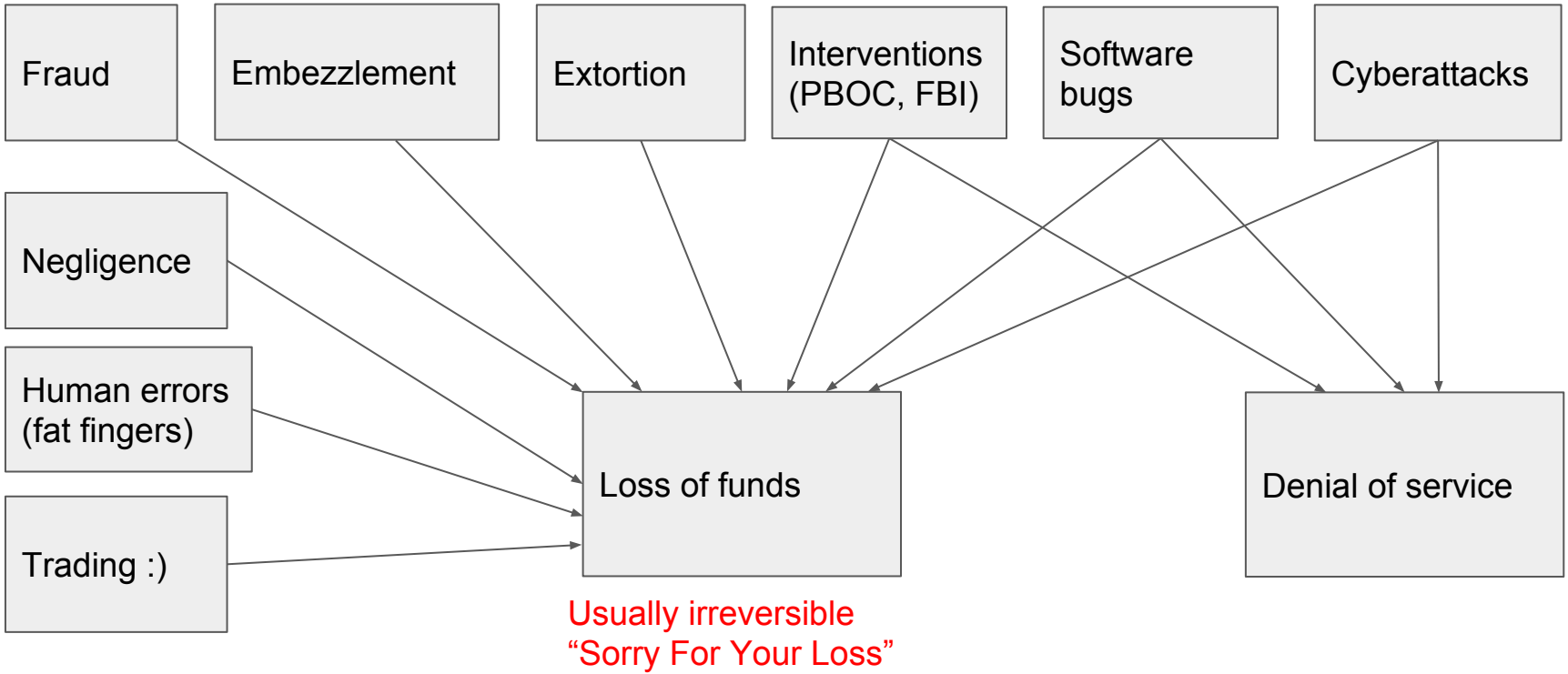
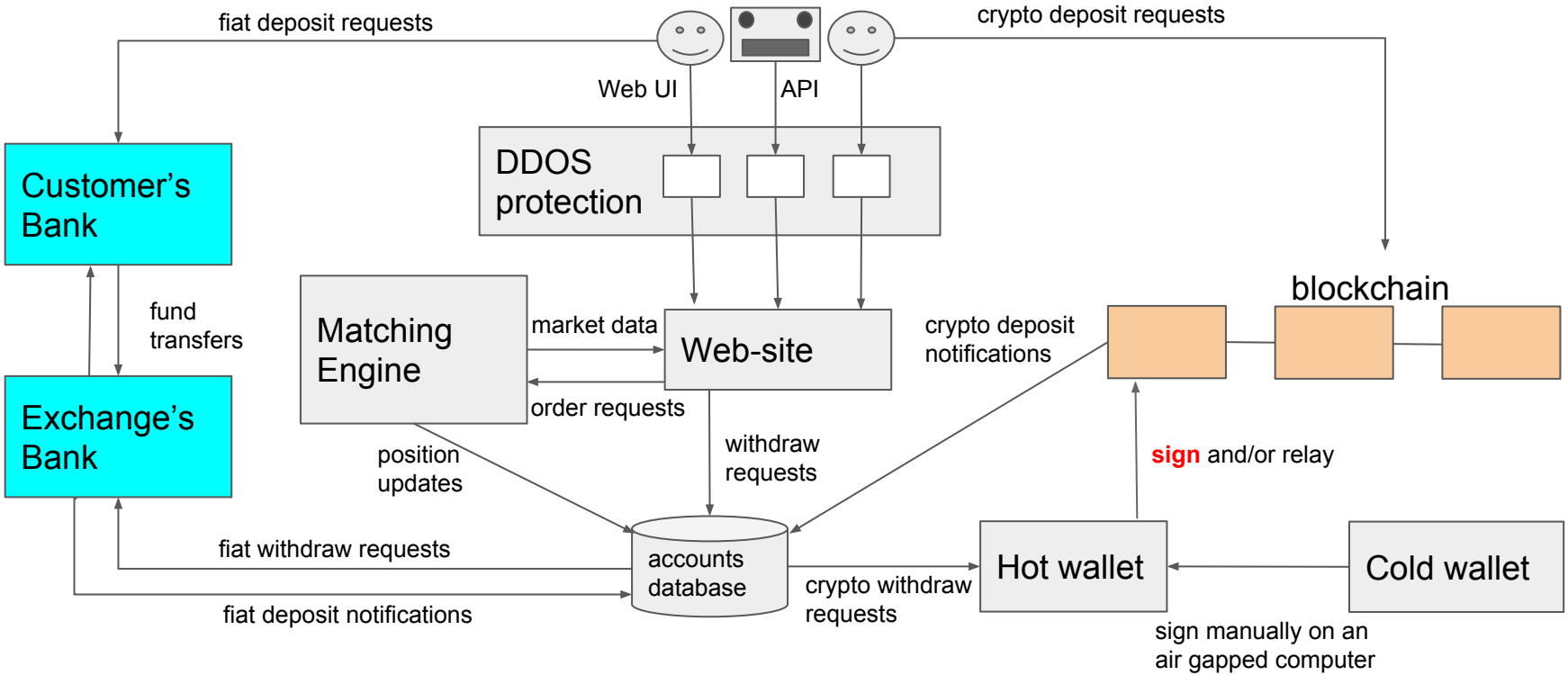
When things go wrong in cryptocurrencies world

