

Blockchain in Banking

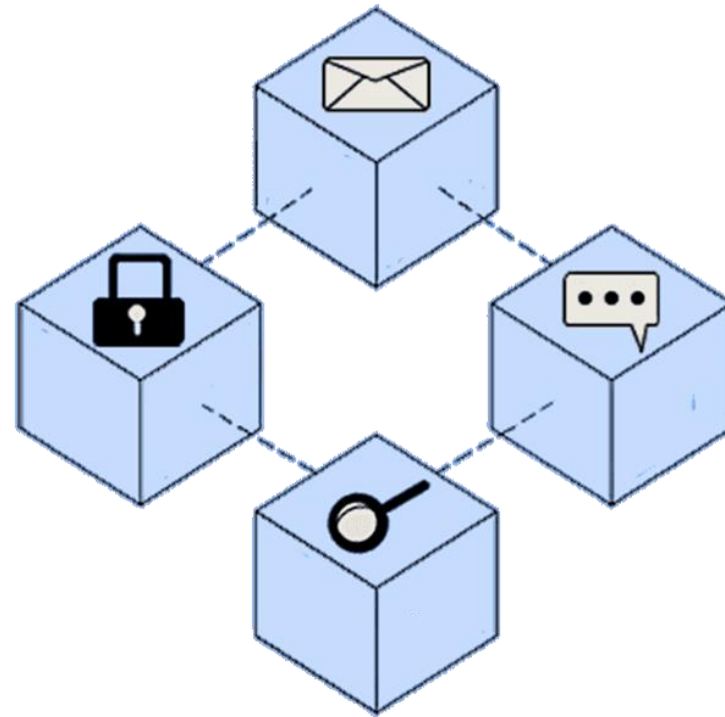
Dr Jie Wen

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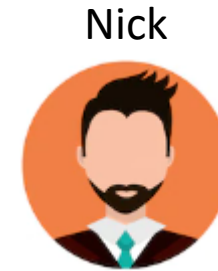
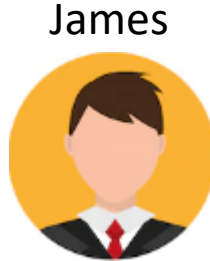
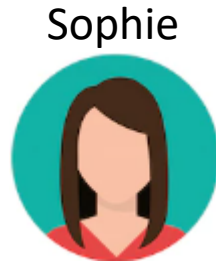
Blockchain

A Blockchain is a **decentralized, distributed digital ledger** that records transactions in a secure and transparent manner.



How does Blockchain Work?

Each friend has £100 and needs to pay Nick £20 for dinner share.



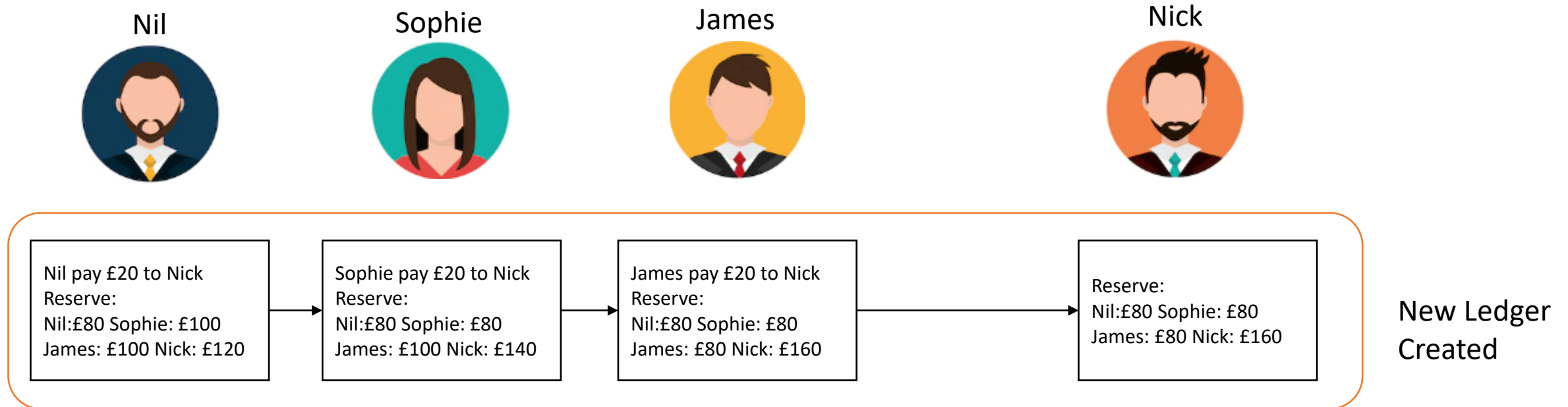
Nil pay £20 to Nick
Reserve:
Nil:£80 Sophie: £100
James: £100 Nick: £120

