider.



## Inception Current Account - Product Features : *Continued*

- Interest application frequency is also configurable and currently can be set to “monthly, quarterly or annually” please bear in mind that quarterly is on a 3 months basis. So this means interest can be accrued for 3 months before it gets applied to the account.
- Finally, we have a configurable day count. This is the number of days used in a year which is part of interest calculation. We calculate the daily rate by taking the interest rate per annum and dividing it by day count. This can be 360, 365, 366 or actual. When it is set to actual then our smart contract will work out the actual number of days in a year.

### Overdraft

- We have a configurable tiered buffer amount and buffer period. This means, if the customer's balance falls below zero and that is within the buffer amount and within the specified period of time then they don't get overdraft charges. However, outside these buffer boundaries they will be charged with overdraft penalties.
- We have a concept of an arranged overdraft which means if the customer's balance falls within the specified arranged limit then they will be charged with an overdraft percentage rate.
- If the customer goes into more debt and falls outside the arranged limit then we allow you to customise an unarranged overdraft limit where the customer will incur overdraft % rate penalty and a fee (which has a configurable cap).
- Finally, our current account has a concept of multiple account tiers. These tiers are called “upper, middle and lower” in the inception current account. As an example, buffer amount and period is one of the features that can be set differently per tier.

### Transactions:

- We support multi currency transactions. This means you can deposit amounts in currencies other than the primary currency of the account. You can also spend in other currencies as long as you have sufficient funds in those currencies. Be aware that Foreign Exchange rates and exchange calculations will be managed outside of the Vault system.
- Autosave is another feature, the customer can round up the amounts of transactions and save the amount that was rounded up to.
- We also support dormancy rules, if accounts are already identified as dormant by a bank, the bank can set a flag on the account and our product will block any credit and debit to and from the account.



## Inception Current Account - Product Features : *Continued*

### Limits

- We support ATM withdrawal limits which are configurable on each customer's account. There is also a concept of upper limit which is set per account tier so for example, if an account is in the upper tier they may have an upper limit of £5000 per day but accounts in lower tier may have an upper limit of £1000 a day.

### Fees

- We support account maintenance fees, This can be monthly, annually or both at the same time.
- We support minimum balance fees. This means if the customer's average balance falls below a certain threshold in a month then they will incur a fee.
- And finally we support dormancy inactivity fees. So if a bank has already identified an account as dormant then they have an option of charging the customer a configurable monthly inactivity fee.
- All the fees we've mentioned are configurable and if banks don't want to apply them then they can configure them to zero during the initial product setup.

### Accounting

- The accounting section is about the double entry book keeping that is done within the smart contract and that is the movement of money for interest accruals, interest application and fees.

### Supporting workflows

Supporting workflows are examples of what the bank operational user journeys can look like. So we support opening and closing a current account, adjusting overdraft amounts, creating an overdraft if overdraft doesn't exist in the first place and also cancelling an overdraft. Supporting workflows are:

- Apply for a current account.
- Adjust overdraft.
- Create overdraft.
- Cancel overdraft.
- Close current account.



## Easy Access Saver

### What Is an Easy Access Saver?

Inception Current Accounts is the ever:

Inception Easy Access Saver Account is the everyday savings account where customers can make deposits and withdrawals whilst accruing interest. It is typically the account that a customer would use to set up a basic no risk savings account, so that they can accrue capital at their own pace.

Most consumer facing retail banks will have a basic savings account offering for their customers paying low interest but with no risk, because it is a way to elicit deposits from customers which can be used to make money by lending to other customers. Banks sometimes offer these accounts as an instant saver, or one where a notice period must be made before a withdrawal can be made.

There are a number of key advantages of these products to a customer:

- They will have an account they are able to use to instantly save money without risk.
- Banks can offer tiered interest based on the balance so that customers are encouraged to save more.
- Typically the bank will allow customers to withdraw funds instantly, but not always.



An Easy Access Saver is a type of savings account that could be used as an everyday saving product.

#### Consumer Advantages:

- Bank offers different interest rates based on the balance range.
- Customers can save at their own pace.
- Bank offers more flexibility to withdraw money whenever customers like.



# Inception Easy Access Saver - Product Features

Easy Access Saver's features in six categories:

- Interest.
- Account Setting.
- Transactions.
- Limits.
- Fees.
- Accounting.

## Interest

- The Easy Access Saver product supports positive interest accrual and application. This means that customers can receive money on their deposited amount. Accrual is done on a daily basis and application on a monthly basis.
- This product also supports negative interest. Negative interest is used when an economy wants to stimulate spending. It does the reverse of the positive interest. Therefore, the customer pays for keeping money at the bank rather than gaining.
- We also support tiered interest balances, which means interest rate can be different per a certain range of balance in the account, so for example, if an account has 0 to \$3000 then interest rate is at 3% but if account has more than \$3000 then interest rate is 4%.
- Next feature is configurable interest accrual and application time, this means banks can configure the time for the hour, minute and seconds that these jobs need to run so that there is no conflict with reconciliation times or other activities that banks may want to consider.
- Interest application frequency is also configurable and currently can be set to "monthly, quarterly or annually" please bear in mind that quarterly is on a 3 months basis. So this means interest can be accrued for 3 months before it gets applied to the account.
- Finally, we have a configurable day count. This is the number of days used in a year which is part of interest calculation. We calculate the daily rate by taking the interest rate per annum and dividing it by day count. This can be 360, 365, 366 or actual. When it is set to actual then our smart contract will work out the actual number of days in a year.



## Inception Easy Access Saver : Product Features- *Continued*

### **Tiers**

- Our Easy Access Saver Account has a concept of multiple account tiers. These tiers are called “upper, middle and lower” in the Easy Access Saver account. As an example, interest applied and the Account’s fees can be set differently per tier.

### **Transactions**

- We support a single currency in the Easy Access Saver account, which currency you choose is configurable.

### **Limits**

- We support a configurable number of withdrawals limit, meaning you can limit the number of withdrawals in a single day and separately in a single month as well.
- There is a minimum deposit amount, that is the minimum amount that can be deposited into the account in a single transaction.
- There is a maximum balance limit, meaning the customer cannot exceed the maximum amount of savings that you specify.
- You can configure the maximum daily withdrawal limit so that a customer cannot withdraw more than a specified amount per day.
- Finally you can configure a minimum withdrawal limit, that is the minimum amount a customer can withdraw in a single transaction.

### **Fees**

- We support account maintenance fees, This can be monthly, annually or both at the same time.
- We support minimum balance fees. This means if the customer’s average balance falls below a certain threshold in a month then they will incur a fee.
- And we support the ability for you to configure whether to allow excess withdrawals or not. If you choose to allow excess withdrawals above a limit that you choose, you are able to charge your customer a fee for doing so.

### **Accounting**

- The accounting section is about the double entry book keeping that is done within the smart contract and that is the movement of money for interest accruals, interest application and fees.

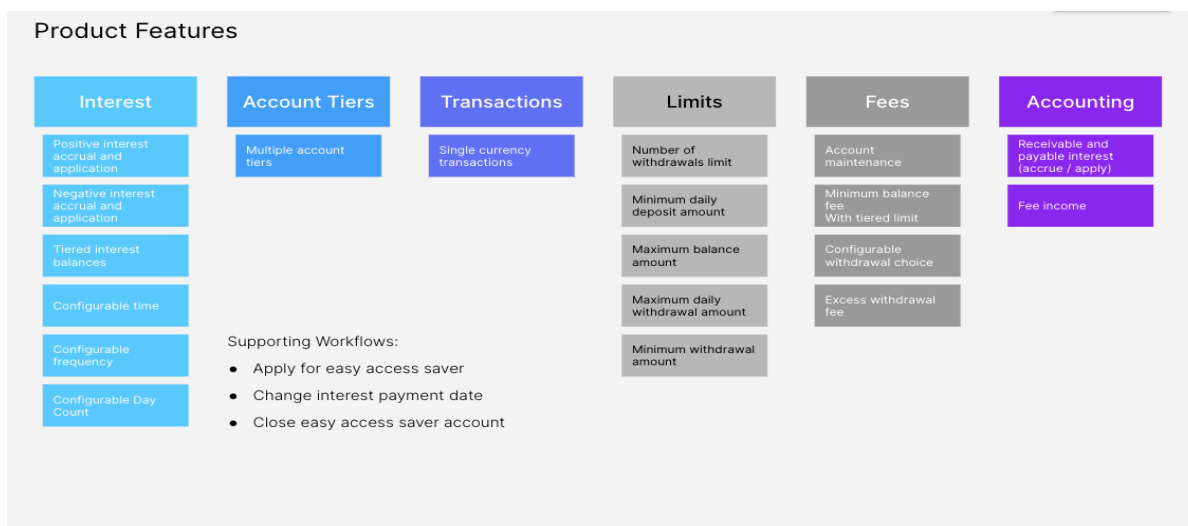


## Inception Easy Access Saver : Product Features- *Continued*

### Supporting workflows

We also provide supporting workflows which are examples of what the bank operational user journeys can look like. We provide example workflows for Applying to the Easy Access Saver, Changing an Interest Payment Date and Closing an Easy Access Saver. Supporting workflows are:

- Apply for easy access saver.
- Change interest payment date.
- Close easy access saver account.