Alexey Akhunov, May 2017

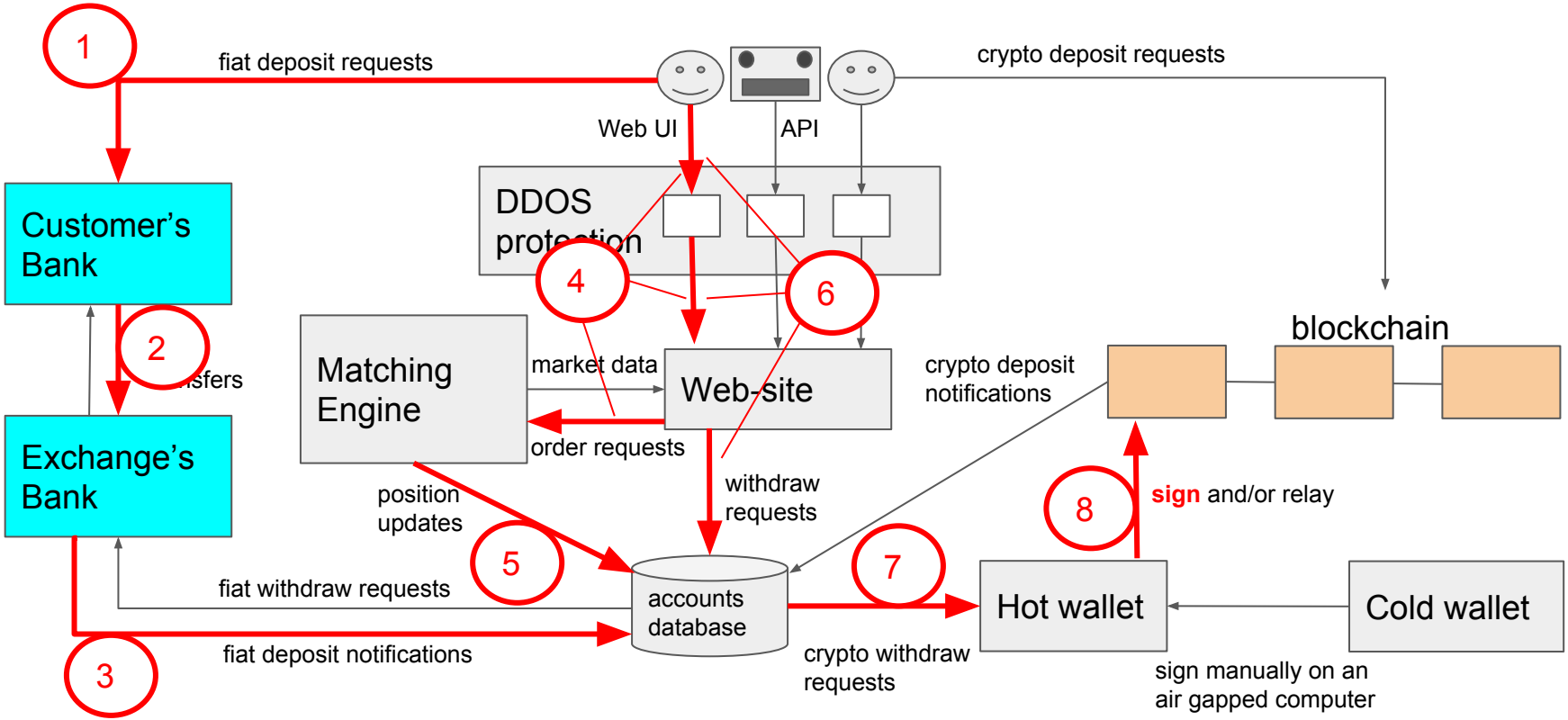
What could possibly go wrong?



