

# When things go wrong in the world of cryptocurrencies

Alexey Akhunov, May 2017

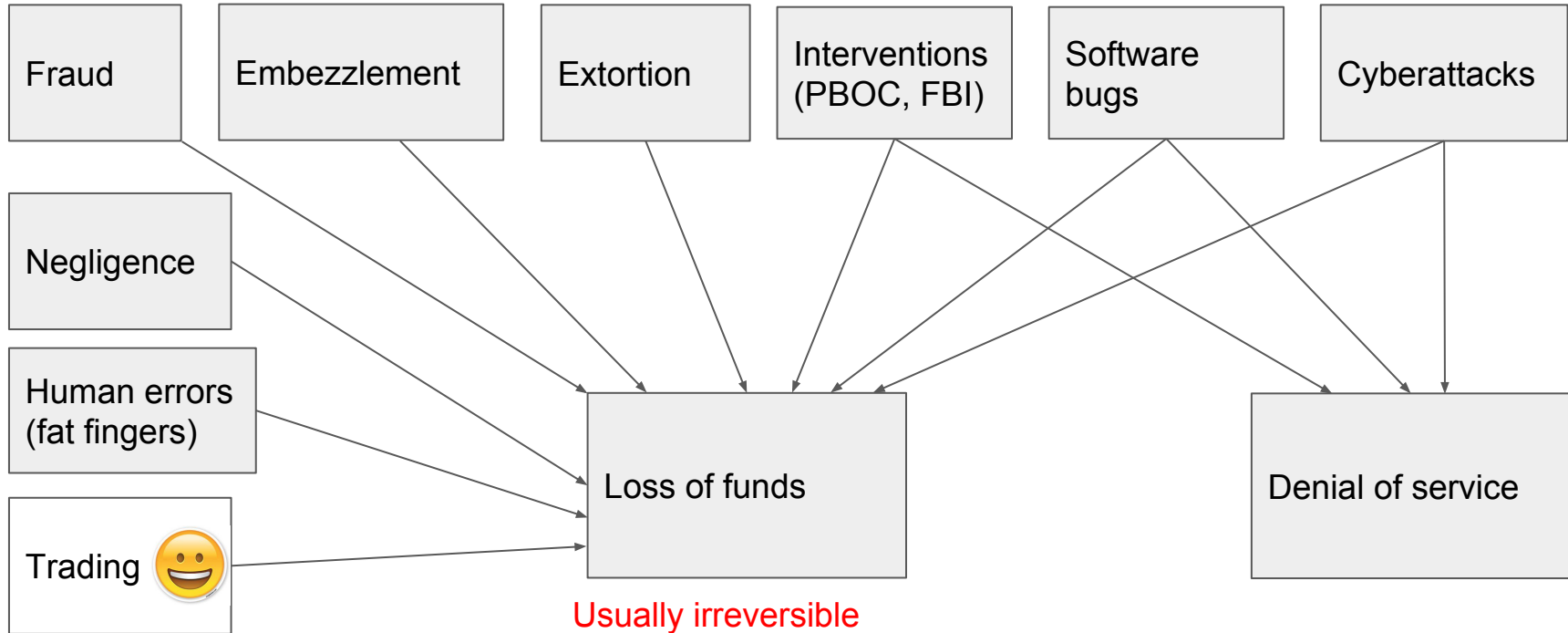
# Disasters, causes, and lessons learnt

Bitcoin exchange MtGox - February 2014 - 850'000 bitcoins went missing