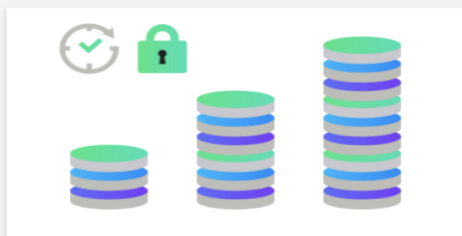


## Time Deposit

### What is a Time Deposit?

Time deposit is a type of savings account where money is locked away for a set period of time and then on maturity it will either roll over or disburse all the funds to the customer's main bank account. Typically interest is higher than an instant savings account, but there are penalties for early withdrawal. The benefit to the bank of providing this product is that customers are incentivized to hold their money in the bank for a longer and more predictable period of time.

The key advantage of this product to the consumer is that these accounts will offer higher interest rates than an instant access saver account.



- Time deposit is a type of savings account where money is locked away for a set period of time
- Maturities ranging from one month/day to few years

#### Consumer Advantages:

- Typically, time deposit offer **higher interest** rates than easy access saver accounts

### Inception Time Deposit - Product Features

Time Deposit features are broken down into seven categories:

- Interest.
- Deposits.
- Withdrawals.
- Account.
- Maturity.
- Holiday management.
- Accounting.



## Inception Time Deposit - Product Features: *Continued*

### **Interest**

- The time deposit has a fixed interest rate that is set at the time of account creation, this rate will be determined by the bank and given to the product.
- Interest can be accrued and applied at a configurable time of day, where the bank chooses the hour, minute and second. In addition, the frequency of interest application is configurable - it can be Weekly, Fortnightly, Four Weekly. Monthly, Quarterly, Semi Annually, Annually or only at maturity.
- Interest can be configured to 5 decimal places for accrual and application, and is rounded half up.
- The interest can be set to compound or sent to another account.
- The account interest is paid into can be configured and changed on the product.
- The interest application date can also be configured on the account.

### **Deposits**

- This product only allows deposits to be made during a period of time from account opening known as the deposit window, this timeframe is configurable.
- You can configure a minimum first deposit amount, once this has been placed the customer can place further deposits during the window.
- There is a maximum balance on the product, meaning the customer cannot deposit more than the maximum amount.
- The deposit grace period is configurable and runs after the deposit window, it is there so that funds can be added if they haven't been during the window. If the account balance remains 0 after the grace period has completed, the account is closed. This is so that accounts where the customer has failed to deposit any funds are closed.

### **Withdrawals**

- The customer is able to make early withdrawals subject to penalties which can be configured by the bank.
- Exceptional withdrawals can also be permitted even if the bank has not permitted early withdrawals.

### **Account**

- There is a fixed term on the account.
- No maintenance fees or charges have been associated with this product.



## Inception Time Deposit - Product Features: *Continued*

### Maturity

- At maturity there are 3 options: Rollover to a new time deposit account, transfer to another on Vault account (such as a current account) or transfer to an external account. These are configurable on a per customer account basis.
- The maturity is determined using the term and opening date, and it is provided to you for viewing as a derived parameter.
- A cool-off period allows customers to make changes to the account such as deposits and withdrawals, this is configurable.

### Holiday Management

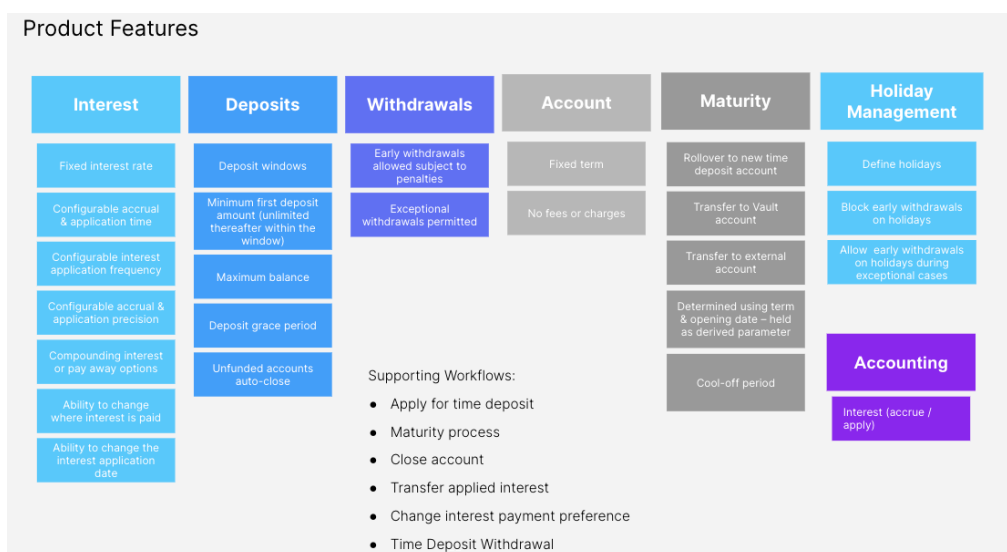
- You are able to define bank or public holidays on your account, so that you can block early withdrawals by default on holidays. You may want to allow withdrawals by exception, and if so the product allows this.

### Accounting

- The accounting section is about the double entry book keeping that is done within the smart contract and that is the movement of money for interest accruals and interest application.

### Supporting Workflows

- We also provide supporting workflows which are examples of what the bank operational user journeys can look like. We provide example workflows for Applying to the Time Deposit, managing maturity process, closing the account, transferring applied interest, changing interest payment preference and time deposit withdrawal.





# US Checking Account

## What Is a US Checking Account?

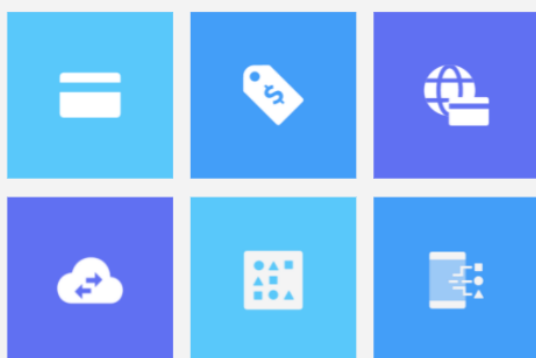
US Checking Account is the everyday banking transactional account specifically designed for the US market where customers can make deposits and withdrawals. It is typically the account that a customer would use to set up recurring payments such as standing orders and direct debits, and where a customer will receive their salary.

The US checking account also has an Overdraft Line of Credit facility, this enables customers to borrow additional money within pre-agreed limits for a fee.

Most US based consumer facing retail banks will have a checking account offering for their customers, because it is a way to elicit deposits from customers which can be used to make money by lending to other customers and a way to charge fees to customers.

There are a number of key advantages of these products to a customer:

- They will have an account they are able to use to make or receive payments.
- Many employers do not pay their employees in cash, and instead will deposit payments directly into their current account.
- The customer is typically able to have fees waived if they deposit sufficient funds and are active on the account.
- Finally the customer can access an additional overdraft line of credit to help make ends meet.



- The US Checking Account is an everyday deposit account tailored to the US market.
- It allows the customer to hold money within the account and perform transactional activities such as deposits and withdrawals (fees may apply).
- The account provides an optional overdraft line of credit facility that enables customers to access additional funds within pre-agreed limits (fees may apply).

### Consumer Advantages:

- Overdraft line of credit facility, including:
  - Overdraft Protection
  - Overdraft Coverage
- Balance and activity account fee waivers



## Inception US Checking Account - Product Features

US Checking Account features are broken down into seven categories:

- Interest.
- Overdraft.
- Overdraft Protection.
- Transactions.
- Limits.
- Fees.
- Monthly maintenance fee waivers.