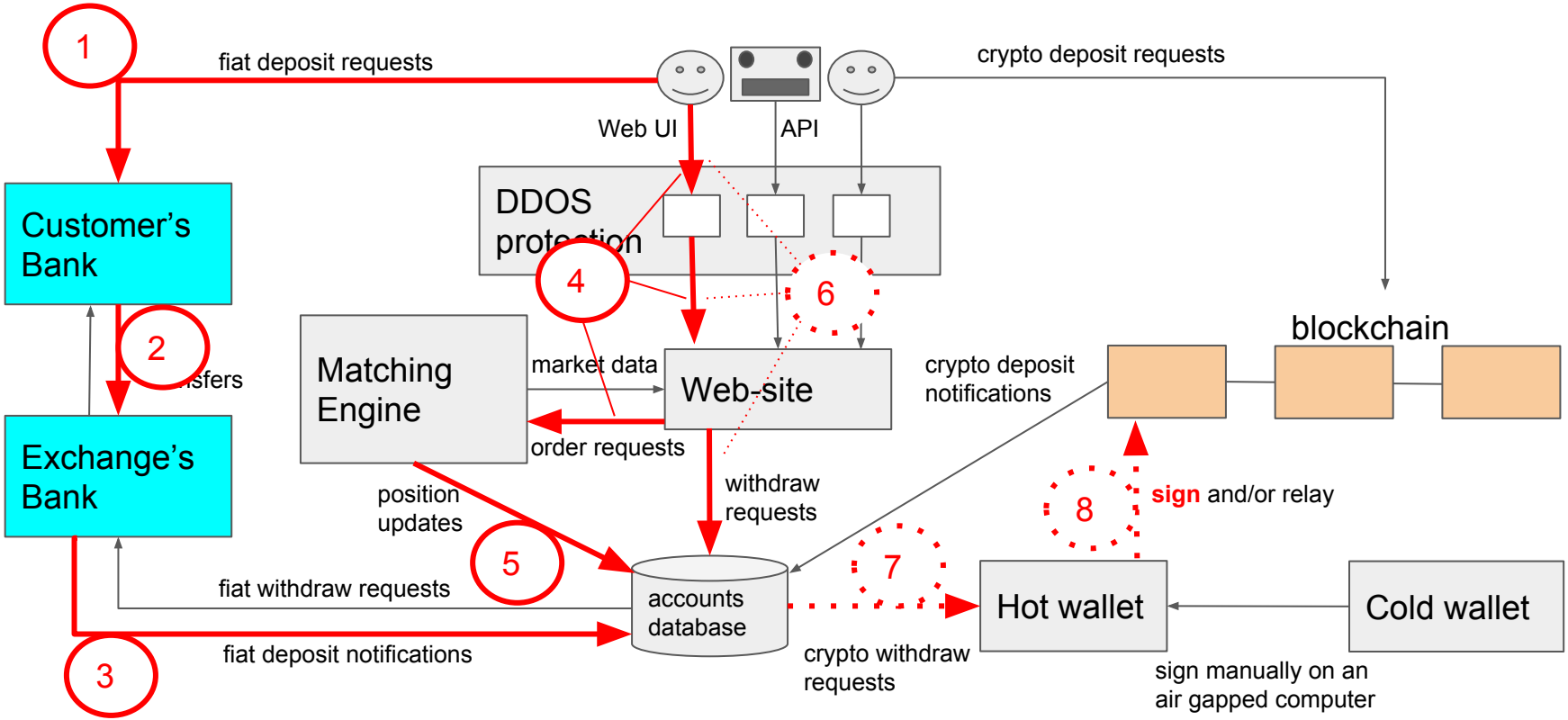
Typical cryptocurrency exchange



Example flow: user sells EUR, buys BTC



Problem 1: many users don't do 6-8

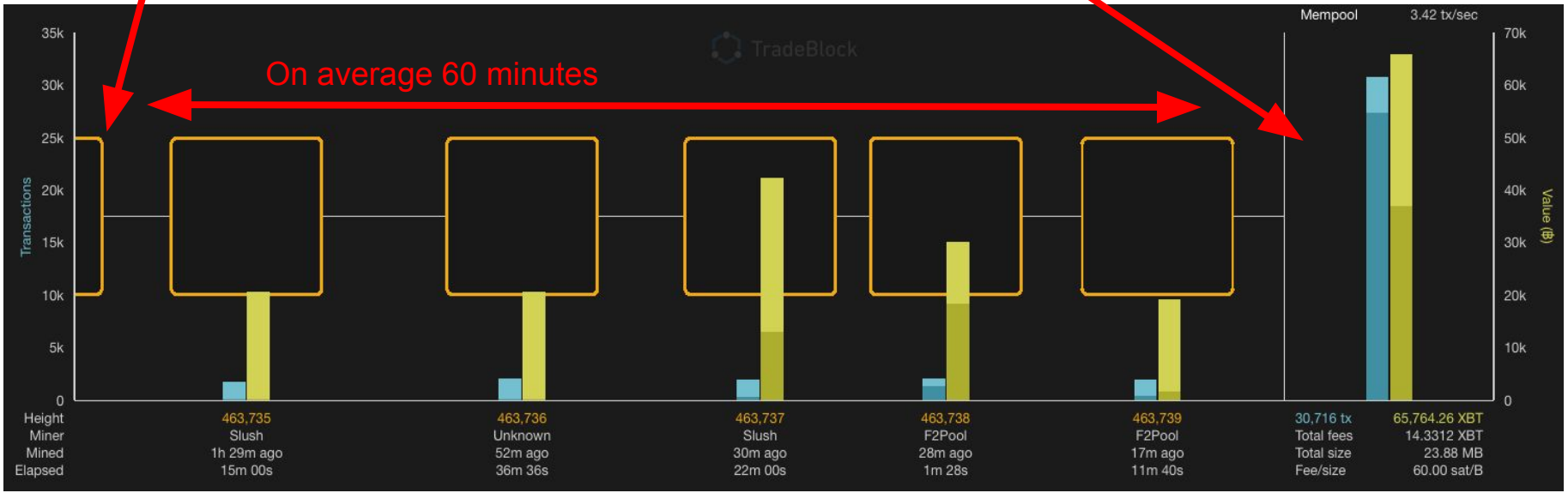


Why users leave their crypto on exchanges?

1. They want to be able to trade fast

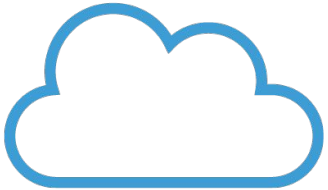
deposit gets here

Account database updated here
(6 confirmations for BTC)



Why users leave their crypto on exchanges?