Bitcoin/Ethereum exchange Bitfinex - August 2016 - 120'000 bitcoins stolen

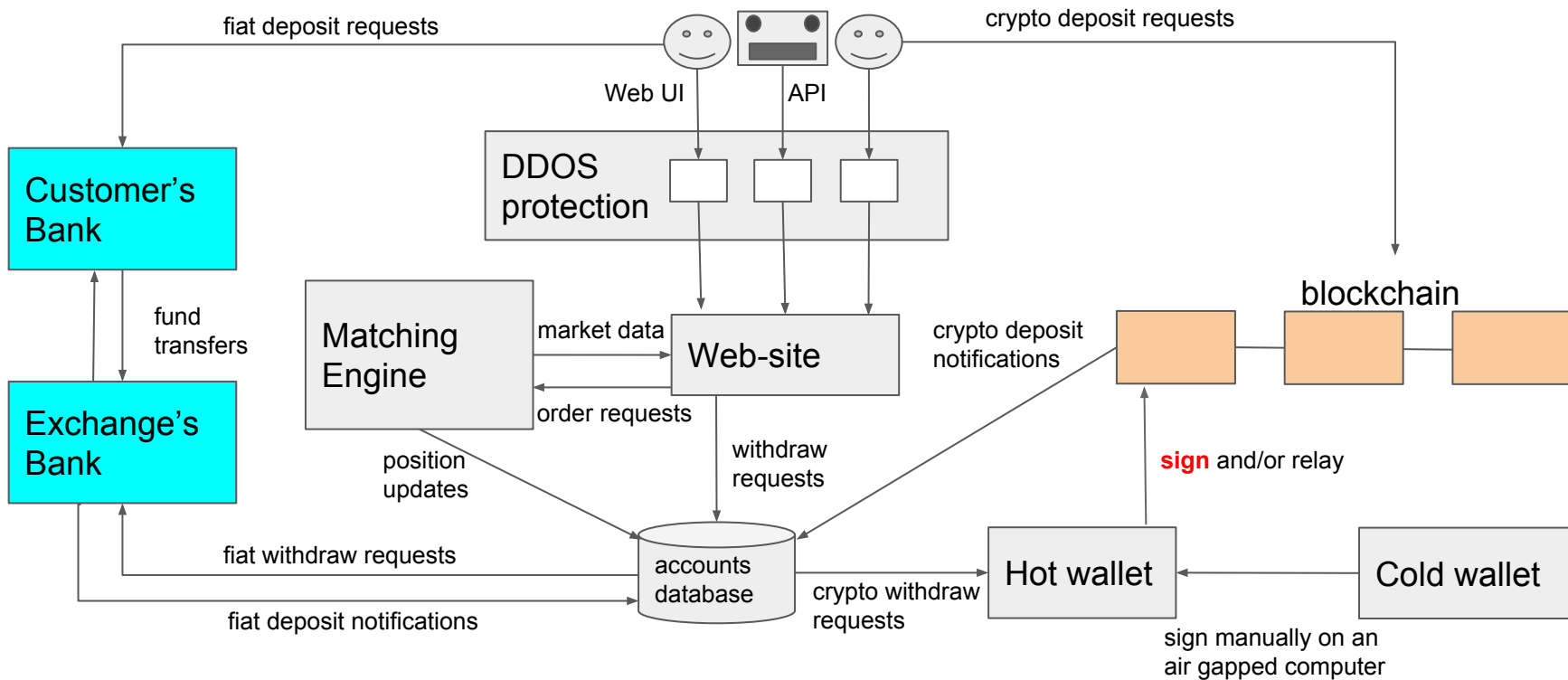
The DAO - Ethereum-based smart contract - June 2016 - 3.6 million ether lost to a smart contract exploit