### **Interest**

- The US Checking Account product supports positive interest accrual and application. This means that customers can receive money on their deposited amount. Accrual is done on a daily basis and application on a monthly basis.
- This product also supports negative interest. Negative interest is used when an economy wants to stimulate spending. It does the reverse of the positive interest. Therefore, the customer pays for keeping money at the bank rather than gaining.
- We also support tiered interest balances, which means interest rate can be different per a certain range of balance in the account, so for example, if an account has 0 to \$3000 then interest rate is at 3% but if account has more than \$3000 then interest rate is 4%.
- Next feature is configurable interest accrual and application time, this means banks can configure the time for the hour, minute and seconds that these jobs need to run so that there is no conflict with reconciliation times or other activities that banks may want to consider.
- Interest application frequency is also configurable and currently can be set to “monthly, quarterly or annually” please bear in mind that quarterly is on a 3 months basis. So this means interest can be accrued for 3 months before it gets applied to the account.
- Finally, we have a configurable day count. This is the number of days used in a year which is part of interest calculation. We calculate the daily rate by taking the interest rate per annum and dividing it by day count. This can be 360, 365, 366 or actual. When it is set to actual then our smart contract will work out the actual number of days in a year.



## Inception US Checking Account - Product Features: *Continued*

### **Overdraft**

- The product provides an Overdraft Line of Credit facility to customers, so that customers can borrow funds in order to make ends meet.
- We have a configurable tiered buffer amount and buffer period. This means, if the customer's balance falls below zero and that is within the buffer amount and within the specified period of time then they don't get overdraft charges. However, outside these buffer boundaries they will be charged with overdraft penalties.
- There is a fee free overdraft limit and an absolute limit, meaning fees can be charged on use of the Overdraft by the customer, we cover this in the fees section.
- The bank can specify which types of transactions are covered by the overdraft and which are not, for example eCommerce transactions may be included by ATM Withdrawals can be excluded.
- Finally, our current account has a concept of multiple account tiers. These tiers are called "upper, middle and lower". This impacts account behaviour. As an example, interest free buffer amount and period is one of the features that can be set differently per tier.

### **Overdraft Protection**

- The US checking account can be linked to the US savings account so that we can provide overdraft protection functionality, this is done using Supervisor functionality.
- Customers can customise the unit sizing over the overdraft protection transfers, which enables funds to be swept in multiples.
- Finally we offer the ability to have a multiple savings account hierarchy, meaning multiple savings accounts can be linked to the Checking Account and used in a specified order.

### **Regarding transactions**

- The customer can round up the amounts of transactions and save the amount that was rounded up using autosave functionality.
- We also support dormancy rules, if accounts are already identified as dormant by a bank, the bank can set a flag on the account and our product will block any credit and debit to and from the account.



## Inception US Checking Account - Product Features: *Continued*

### **Limits**

- We support ATM withdrawal limits which are configurable on each customer's account. There is also a concept of upper limit which is set per account tier.

### **Regarding fees**

- We support account maintenance fees, This can be monthly, annually or both at the same time.
- We support minimum balance fees. This means if the customer's average balance falls below a certain threshold in a month then they will incur a fee.
- The Overdraft Line of Credit fees we support are: Line of Credit daily fee - a fee for using the line of credit and a per transaction fee charged each time the customer makes a transaction using the LoC. You can configure a maximum cap on overdraft fees charged.
- And finally we support an account inactivity fee. So if an account is inactive then the bank can charge the customer a configurable monthly inactivity fee.
- All the fees we've mentioned are configurable and if banks don't want to apply them then they can configure them to zero during the initial product setup.

### **Monthly maintenance fees waiver**

- This can be done using a minimum daily balance, using a combined minimum balance of both the checking & savings account balances, a minimum deposit amount or providing a promotional period to waive maintenance fees for customers.



## Inception US Checking Account - Product Features: *Continued*

### Supporting workflows

- Examples of what the bank operational user journeys can look like are:
- Apply for a US Checking Account.
- Apply for a US Checking and Savings Account.
- Close US Account.
- Link Existing Accounts.
- Manage Overdraft Coverage.
- Manage Overdraft Protection Hierarchy.

### Product Features

Interest	Overdraft	Overdraft Protection	Transactions	Limits	Fees	Monthly Maintenance Fee Waiver
Positive interest accrual and application	Overdraft Line of Credit	Link Checking and Savings Accounts	Autosave	ATM withdrawal limit with tiered max limit	Account maintenance	Minimum Daily Balance
Negative interest accrual and application	Interest Free Buffer	Supervisor Plan	Dormancy rules to reject credit & debit		Maintenance Fee	Minimum Combined Daily Checking & Savings Account Balance
Tiered interest balances	Fee Free Overdraft	Overdraft Protection Transfer Unit Sizing			Minimum Balance Fee	Minimum Deposit Amount
Interest accrual & application time	Overdraft Coverage	Multiple Savings Account Hierarchy			Overdraft Line of Credit Daily Fee	Monthly Maintenance Fee Waive Promotional Period
Interest application frequency	Account Tiers	Supporting Workflows: <ul style="list-style-type: none"><li>• Apply for a US Checking Account</li><li>• Apply for US Checking and Savings Account</li><li>• Close US Account</li><li>• Link Existing Accounts</li><li>• Manage Overdraft Coverage</li><li>• Manage Overdraft Protection Hierarchy</li></ul>			Overdraft Line of Credit Per Transaction Fee	
Interest day Count					Overdraft Line of Credit Fee Cap	
					Overdraft Protection Transfer Fee	
					Account Inactivity Fee	





# US Savings Account

## What Is a US Savings Account?

US Savings Account is a typical transactional savings account specifically designed for the US market where customers can hold money and in return a variable interest rate is paid on the balance. Most US based consumer facing retail banks will have a savings account offering for their customers, because it is a way to elicit deposits from customers which can be used to make money by lending to other customers and a way to encourage customers to increase their total relationship balance, by offering fee waivers alongside interest.

There are a number of key advantages of these products to a customer:

- Bank offers an interest rate or monthly maintenance fee waive promotional period to entice and benefit customers.
- Customers can save at their own pace.
- There can be balance and activity account fee waivers on their checking account if they maintain a sufficient savings balance.



- The US Savings Account is an everyday savings product tailored to the US market.
- It allows the customer to hold money within the account and perform transactional activities such as deposits and withdrawals (fees may apply).
- Funds can be deposited into the account and in return the bank pays a variable interest rate on the balance.

### Consumer Advantages:

- Bank offers an interest rate or monthly maintenance fee waive promotional period to entice and benefit customers.
- Customers can save at their own pace.
- Balance and activity account fee waivers.



# Inception US Savings Account - Product Features

US Checking Account features are broken down into five categories:

- Interest.
- Checking Account Overdraft Protection.
- Fees.
- Monthly maintenance.
- Fee waiver.
- Limits.

## **Interest:**

- The US Savings Account product supports positive interest accrual and application. This means that customers can receive money on their deposited amount. Accrual is done on a daily basis and application on a configurable basis.
- This product also supports negative interest. Negative interest is used when an economy wants to stimulate spending. It does the reverse of the positive interest. Therefore, the customer pays for keeping money at the bank rather than gaining.
- We also support tiered interest balances, which means interest rate can be different per a certain range of balance in the account, so for example, if an account has 0 to \$3000 then interest rate is at 3% but if account has more than \$3000 then interest rate is 4%.
- Next feature is configurable interest accrual and application time, this means banks can configure the time for the hour, minute and seconds that these jobs need to run so that there is no conflict with reconciliation times or other activities that banks may want to consider.
- Interest application frequency is also configurable and currently can be set to “monthly, quarterly or annually” please bear in mind that quarterly is on a 3 months basis. So this means interest can be accrued for 3 months before it gets applied to the account.
- Finally, we have a configurable day count. This is the number of days used in a year which is part of interest calculation. We calculate the daily rate by taking the interest rate per annum and dividing it by day count. This can be 360, 365, 366 or actual. When it is set to actual then our smart contract will work out the actual number of days in a year.



## Inception US Savings Account - Product Features :*Continued*

### **Checking Account Overdraft Protection**

- The US Savings account can be linked to the US Checking account so that we can provide overdraft protection functionality to the checking account, this is done using Supervisor functionality.
- Customers can customise the unit sizing over the overdraft protection transfers, which enables funds to be swept in multiples.
- Finally we offer the ability to have a multiple savings account hierarchy, meaning multiple US savings accounts can be linked to a Checking Account and used in a specified order.

### **Fees**

- We support account maintenance fees, This can be monthly, annually or both at the same time.
- We support minimum balance fees. This means if the customer's average balance falls below a certain threshold in a month then they will incur a fee.

### **Monthly maintenance fees waiver**

- This can be done using a minimum daily balance, using a combined minimum balance of both the checking & savings account balances, a minimum deposit amount or providing a promotional period to waive maintenance fees for customers.