2. They don’t know how to store it securely



???

Why users leave their crypto on exchanges?

3. They trust that exchange can keep it better than themselves

Mt.Gox - Feb 2014 (~850’000 bitcoins went missing)

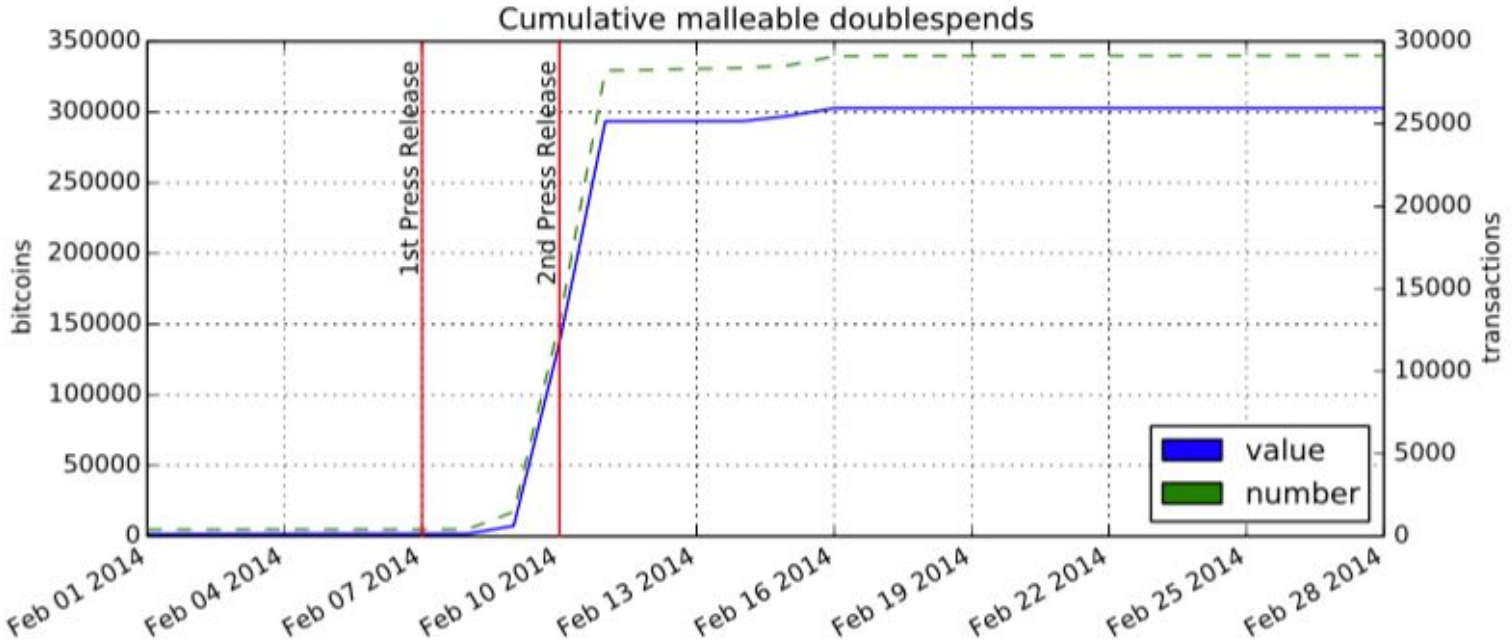
The bankruptcy case is still ongoing

The real cause of fund loss has never been revealed

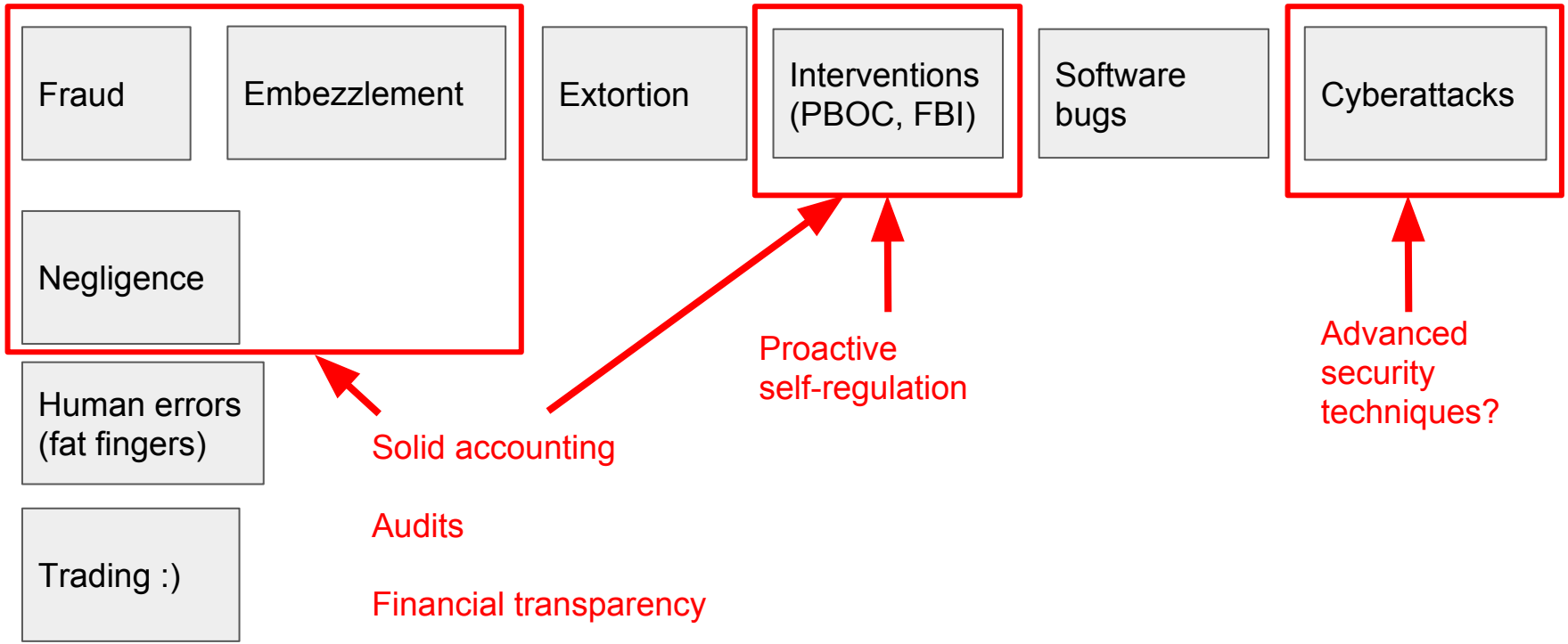
Suggested causes: transaction malleability, loss of keys, hackers, web server or database exploit, seizure by US government, embezzlement