# What could possibly go wrong? Known risks

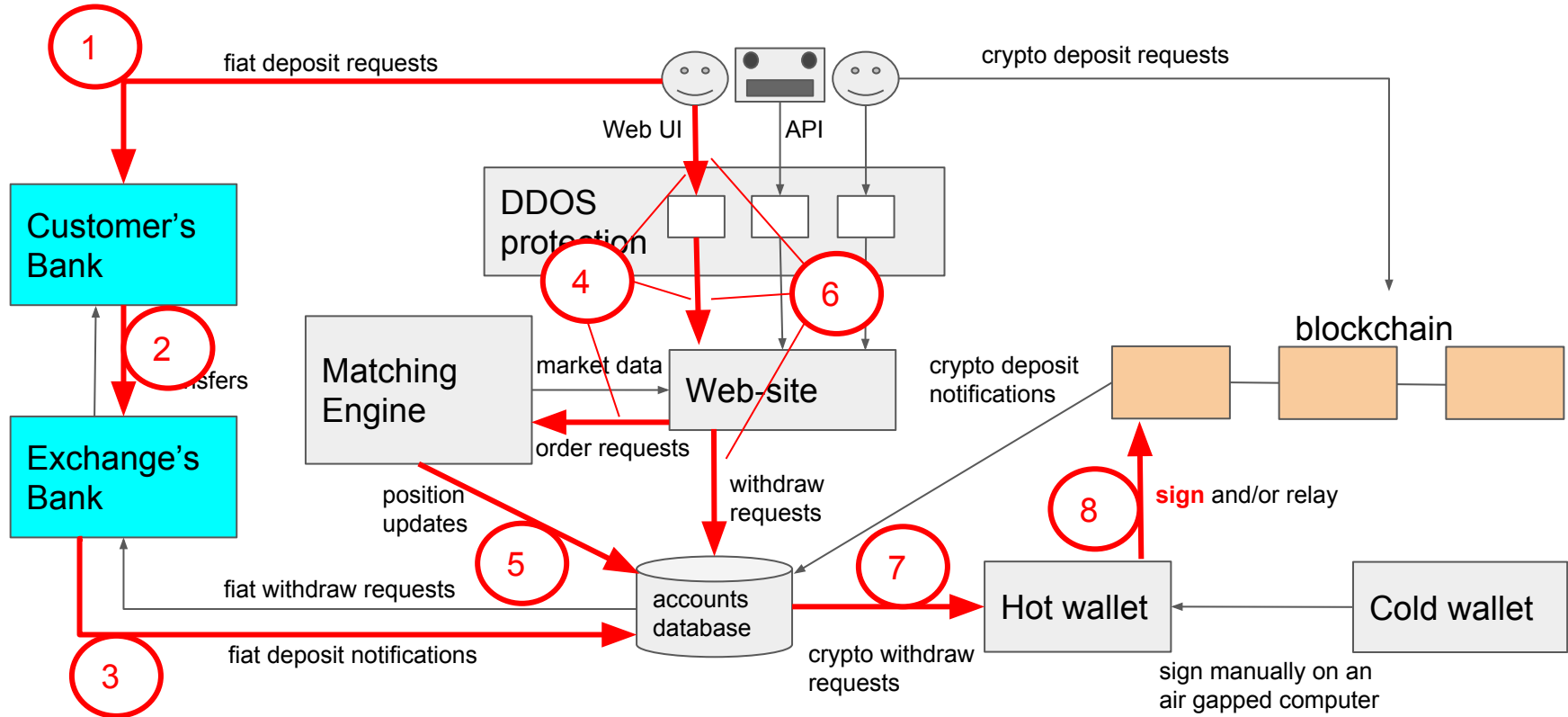


Usually irreversible  
"Sorry For Your Loss"