### **Limits**

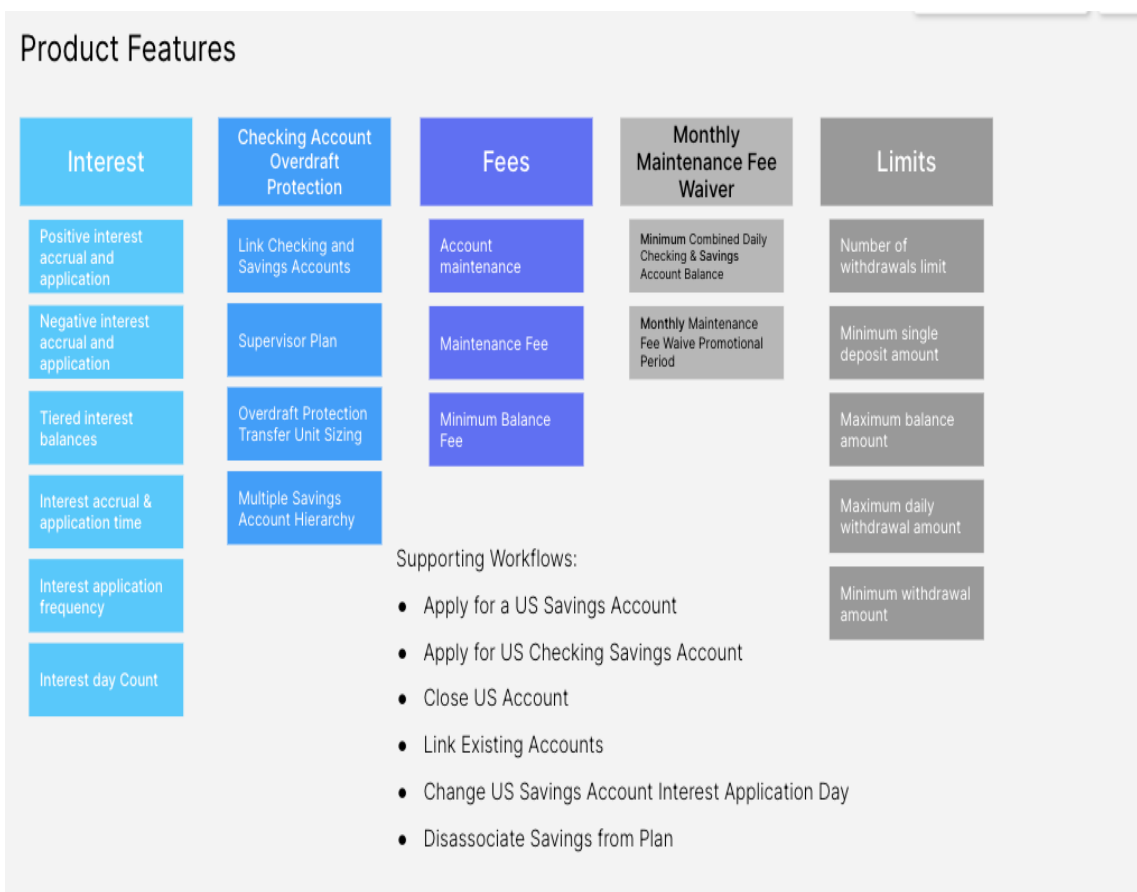
- You are able to limit the number of withdrawals on a monthly and daily basis.
- You can set a minimum single deposit into the account, meaning the minimum amount that will be accepted for a deposit.
- A maximum balance amount will ensure that you cannot exceed a specified limit.
- The maximum daily withdrawal limit will ensure you can't exceed a maximum net amount withdrawn per day.
- Finally the minimum withdrawal limit specified the minimum amount that can be withdrawn in a single transaction.



## Inception US Savings Account -Product Features:*Continued*

### Supporting workflows are:

- Apply for a US Savings Account.
- Apply for a US Checking Savings Account.
- Close US Account, Link Existing Accounts.
- Change US Savings Account Interest Application Day.
- Disassociate Savings from Plan.





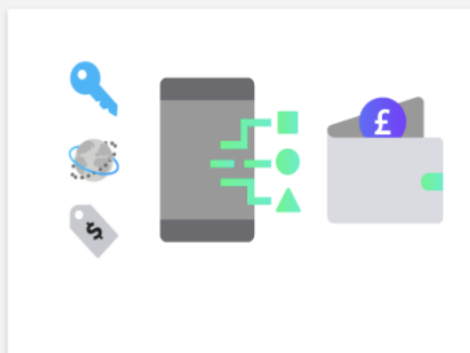
## Wallet

### What Is a Wallet?

Wallet Product is a typical virtual wallet account where customers can deposit and transfer money, typically it doesn't earn interest and the customer channel used to access it is a mobile app. It is an alternative to a Current or Savings Account. Wallet transfers are regularly used as an alternative to cash payments.

There are a number of key advantages of these products to a customer:

- Banks offer wallet holders the flexibility to spend money anywhere anytime instantly.
- Mobile wallets offer customers a secure option to pay for purchases from the convenience of a smartphone instead of using a credit/debit card.
- Customers can link and top-up their wallet from another bank account.



A wallet account is a virtual wallet which is a place to hold money online as an alternative to a traditional deposit accounts (eg. Current or Savings). This virtual money is typically accessed via a mobile app.

#### Consumer Advantages:

- Banks offer wallet holders the flexibility to spend money anywhere anytime instantly.
- Mobile wallet offers a customer various secure options to pay for purchases from the **convenience** of their smartphones instead of using a credit/debit card
- Customer's bank account can be linked to their wallet
- The wallet holder can choose to top-up their wallet automatically or manually as needed



## Wallet - Product Features

Wallet product features are broken down into two categories:

- Transactions.
- Limits.

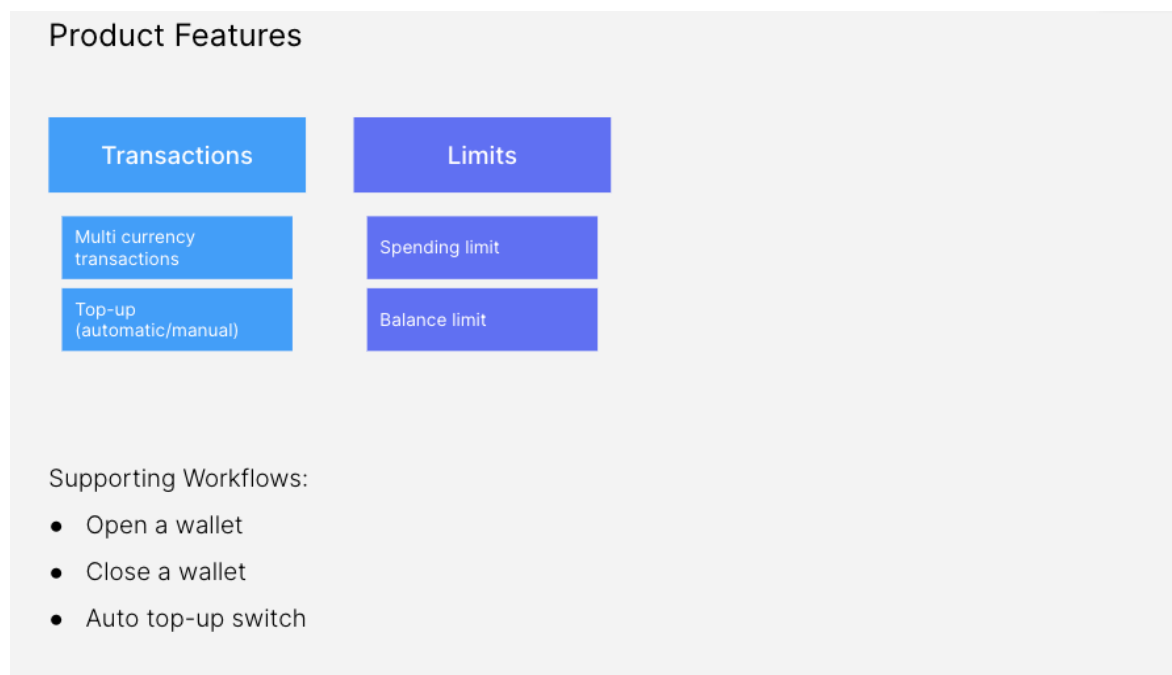
### Transactions

- The wallet is a multi-currency wallet, meaning it is compatible with any currency and can hold multiple currencies instead of just the primary wallet currency.
- The wallet has an option to be topped up automatically, this is done by linking it to a current account. Manual top-ups are also allowed.

### Limits

- The customer is able to configure their own daily spending limit on their wallet account, so they can control the amount they are spending on it.
- Second the wallet can also have a balance limit, meaning this is the maximum balance a wallet can have at any given time.