Transaction Malleability? Nah...

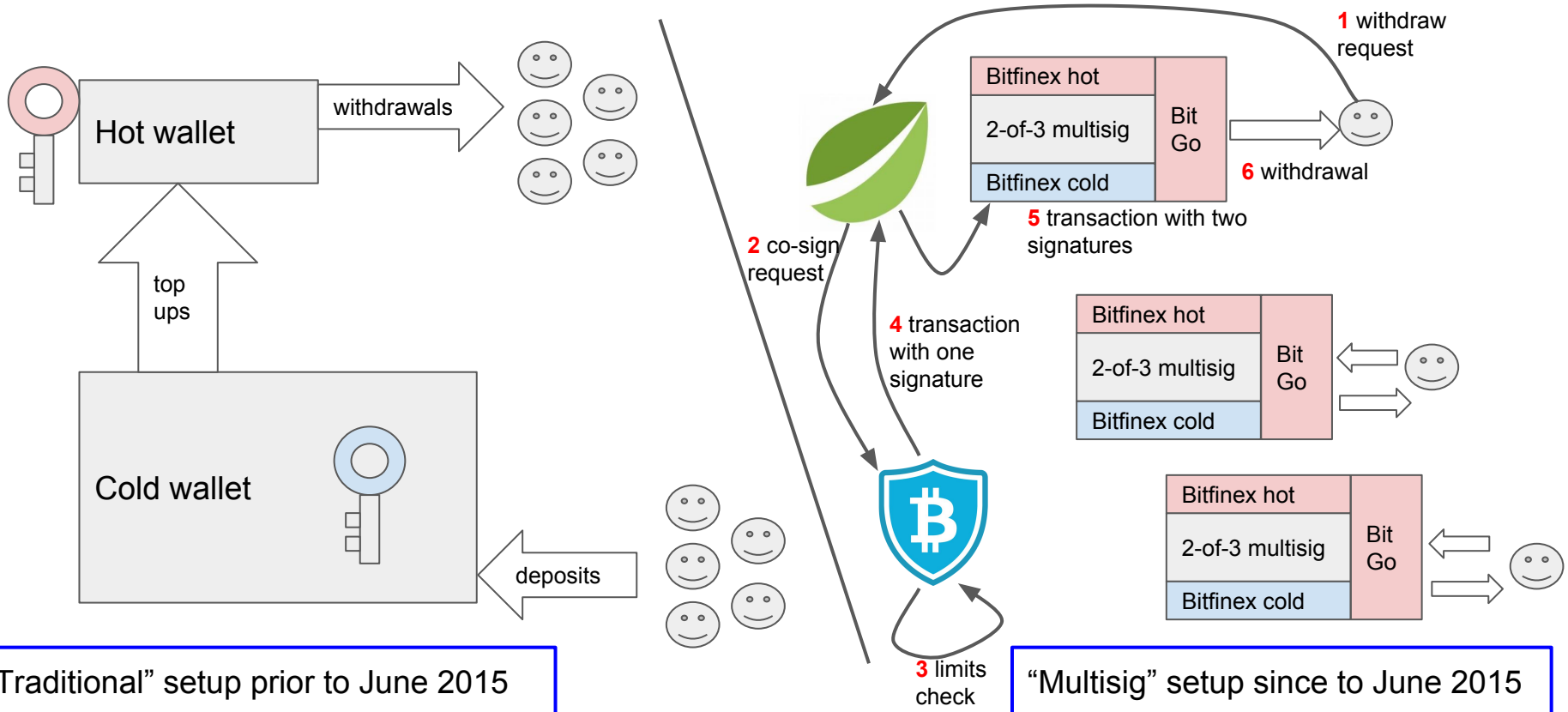
Transaction malleability could not be the cause (see “Bitcoin Transaction Malleability and MtGox” by Christian Decker and Roger Wattenhofer)



Lessons learnt?