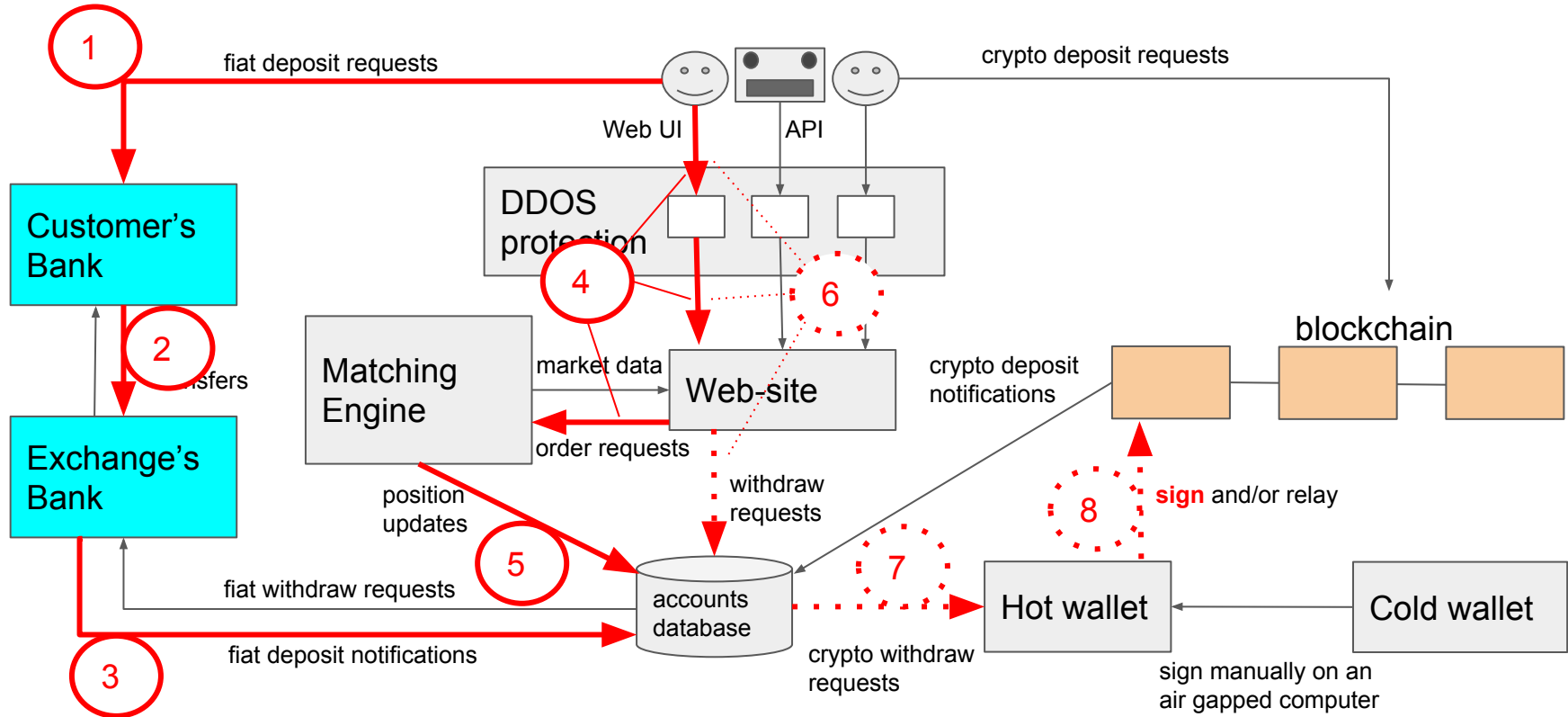
# Typical cryptocurrency exchange



# Example flow: user sells EUR, buys BTC



# Many users do not withdraw (steps 6-8)

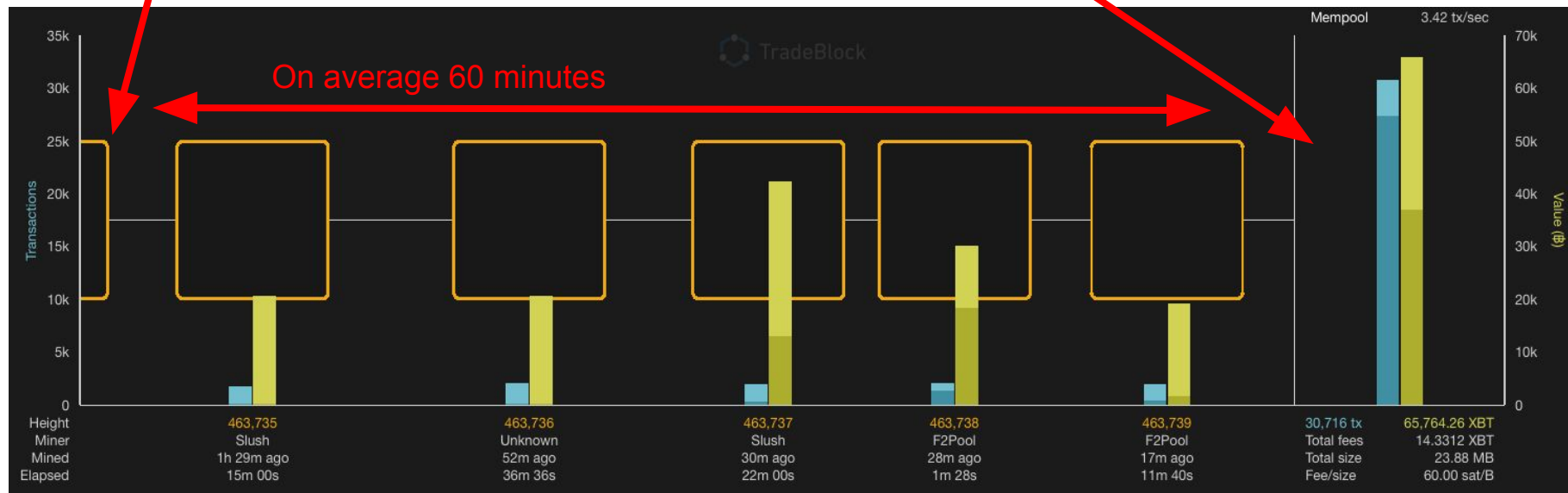