The wallet product is a simple, basic wallet aligned to a typical wallet you'd see on a mobile banking app or other e-commerce platform wallet. Further configuration can be added to it in the project. We provide a set of example workflows to complement the Smart Contracts, these are: Open a wallet, Close a wallet and auto-top up switch.





# Inception Lending Products

## Line of Credit

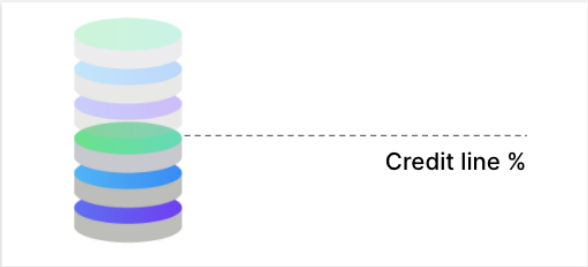
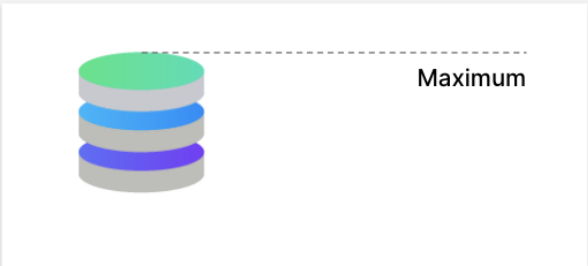
What is a line of credit ?

Inception Line of Credit, is a type of loan where the customer has a single amount of pre-agreed available credit however, rather than being taken at once, customers are able to access funds as required and each of these will form individual loans. This provides the borrower with flexibility to take as much as they need up to the maximum amount, on demand.

## Line of credit - Product Features

There are a number of key advantages of these products to a customer:

- Borrowers are only charged interest on the funds they actually draw.
- And the Interest rate is often lower than that of a one-time loan for the smaller amounts.



- Banks offer an arrangement with a maximum amount that a borrower can draw upon at any time. The max amount is the credit limit or credit line
- Borrower has flexibility to take as much as they want up to the maximum amount

**Advantages:**

- Borrowers are only charged interest on the funds they actually draw
- The interest rate is often lower than that of a one-time loan

Line of Credit features are broken down into seven categories:

- Interest.
- Loan.
- Repayment.
- Repayment Type.
- Limits.
- Fees.
- Accounting.



## Line of credit - Product Features :*Continued*

### **Interest**

- The product allows each loan taken by the customer to have its own fixed interest rate that is set at the time of draw down, this can be set to any number above 0.
- Interest will accrue on a daily basis on each loan.
- Next feature is configurable interest accrual and application time, this means banks can configure the time for the hour, minute and seconds that these jobs need to run so that there is no conflict with reconciliation times or other activities that banks may want to consider.
- Accrued and applied interest is rounded half up to a configurable number of decimal places, specified by the bank.

### **Loan**

- Each loan that is given will have a fixed term that the customer has to repay.
- The product allows customers to have one or more loans within a single account, specified by an individual loan ID. Each loan can have its own principal, length (term) and interest rate which allows it to have an individual repayment schedule.

### **Repayment**

- The loan amount and interest is repaid in fixed monthly repayments over the loan term. The product uses the amortisation method to calculate a schedule of equal monthly repayments designed to reduce the loan amount and the associated interest to zero over the term of the loan. This is the EMI method.
- The repayment day is configurable and can be set per account based on customer preference.
- The product has one flat penalty interest rate which applies to overpayments and early repayments.
- The product has a configurable grace period which can be set to a number of days. This is the timeframe that the customer has to pay the full amount overdue and any additional penalties, if they do not then the product is marked as delinquent.

### **Repayment types**

- Customers can make overpayments on their account. An overpayment is defined as any repayment that is greater than the amount that is due to be repaid in that cycle.
- If the customer makes an overpayment which leads to their full line of credit or an individual loan being fully repaid, we class this as an early repayment. The product allows early repayments to be made to both the overall line of credit or targetted at a specific loan. The product can also apply penalties for an early repayment.
- Finally the product has the ability to set a repayment holiday at the account level, meaning it impacts all of the active loans on the Line of credit account.





## Line of credit - Product Features :*Continued*

### Limits

- The Line of Credit offers a maximum overall credit limit, that is the maximum amount that can be taken out across all of the loans on a single Line of Credit account.
- The product has the ability for a bank to configure at what stage the available credit limit increases. This can be as repayments are made on individual loans and the principle owed is reduced or only when the whole loan principal is repaid.
- You are also able to define minimum and maximum loan amounts, if you want to control how the customer takes the individual loans from the Line of Credit.

### Fees

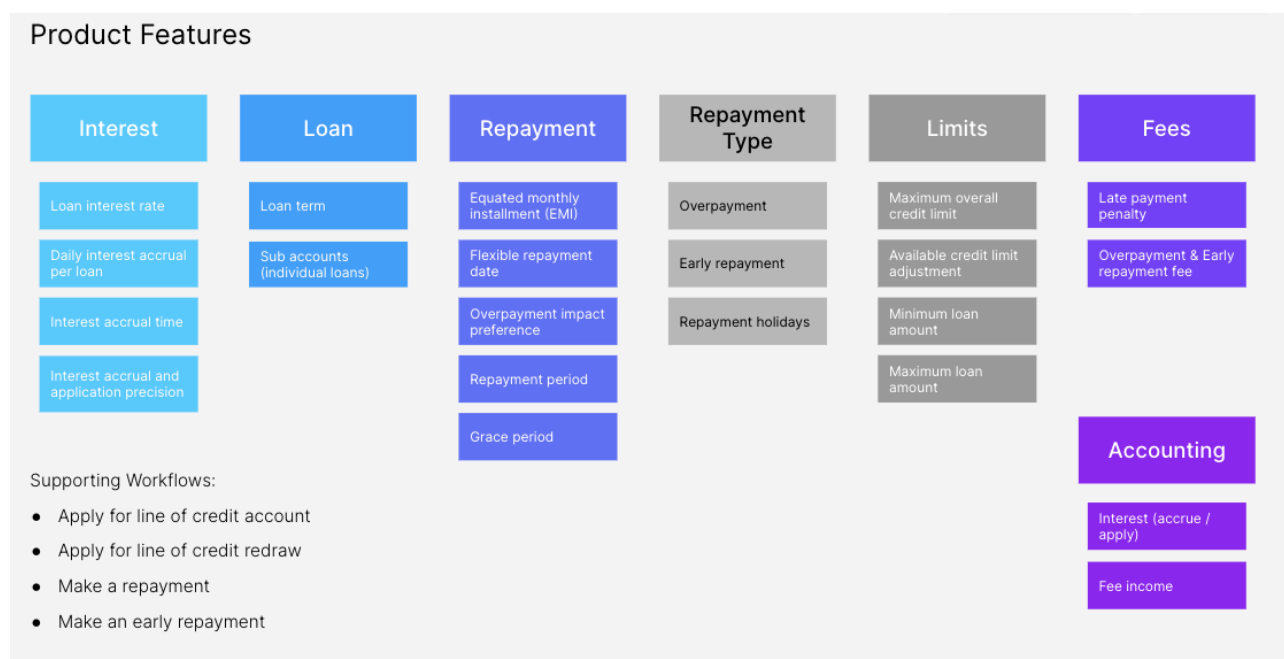
- The Late Payment Penalty fee will be applied if the customer does not repay their individual loan on time, this can be penalty interest or a fee.
- Overpayment or full Early Repayment can also have fees applied to the customer account.

### Accounting

- The accounting structure used for all interest and fee accrual is following the double entry bookkeeping model.

### Supporting workflows are:

- Apply for line of credit account, Apply for line of credit redraw, Make a repayment and Make an early repayment.





# Loan

## What is a loan ?

A loan is an amount of money borrowed from a lender in order to pay upfront for large expenses such as a car, wedding, home improvements and more. The loan amount along with the associated interest is then repaid, usually in fixed monthly repayments, over the term of the loan. If the customer falls behind on repayments, typically penalty fees and interest are charged.

There are a number of key advantages of these products to a customer:

- High borrowing limit compared to alternatives like credit card, where you may pay additional fees or interest for obtaining cash from the credit card line.
- Lower interest rate than credit card.
- Finally there is a predictable repayment plan meaning the consumer can plan their finances.



- A loan is a lump sum amount of money that people can borrow from the bank to cover personal expenses.
- The borrowed money must be repaid over time, typically with interest.