← Block

After Nil pay £20 to Nick, the information in the block record the transaction and also the reserves in each person's account.

How does Blockchain Work?

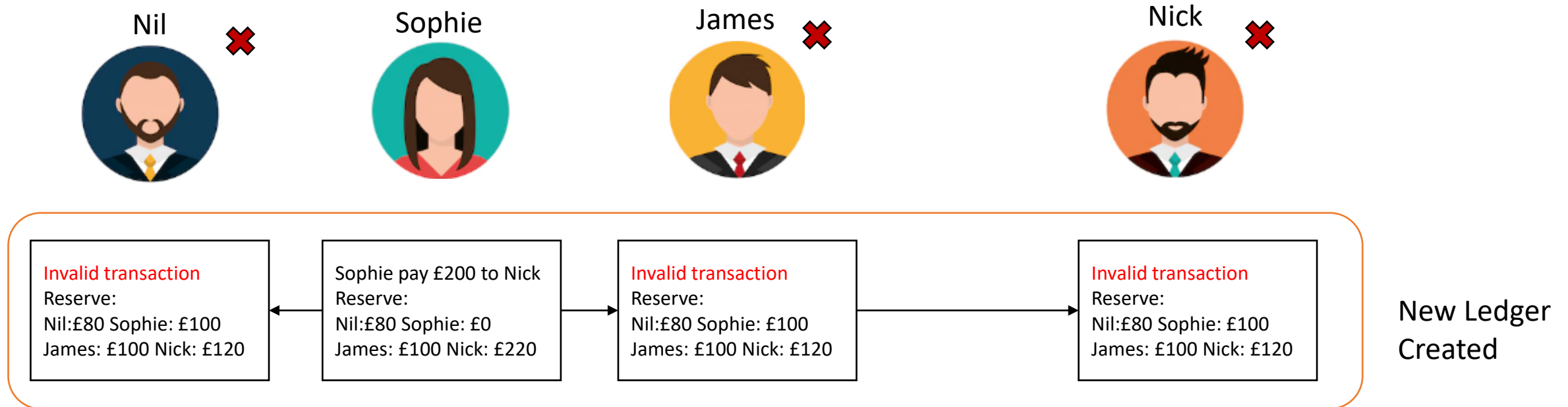
After Sophie and James pay £20 to Nick, a new ledger contains the transaction is created.



This chain of blocks is the ledger, and this ledger is shared among all users through the public distributed ledger.