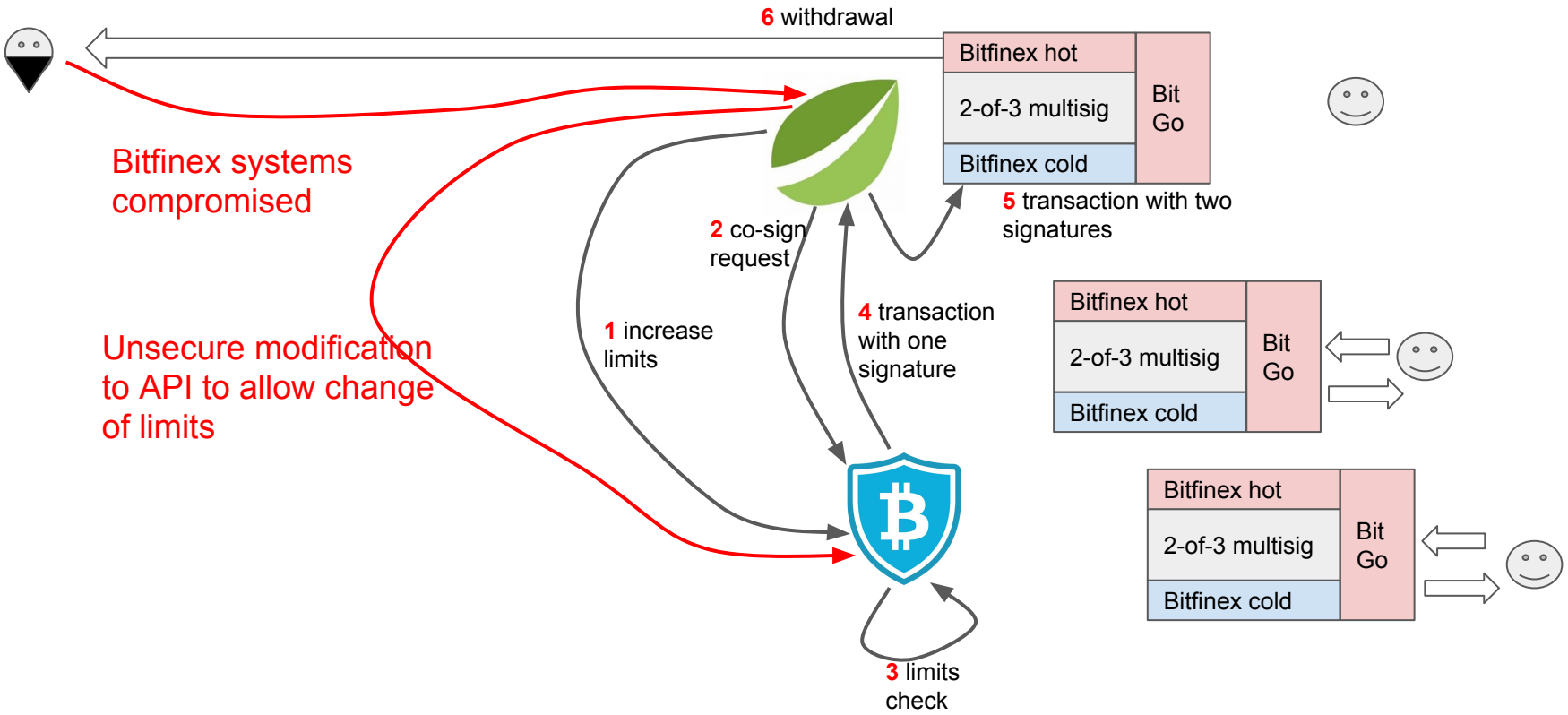
Bitfinex - August 2016 (~120’000 bitcoins stolen)



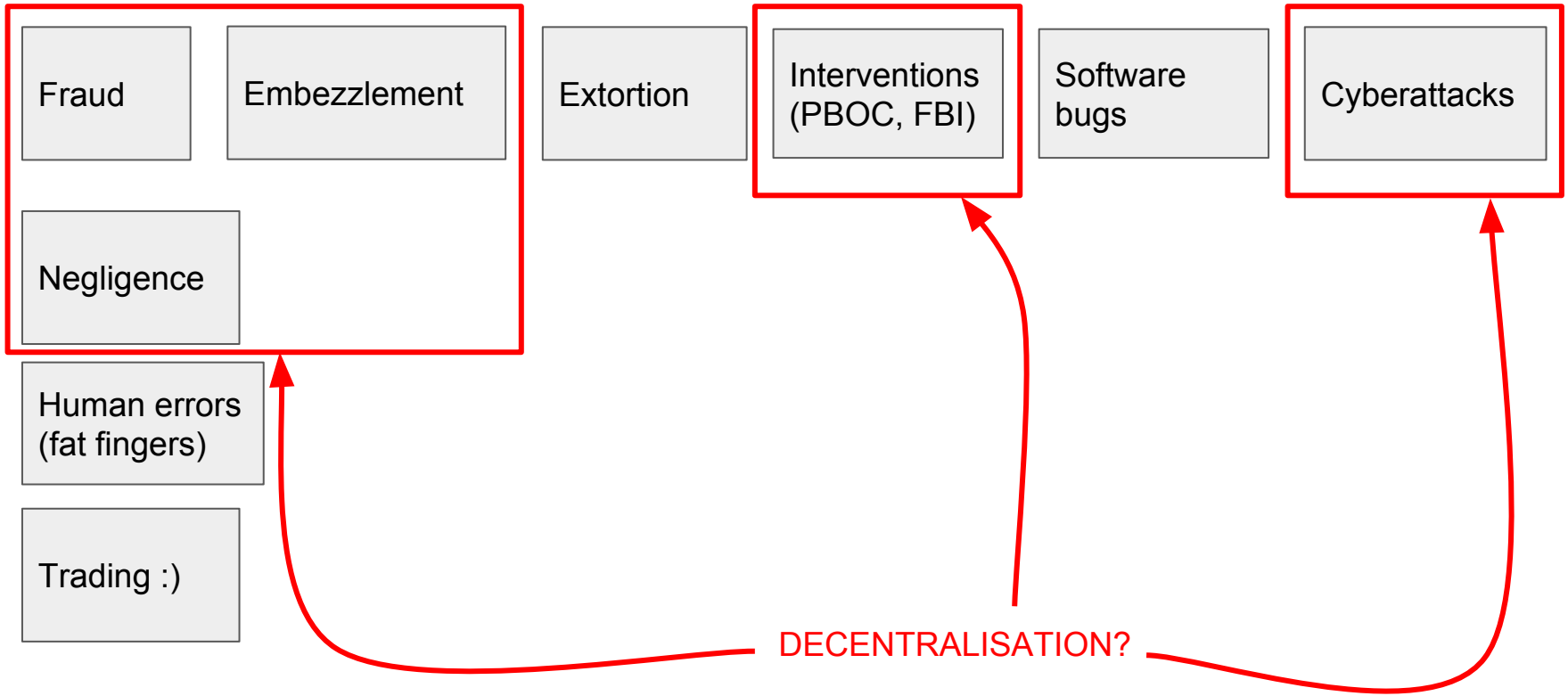
“Traditional” setup prior to June 2015

“Multisig” setup since to June 2015

Bitfinex - August 2016 (~120’000 bitcoins stolen)