### Consumer Advantages:

- High borrowing limit compared to alternatives like credit card
- Lower interest rate than credit card
- Predictable repayment plan

## Inception Loan - Product Features

Loan features are broken down into six categories:

- Interest.
- Loan.
- Repayment.
- Repayment Type.
- Fees.
- Accounting.



## Inception Loan - Product Features: *Continued*

### Interest

- The product allows each loan to use a fixed or variable interest rate. The Variable Interest Rate can include a variable rate adjustment, either positive or negative.
- A cap and floor can be applied to the Variable Interest, meaning the interest rate cannot be higher or lower than the cap and floor.
- Interest will accrue on the loan on a daily basis, and be applied on a monthly basis to the customer's loan.
- You are able to configure the monthly interest rest and daily interest rest. This will impact the way overpayments and more frequent repayments are recognised when calculating the outstanding principal and interest.

### Loan

- Each loan that is given will have a loan term that the customer has to repay.
- The loan will have an initial loan amount which will be repaid by the customer.
- It is expected that the customer will repay their loan on a monthly basis.
- And finally the customer is able to top up their loan while it is active, i.e. extend the loan and take a larger amount while the loan is live.

### Repayment

- The loan amount and interest is repaid in fixed monthly repayments over the loan term. The product uses the amortisation method to calculate a schedule of equal monthly repayments designed to reduce the loan amount and the associated interest to zero over the term of the loan. This is the EMI method.
- The repayment day is configurable and can be set per account based on customer preference.
- A notification can be sent to inform a customer that their repayment is due, so they pay their loan on time.
- In addition an overdue notification can be sent to the customer when they do not repay the loan on time.
- Any repayments made by the customer will repay the loan's balances in a specific order, this order is found in the Inception Documentation.
- The product has a configurable grace period which can be set to a number of days. This is the timeframe that the customer has to pay the full amount overdue and any additional penalties, if they do not then the product is marked as delinquent.
- Finally the product can be set to use the Flat Rate Amortisation method, or the Rule of 78 amortisation method. This will impact the product behaviour relating to repayments and overpayments, so consult the documentation if you are unsure which to use.



## Inception Loan - Product Features: Continued

### **Repayment types**

- Customers can make overpayments on their account. An overpayment is defined as any repayment that is greater than the amount that is due to be repaid in that cycle.
- If the customer makes an overpayment which leads to their loan being fully repaid, we class this as an early repayment. The product allows early repayments to be made with penalties for an early repayment.
- The product has the ability to set a repayment holiday onto the loan account. The bank will be able to choose whether to increase the instalments being paid or the Loan Term when the bank initiates the payment holiday.
- Finally an overpayment can either reduce the remaining instalments to be paid or reduce the remaining term of the loan.

### **Fees**

- An upfront fee can either be deducted from the loan disbursement or amortised to be repaid with the loan.
- The Late Payment Penalty fee will be applied if the customer does not repay their loan on time, this can be penalty interest or a fee.
- Overpayment or full Early Repayment can also have fees applied to the customer account.

### **Accounting**

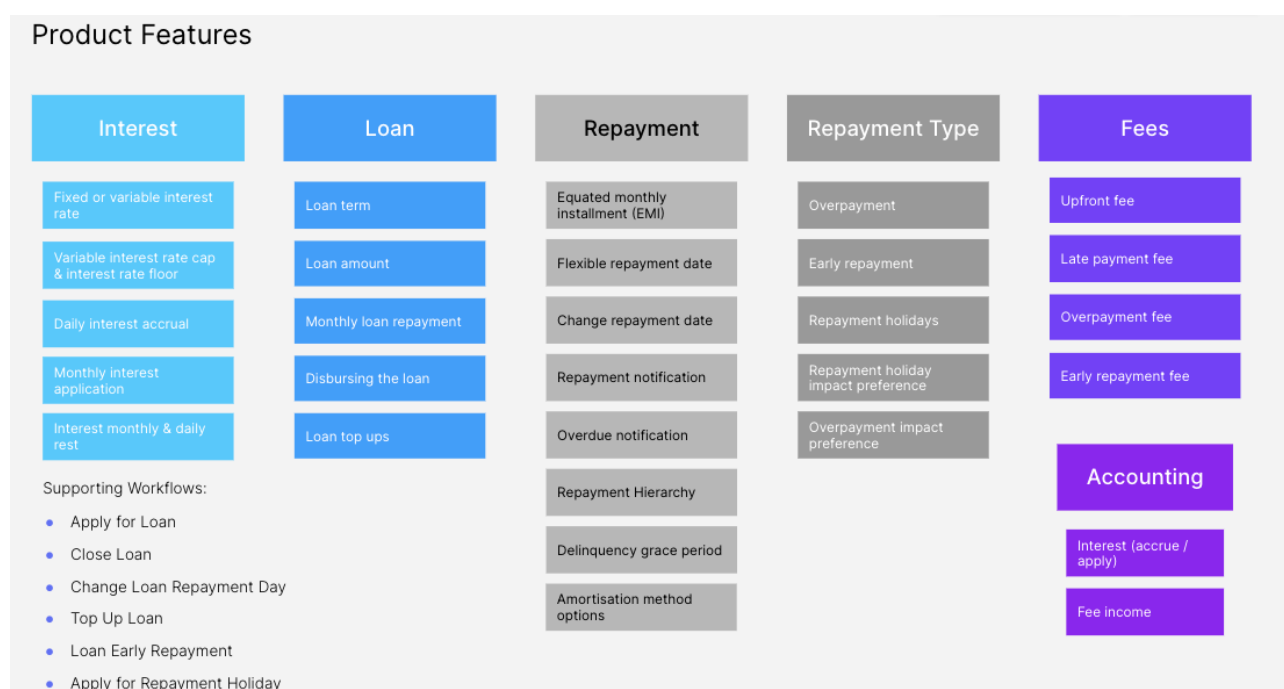
- The accounting structure used for all interest and fee accrual is following the double entry bookkeeping model.



## Inception Loan - Product Features: Continued

### Supporting workflows are:

- Apply for Loan.
- Close Loan.
- Change Loan Repayment Day.
- Top Up Loan.
- Loan Early Repayment.
- Apply for Repayment Holiday.





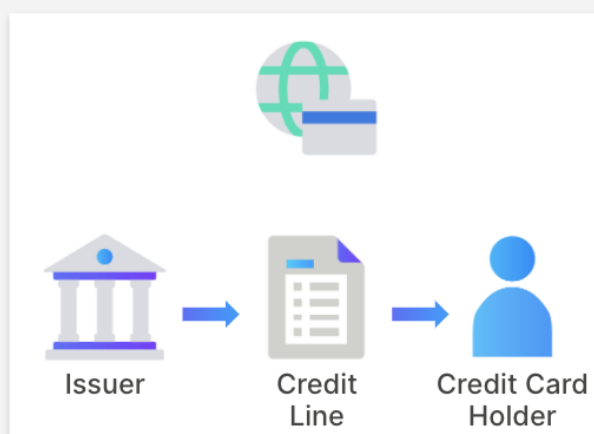
# Credit Card

## What is a Credit Card?

A credit card is a payment card issued to cardholders to enable the cardholder to pay a merchant for goods and services. The cardholder is then expected to pay the issuer of the card back plus any other charges for using the card, for example an annual fee. The bank will typically charge a high interest rate on the outstanding balance if it is not fully repaid on time.

There are a number of key advantages of these products to a customer:

- Credit cards often offer enhanced levels of Fraud and Consumer Protection compared to using a debit card to make payment.
- Rewards and cash back are a common feature of credit cards, rewarding customers for spending money on their card.
- Credit Cards are an effective way for consumers to Build a credit history and improve their credit score.
- A credit card will have an Interest free period during which the consumer can repay it in full to pay no interest, but have short term credit.



- A physical card that entitles the holder to borrow money from the issuer
- Holder has flexibility to spend up to the maximum amount (credit limit)
- Unsecured loan with considerably higher interest if the full amount due is not paid by the due date

### Advantages:

- Fraud protection
- Consumer protection
- Rewards and cash back
- Build credit history
- Interest free period



## Credit Card - Product Features

Credit Card features are broken down into six categories:

- Interest.
- Repayment.
- Transactions.
- Limit.
- Fees.
- Accounting.

### **Interest**

- The Credit Card has a configurable interest rate for each individual customer account.
- The interest charged and interest free period can be configured on each transaction type, for example you may charge Cash Withdrawals differently to how you charge a Balance Transfer transaction.
- The interest rate can accrue on a daily basis and be applied if the customer does not repay their balance in full during the interest free period, alternatively it can accrue only from the Statement Cut Off Date.
- Finally you can configure an interest rate on unpaid fees and unpaid interest.