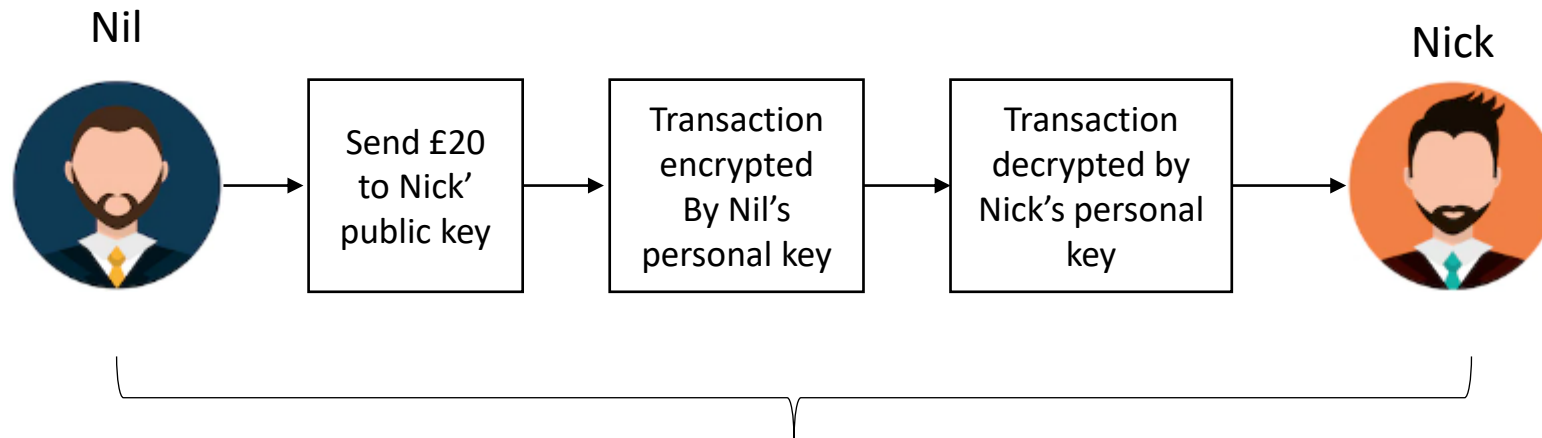
How does Blockchain Work?

Can Sophie pay £200 to Nick?



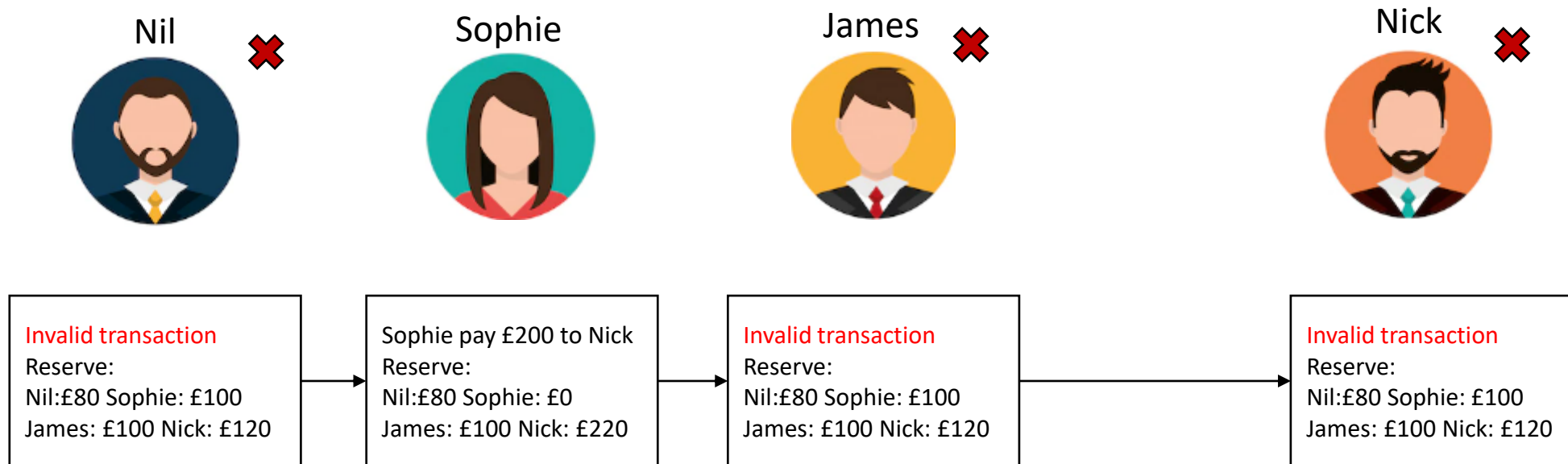
As all the users in the network has the record that Sophie has only £100 in her reserve. Therefore, they will flag this transaction in the system as invalid.

How do we make transfer in Blockchain?



The transaction will be recorded once it completes.

How does Blockchain Work?