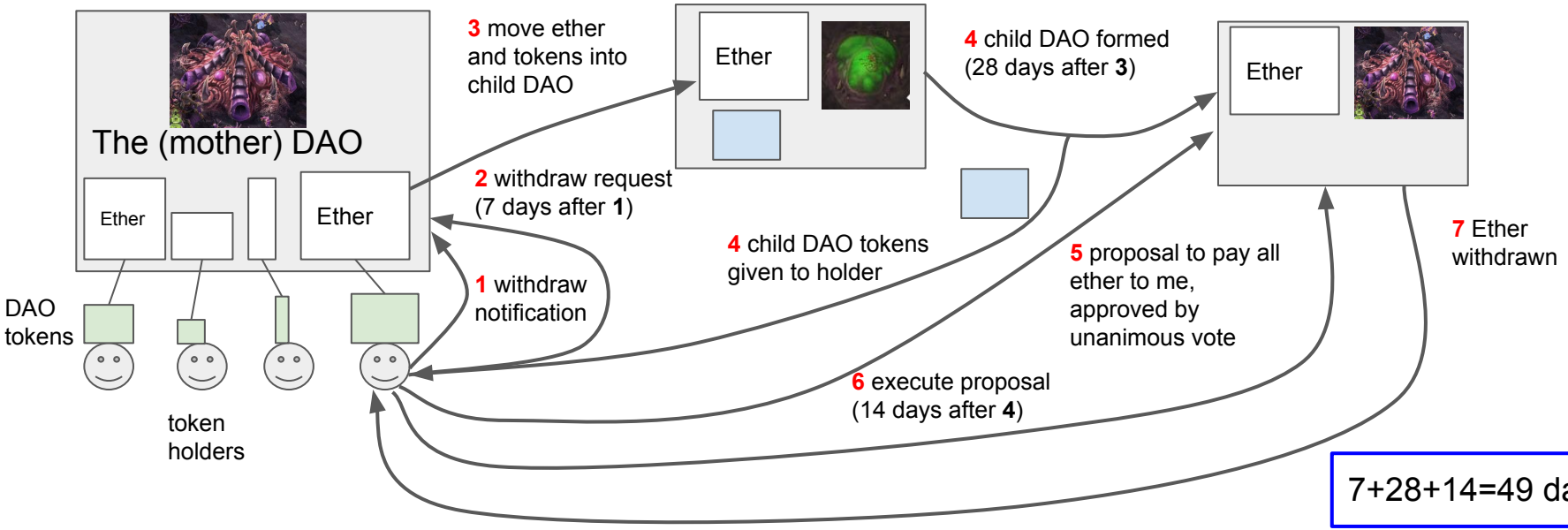


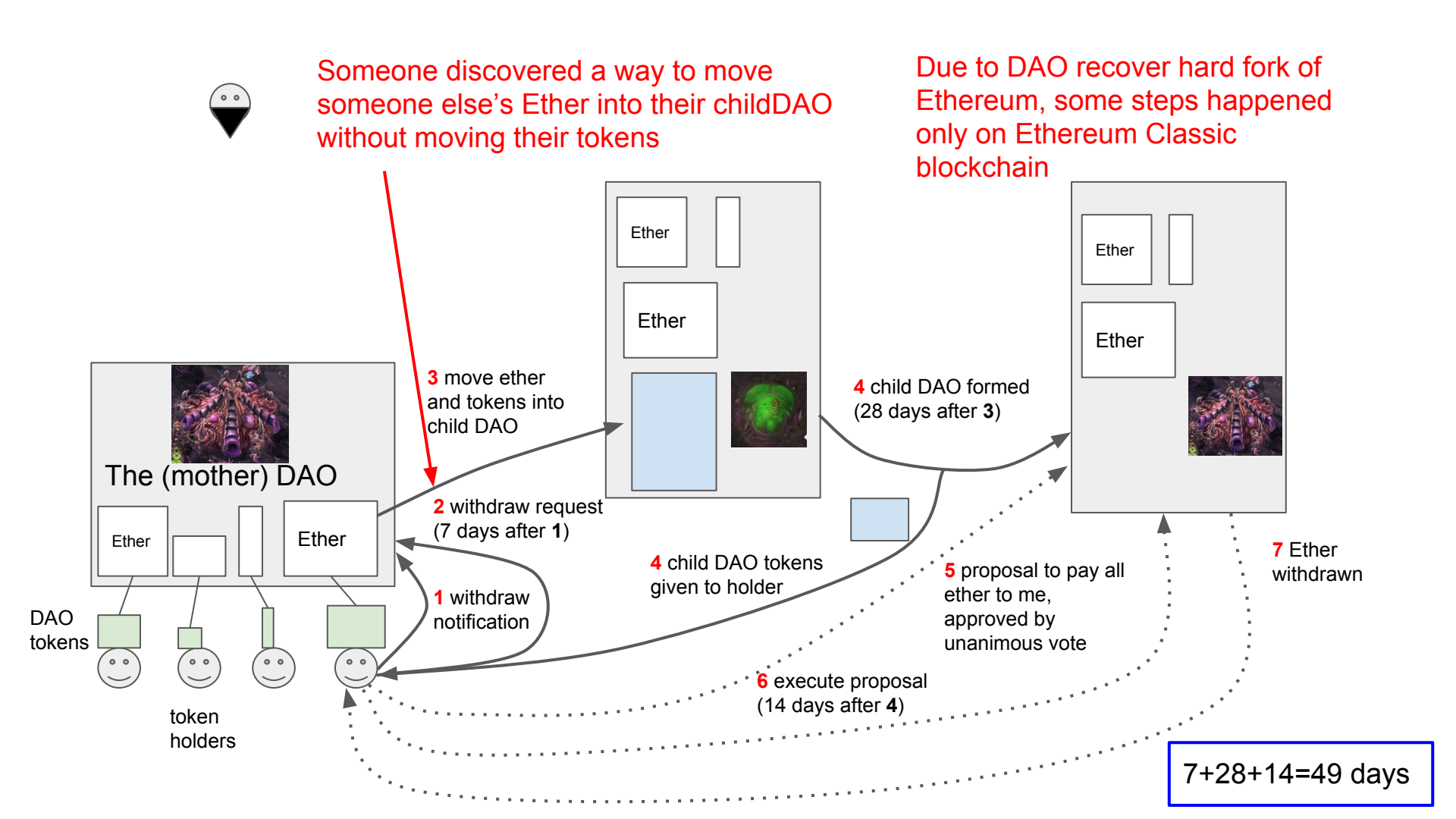
Lessons learnt?