### **Repayment**

- The minimum amount due will be calculated automatically by the product, and you are able to define an absolute minimum fixed amount that must be repaid. The higher of the two will be the Minimum Amount Due for the customer.
- The minimum amount due calculation can be impacted by the Transaction Type's minimum amount due, which you can configure.
- The customer is able to repay their balance fully or partially at any time.
- Any repayments made by the customer will repay the Credit Card's balances in a specific order, this order is found in the Inception Documentation.
- Finally a Repayment holiday can be applied, which provides the customer a break in monthly payment commitments but interest will continue to accrue as normal without penalties.

## Credit Card - Product Features:*Continued*



## **Transactions**

- Transactions can be configured to have specific types such as Balance Transfer, Purchase, Cash Advance or Transfer and others. These individual types can have their own credit limits, interest rates, interest free periods, minimum percentages due, and fees.

## **Limits**

- An overall credit limit can be configured, to define the amount of money the customer is allowed in total.
- The bank can also provide an option for the customer to go above this limit, and the bank is able to charge a fee when the customer exceeds their limit.
- The product can have individual credit limits per transaction type.
- And finally the time limit for specific transaction types like balance transfers to be completed from account opening day can also be configured, after which they are rejected.

## **Fees**

- The Late Payment Penalty fee will be applied if the customer does not repay their loan on time, this can be penalty interest or a fee.
- The over limit fee will be used when the customer exceeds their maximum credit limit.
- An annual fee can be charged on the credit card as well.
- And finally transaction types can have flat or percentage fees when used, with a cap on the transaction type fees.

## **Accounting**

- Accounting structure used for all interest and fee accrual is following the double entry bookkeeping model. We also provide the internal accounting structure required for a bank to manage their exposure of revocable commitments.

## **Supporting Workflows are:**

- Apply for a credit card.
- Apply for a balance transfer.
- Statement notification.





# Mortgage

## What is a Mortgage?

A mortgage is a loan that is used by purchasers of real property to raise funds to buy a house, or alternatively by existing property owners to raise funds for a purpose, usually renovations or a further property purchase. The borrowed money must be repaid over time, typically with interest.

There are a number of key advantages of these products to a customer:

- Interest rates are lower than using other forms of borrowing such as a loan or credit card.
- Loan is secured against the property that the mortgage holder has purchased.
- Lenders offer flexibility on repayment options (for example Interest only or Interest + Principal).
- Mortgages offer a predictable repayment plan for customers, allowing long term planning.

## Mortgage - Product Features

Mortgage features are broken down into eight categories:

- Interest.
- Loan.
- Repayment.
- Repayment Type.
- Limits.
- Fees.
- Balance Offsetting.
- Accounting.



## Mortgage - Product Features: *Continued*

### **Interest**

- The product allows each mortgage loan to use a fixed or variable interest rate. There is an ability to switch from one to the other during the lifecycle of the mortgage.
- The interest will accrue on a daily basis on the principal.
- Any time the customer goes into arrears, a penalty interest rate can be charged on the arrears amount.
- Finally you can configure whether to charge penalty interest on fees.

### **Loan**

- The mortgage will have an initial mortgage amount which will be repaid by the customer
- Each mortgage that is given will have a mortgage term that the customer has to repay
- The mortgage will disburse funds to the customer's nominated bank account after the account has been opened

### **Repayment**

- The mortgage amount and interest is repaid in fixed monthly repayments over the loan term. The product uses the amortisation method to calculate a schedule of equal monthly repayments designed to reduce the mortgage amount and the associated interest to zero over the term of the mortgage. This is the EMI method.
- The repayment day is configurable and can be set per account based on customer preference.
- Any repayments made by the customer will repay the mortgage balances in a specific order, this order is found in the Inception Documentation.
- The product has a configurable grace period which can be set to a number of days. This is the timeframe that the customer has to pay the full amount overdue and any additional penalties, if they do not then the product is marked as delinquent.
- Finally a Repayment holiday can be applied, which provides the customer a break in monthly payment commitments but interest will continue to accrue as normal without penalties.

### **Repayment types**

- The customer can configure a number of different repayment options including Interest only, principal plus interest, making overpayments as a lump-sum or over a period and a complete early repayment.



## Mortgage - Product Features: *Continued*

### **Limits**

- Annual overpayment limits can be set on the mortgage, so that the customer cannot repay their entire principal immediately if the bank doesn't want them to.

### **Fees**

- A late repayment fee can be applied to the customer's mortgage when they do not repay on time.
- Finally if the customer makes an early repayment, an early repayment fee can be charged on top of the remaining due balance prior to closing out the account.

### **Balance Offsetting**

- The Mortgage can be converted into a Balance Offset Mortgage, where the mortgage balance is offset using funds in a savings account. This can save the customer a significant amount of money over the life of their mortgage.

### **Accounting**

- The accounting structure used for all interest and fee accrual is following the double entry bookkeeping model.

### **Supporting workflows are:**

- Apply for Mortgage.
- Change mortgage repayment day.
- Close mortgage.
- Switch mortgage.
- Early repayment.
- Apply for Offset Mortgage.
- Close Offset Mortgage.
- Apply for Repayment Holiday.



## Inception Product Library Recap

The Product Library includes smart contracts and workflows designed to enable common deposit and lending products

Deposits		Lending	
<b>Current Account</b>	A transactional account with interest rates, account tiers, auto-save, multicurrency pots, withdrawal limits, overdraft line of credit plus lending rate & fees.	<b>Line of Credit</b>	A single smart contract that enables the holder to take out multiple loans under an overall line of credit. Individual loans can vary by amount, term and rate.
<b>Savings</b>	The <b>Time Deposit</b> is a fixed maturity account with configurable term, interest, deposit window, and limits. <b>Easy Access Saver</b> is a transactional Savings account with configural withdrawal limits and maximum balance limits.	<b>Mortgage + Offset</b>	Ability to configure as interest plus principal repayment or interest only and supports fixed and non-fixed interest rates over a defined mortgage term. Supervisor functionality can be used to offset loan against a deposit account.
<b>Wallet</b>	A transactional account that can hold multiple currencies, enables configurable spending/balance limits plus manual and auto top ups.	<b>Credit Card</b>	A revolving line of credit with configurable transaction types and interest rates, fees (annual, overlimit, and late payment fees) and repayment hierarchy
<b>US Products</b>	US Checking and Savings account that uses Supervisor functionality to deliver US regional features like Overdraft Protection.	<b>Loan</b>	A fixed tenor loan with configurable interest rate tiers based on principal amounts plus support for overpayment and early repayment



# Building the Inception Library

## Inception Management Structure

The Inception Management structure is composed of 3 key heads, plus core Banking Product Specialists.

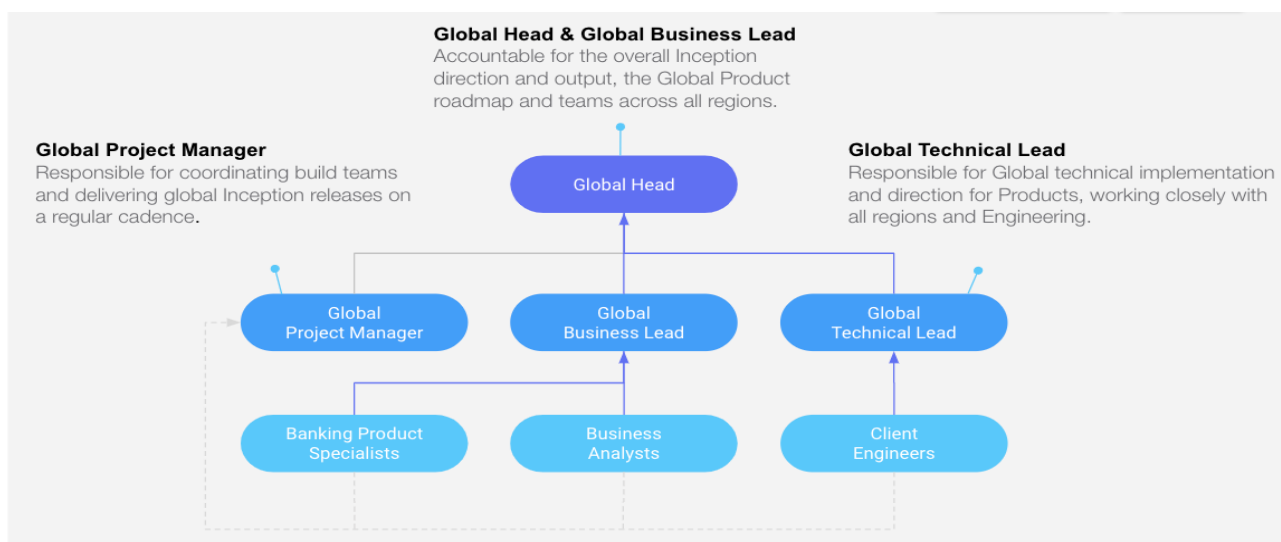
The Global Head & Business Lead is accountable for the overall Inception direction and output, the Global Product roadmap and teams across all regions. They also act as a point of escalation for issues related to prioritisation of resources and roadmap across regions.