Miner will validate all the information and add the new block into the blockchain.

Problem with banking transfers

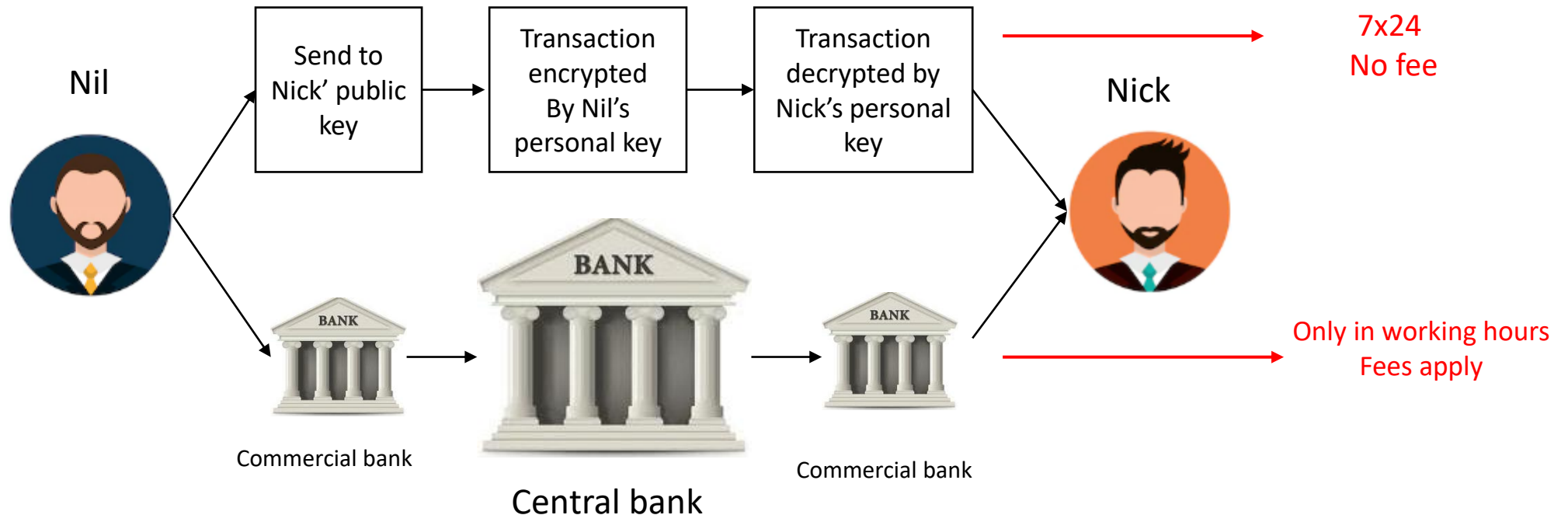
There are many ways bank transfer could fail.

- i. Technical issues
- ii. Fraud
- iii. Transfer limits
- iv. Transaction costs
- v. Political risks

Blockchain technology has the potential to revolutionize the way banks operate by increasing efficiency, security, and transparency in transactions.