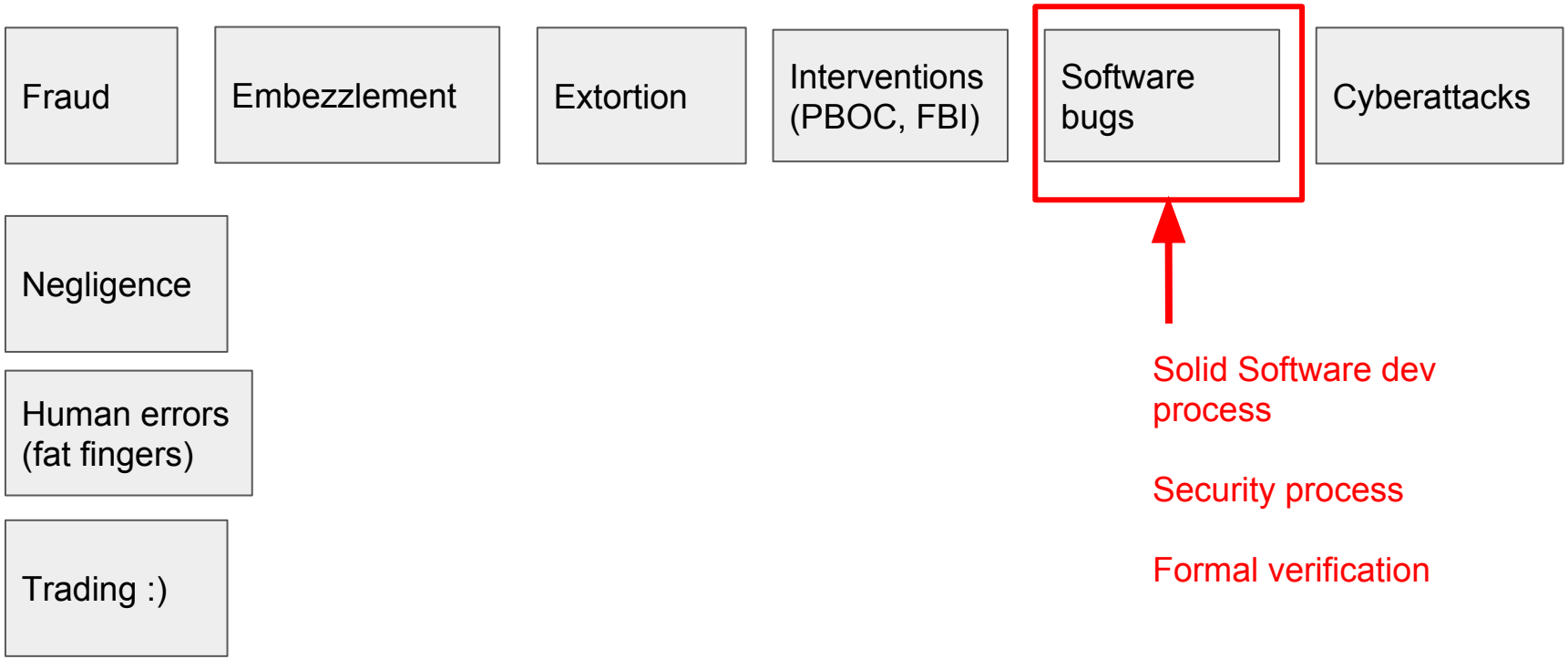
DAO - June 2016 (~3.6m Ether lost to contract exploit)

DAO is not an exchange, it is Decentralised Autonomous Organisation




Someone discovered a way to move someone else's Ether into their childDAO without moving their tokens
Due to DAO recover hard fork of Ethereum, some steps happened only on Ethereum Classic blockchain
Ether
Ether
Ether
Ether
Ether
Ether
The (mother) DAO
3 move ether and tokens into child DAO
4 child DAO formed (28 days after 3)
2 withdraw request (7 days after 1)
4 child DAO tokens given to holder
1 withdraw notification
5 proposal to pay all ether to me, approved by unanimous vote
7 Ether withdrawn
DAO tokens
token holders
6 execute proposal (14 days after 4)
7+28+14=49 days

Lessons learnt?



What is next?

Likely future problems:

- Incentive incompatibility?
- Game theoretical attacks? (also existed in the DAO)

Interesting security trends

- Hardware wallets for personal security
- Vaults (suggested for bitcoin, implemented in Dash)