The Global Project Manager is responsible for coordinating build teams and delivering global Inception releases on a regular cadence. They will ensure the build teams are operating effectively on a day-to-day basis and will be involved in managing team standups.

The Global Technical Lead is responsible for Global technical implementation and direction for Products, working closely with all regions and Engineering. They act as the point of escalation for technical issues or queries related to best practice, and will oversee design decisions for requirements in the library.

In addition to these 3 leads, the Banking Product Specialists are responsible for their region's requirements gathering and scoping out of new product variants required in that region. They are experienced experts in financial products, and will define much of the roadmap for the Inception Library as it relates to their region.

These four key roles will manage the Inception team, and the Business Analysts and Client Engineers will make up the build teams.

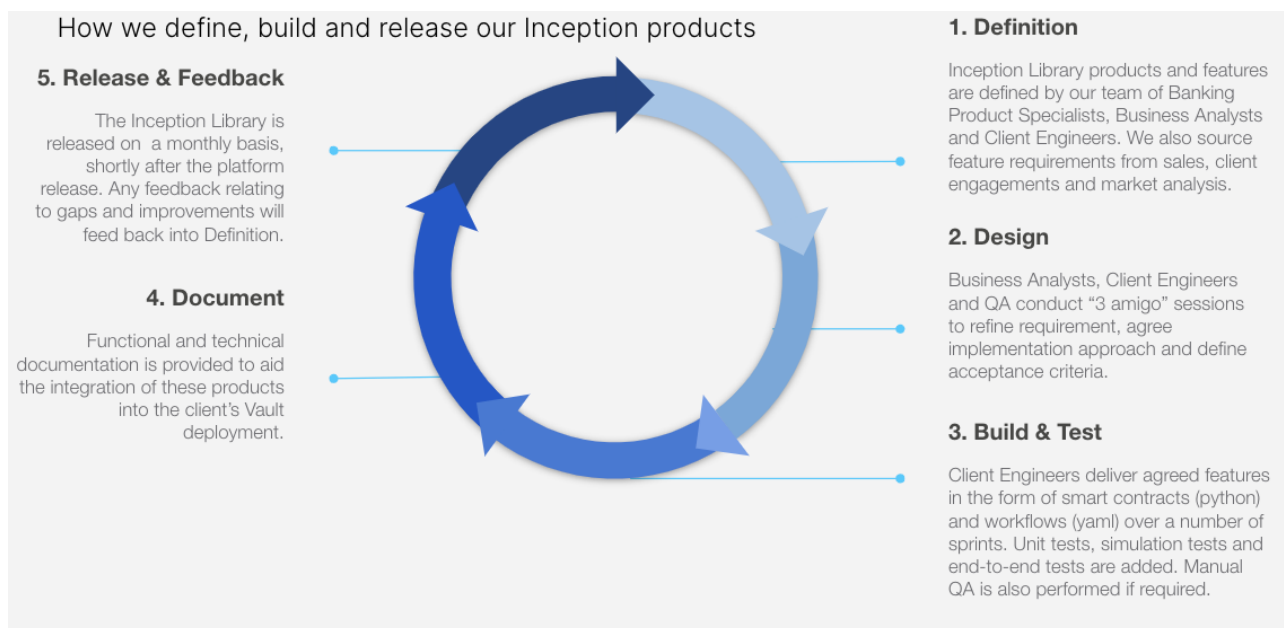




# Configuration Layer Delivery Framework

This is a high level overview of our end to end process, we have five steps: Definition, Design, Build & Test, Document and Release & Feedback:

- Definition - Inception Library products and features are defined by the Inception team of Banking Product Specialists, Business Analysts and Client Engineers. These requirements are documented and placed onto the roadmap.
- Design - At this stage the requirements will have been accepted for build, and Business Analysts, Client Engineers and any QA conduct refinement sessions to agree implementation approaches and define acceptance criteria.
- Build & Test - Client Engineers deliver agreed features and a set of sprints. Unit tests, simulation tests and end-to-end tests are added. Manual QA is also performed if required. The QA will be either a Business Analyst, another Client Engineer or a QA Engineer.
- Document - Documentation is completed by the Business Analyst throughout this cycle. The Documentation is finished and versioned alongside the delivered code.
- Finally Release & Feedback - The library will be released on a monthly basis, feedback is sought from clients and partners, and the cycle restarts.





## Inception Project Build Teams

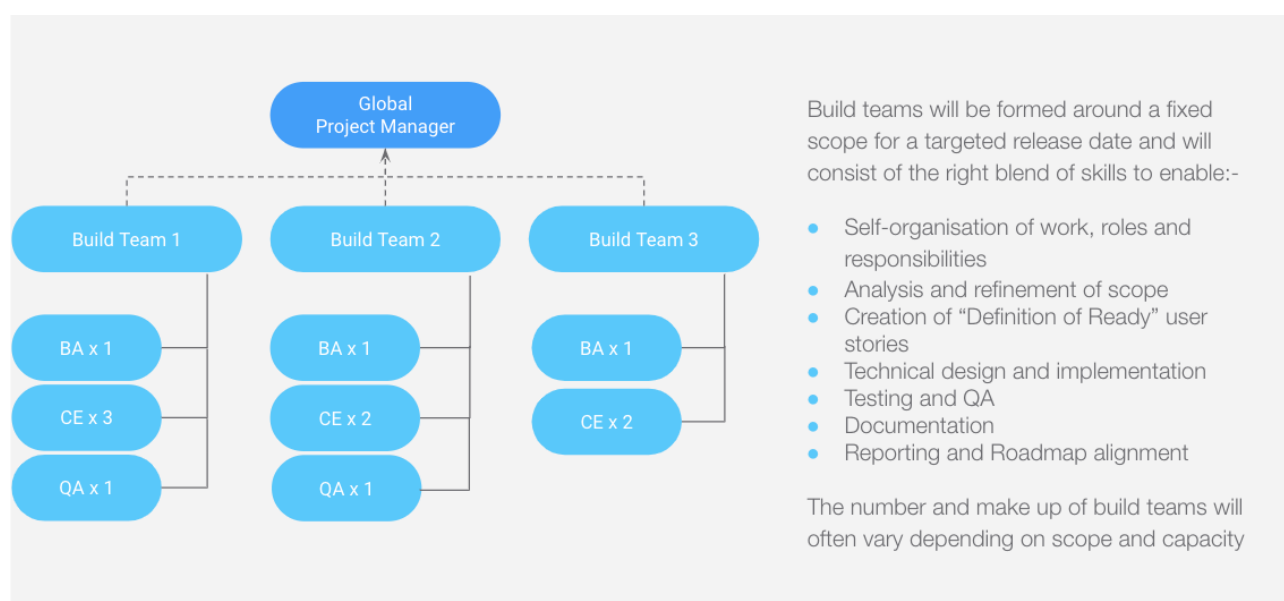
Each build team within Inception will be formed with a clear fixed scope for delivery, and a targeted release date for any documentation and code. The typical Build Team sizings will comprise of a single Business Analyst and 2 Client Engineers, sometimes 3 plus a QA tester for significant deliveries.

The build teams will need to self organise, refine their own scope and take their scope through to delivery including build, testing and documentation.

They will be responsible for ensuring alignment to the part of the committed roadmap they have been given, and will report regularly back to the Global Inception Project Manager with updates.

The Business Analyst will typically be responsible in the build team for leading the self organisation, analysing and refining requirements with the Client Engineers, completing documentation and ensuring that any manual testing has been completed.

The Client Engineer will be focussed on providing technical refinements to requirements, building the Smart Contracts and Workflows that make up the product, and highlighting any issues early on to the Business Analyst.





## Summary

We've walked you through what the Inception team is, and the function and purpose of the Inception Library. You now understand the purpose of the team and its library, and how this enhances our Client's ability to use Vault.

We've walked you through the Inception Library, including the Deposit Products and Lending Products. You've picked the key products you are interested in and are aware of their key features, you know that you can find more information on these in the Inception Documentation.

We've introduced you to how Inception has built these products and you now have an understanding on a high level of the resources required to build the library.

And finally we've outlined some of our key principles related to the upcoming Inception Roadmap, and you're aware you can get the full roadmap from our Client and Partner Portal or by contacting us at Thought Machine.





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