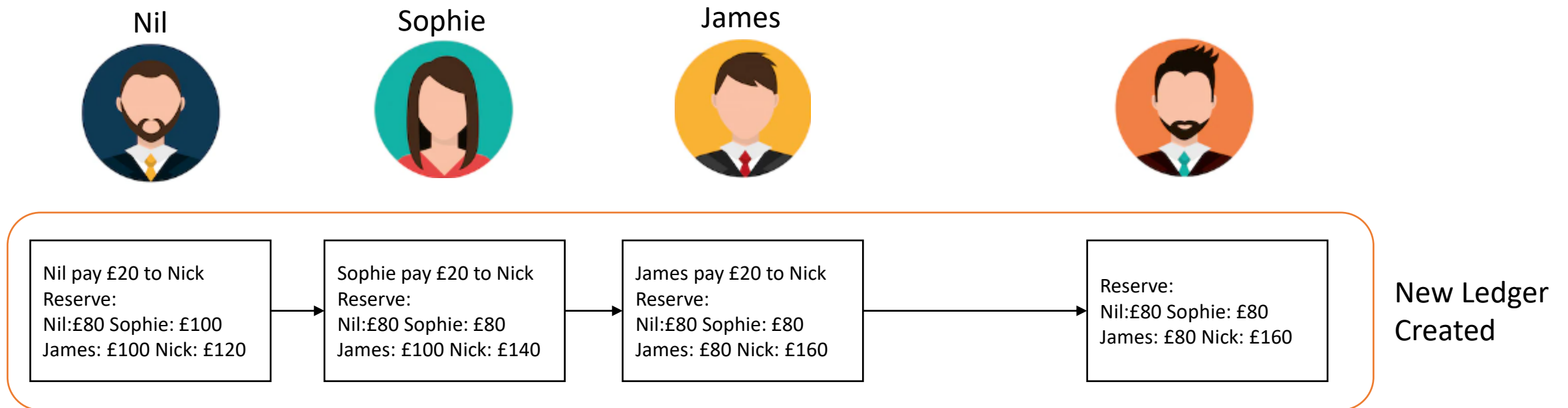
Benefits of Blockchain in banking

Blockchain can eliminate intermediaries in transactions and automate process, resulting faster and cheaper transactions.



Benefits of Blockchain in banking

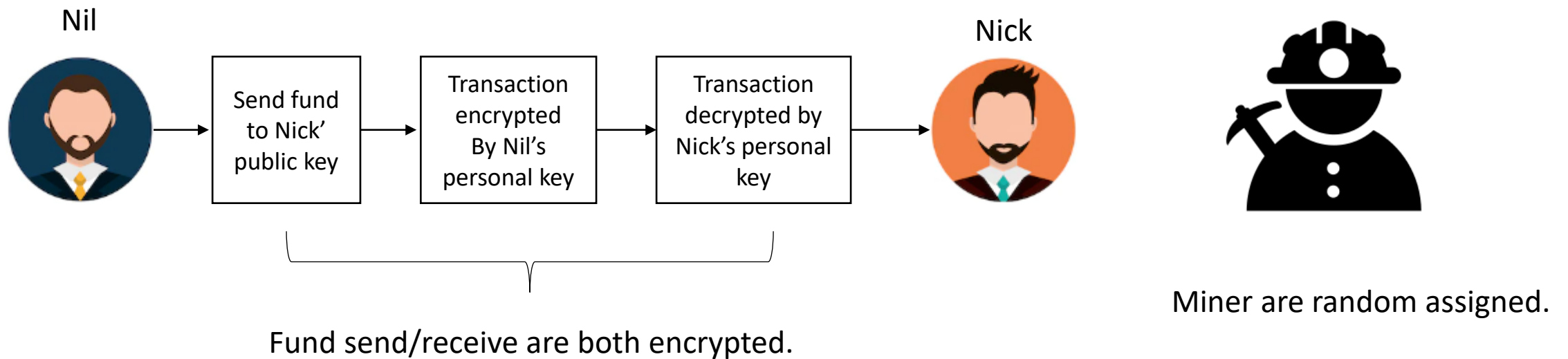
The decentralized and transparent nature of blockchain makes it difficult to tamper with transactions, and smart contracts can enforce compliance with regulations and prevent fraud.



All users in the network has a copy of the ledger. No one can tamper these transactions without change all the records in the network.

Benefits of Blockchain in banking

Improved customer experience: Faster, cheaper, and more secure transactions can enhance the customer experience and increase customer loyalty.



Scenarios for blockchain in banking

- Cross-border payments
- Knowing your Customer/Anti-Money Laundry (AML)
- Trade Finance
- Syndicated Loans
- Supply Chain Financing

Implementation Challenges

Regulatory challenges:

Blockchain technology is relatively new, and there are regulatory and legal issues that need to be addressed to ensure compliance.

1. Lack of regulatory clarity
2. Transactions are anonymous
3. Data privacy and protection
4. Smart contract regulation
5. International law arbitration

Implementation Challenges 2

Integration with legacy systems

- Many banks have legacy systems that are not compatible with blockchain technology, which can make integration difficult.

Implementation Challenges 3

Security concerns

While blockchain is inherently secure, there are still security concerns related to smart contracts, private keys, and potential attacks.



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Implementation Challenges 4

Interoperability issues

There are multiple blockchain platforms and protocols, and interoperability between them can be a challenge.

1. Public Blockchain
2. Private Blockchain
3. Hybrid Blockchain
4. Consortium Blockchain

Summary of Every Major Blockchain Platform

	Year	Coin	Developer	Main use case
Ethereum	2013	ETH	Ethereum community	Public
Polygon	2017	MATIC	PolygonDAO	Public
Hyperledger	2015	N/A	Linux Foundation	Private
Quorum	2016	N/A	JP Morgan / Consensus	Private
Corda	2015	N/A	R3	Private
Aptos	2021	APT	Aptos Labs	Public
Ripple	2012	XRP	XRPL Community	Public

Real-world examples

Ripple and Santander

FINANCE

Santander launches a blockchain-based foreign exchange service that uses Ripple's technology

PUBLISHED THU, APR 12 2018•9:35 AM EDT | UPDATED THU, APR 12 2018•4:00 PM EDT



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Real-world examples 2

J.P. Morgan and Quorum

J.P. Morgan Interbank Information NetworkSM Expands
to More than 75 Banks

Largest number of banks to join live application of blockchain technology

Sep 25, 2018

Real-world examples 3

HSBC trade Finance

THE FINTECH EFFECT

HSBC says it's made the world's first trade finance transaction using blockchain

PUBLISHED MON, MAY 14 2018•6:16 AM EDT | UPDATED FRI, JUN 1 2018•8:29 AM EDT



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Real-world examples 4

Credit Suisse and Taurus

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Business

Credit Suisse Leads \$65 Million Funding for Digital-Asset Firm

- Swiss company Taurus also secured backing from Deutsche Bank
- Investment comes amid a slump in crypto prices and investments

Future of blockchain in banking

Challenge to traditional banking model

- Deposit is no longer the primary source of funding.
- No more bank run
- Reduce counterparty risk

Future of blockchain in banking 2

Banks are committing more to blockchain

- Bank of England testing blockchain for gross settlement application
- Credit Suisse tests securities tokenization on public blockchain

Banks are continuing to invest in blockchain technology and develop new use cases.

Future of blockchain in banking 3

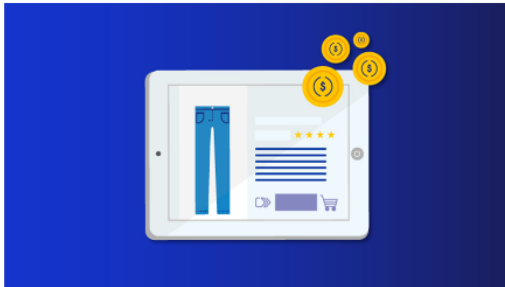
Increasing collaboration between banks and Fintech companies

- Accelerate the adoption of blockchain technology
- Improve the implementation

Future of blockchain in banking 4

Potential for increased financial inclusion

Visa is working with partners for stablecoin payouts



Crypto Stablecoin Payouts

Crypto Partner Wallets for Stablecoin Payouts enable USDC payouts so your sellers and contributors worldwide have more ways to get paid and pay. Learn how Visa and our partners are making this happen.

[Read the Clothia case study](#) 



Crypto consulting and innovation



Learn to navigate crypto's complexities and seize new opportunities by working with Visa's consulting, product, and design experts at the Digital Currency Innovation Hub.

[Learn about the Digital Currency Innovation Hub](#) 



Minimize crypto-related fraud

Use best in-class solutions from Visa to provide innovative end-to-end authentication, fraud, risk, and dispute solutions for crypto transactions.

[Learn about Visa Intelligent Security Solutions](#) 
[Learn about Cybersource Revenue Optimization Solution](#) 

Final Thoughts

Let first check the Asset section of a bank's balance sheet

Millions of dollars

Assets, liabilities, and capital	Eliminations from consolidation	Wednesday Mar 22, 2023	Change since	
			Wednesday Mar 15, 2023	Wednesday Mar 23, 2022
Assets				
Gold certificate account		11,037	0	0
Special drawing rights certificate account		5,200	0	0
Coin		1,285	- 20	- 8
Securities, unamortized premiums and discounts, repurchase agreements, and loans		8,628,927	+ 92,037	- 220,553
Securities held outright ¹		7,936,558	- 3,456	- 563,697
U.S. Treasury securities		5,328,976	+ 49	- 430,173
Bills ²		282,374	- 813	- 43,670
Notes and bonds, nominal ²		4,566,632	0	- 399,853
Notes and bonds, inflation-indexed ²		377,024	0	- 11,209
Inflation compensation ³		102,945	+ 862	+ 24,559
Federal agency debt securities ²		2,347	0	0
Mortgage-backed securities ⁴		2,605,235	- 3,506	- 133,525
Unamortized premiums on securities held outright ⁵		305,773	- 675	- 40,123
Unamortized discounts on securities held outright ⁵		-27,594	+ 126	- 6,184
Repurchase agreements ⁵		60,000	+ 60,000	+ 60,000
Loans ⁷		354,191	+ 36,043	+ 329,453
Net portfolio holdings of MS Facilities LLC (Main Street Lending Program) ⁸		22,282	+ 21	- 6,575
Net portfolio holdings of Municipal Liquidity Facility LLC ⁸		5,599	+ 2	- 1,053
Net portfolio holdings of TALF II LLC ⁸		1,944	+ 2	- 583
Items in process of collection	(0)	52	- 5	- 2
Bank premises		475	+ 5	- 818
Central bank liquidity swaps ⁹		587	+ 115	+ 278
Foreign currency denominated assets ¹⁰		18,706	+ 288	- 862
Other assets ¹¹		37,692	+ 2,041	+ 1,487
Total assets	(0)	8,733,787	+ 94,487	- 228,687

Can you work out the unrealised loss on these fixed income securities




Final Thoughts

Let first check the liability section of the same bank's balance sheet

Millions of dollars

Assets, liabilities, and capital	Eliminations from consolidation	Wednesday Mar 22, 2023	Change since	
			Wednesday Mar 15, 2023	Wednesday Mar 23, 2022
<i>Liabilities</i>				
Federal Reserve notes, net of F.R. Bank holdings		2,268,721	+ 8,354	+ 52,587
Reverse repurchase agreements ¹²		2,649,984	+ 226,858	+ 595,402
Deposits	(0)	3,789,069	- 143,061	- 834,663
Term deposits held by depository institutions		0	0	0
Other deposits held by depository institutions		3,369,986	- 74,224	- 399,060
U.S. Treasury, General Account		199,856	- 77,787	- 376,586
Foreign official		9,437	- 2,198	+ 1,864
Other ¹³	(0)	209,791	+ 11,149	- 60,880
Deferred availability cash items	(0)	325	+ 84	+ 116
Treasury contributions to credit facilities ¹⁴		15,347	0	- 5,911
Other liabilities and accrued dividends ¹⁵		-32,160	+ 2,252	- 37,611
Total liabilities	(0)	8,691,286	+ 94,487	- 230,079
<i>Capital accounts</i>				
Capital paid in		35,716	0	+ 1,392
Surplus		6,785	0	0
Other capital accounts		0	0	0
Total capital		42,501	0	+ 1,392

If you were an investor, would you worry about this bank's solvency, giving the CET1 is less than 1%



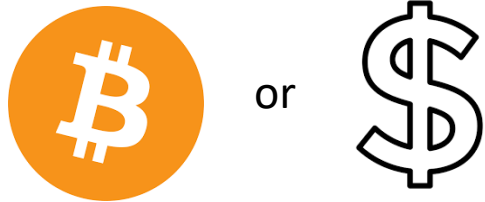
Note: Components may not sum to totals because of rounding.

If you were an investor, would you worry about this bank's solvency, giving the CET1 is less than 1%



Final Thoughts

What if the Federal Reserve is insolvent.



Which one is safer?