# Why users leave their crypto on exchanges?

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

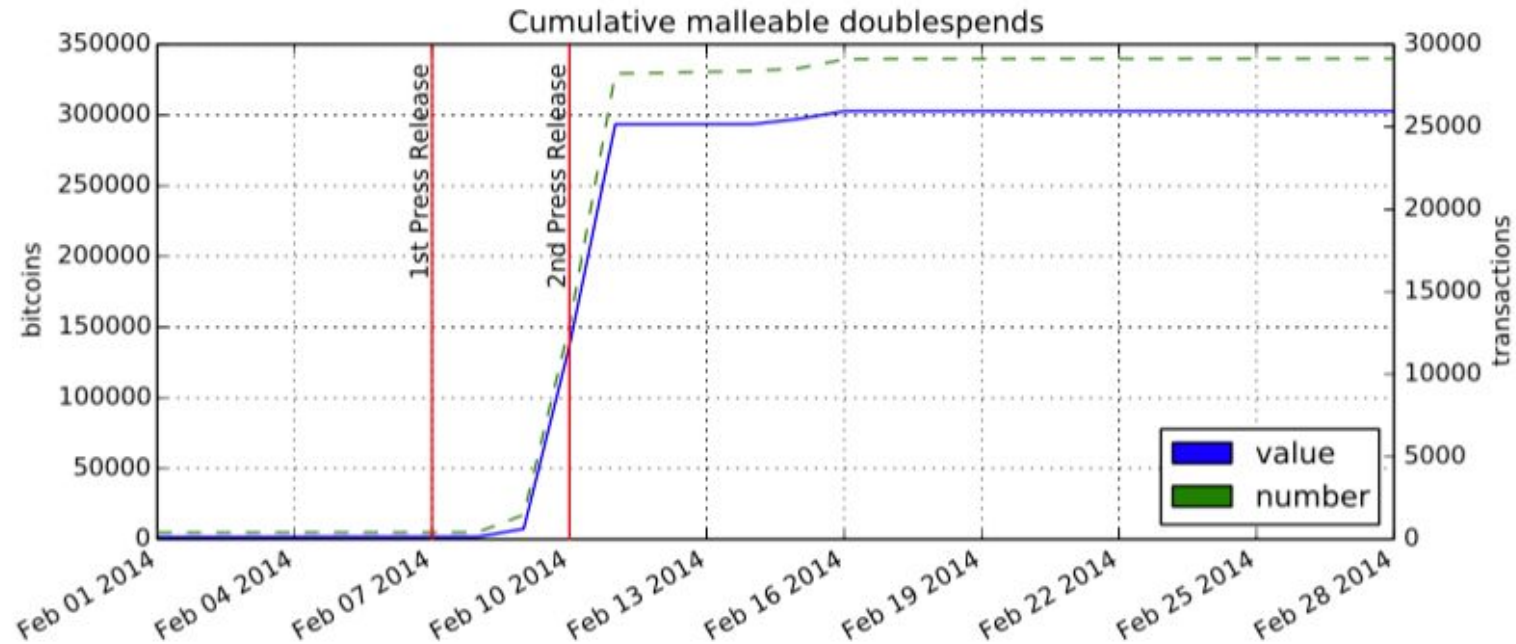
The real cause of fund loss has never been revealed



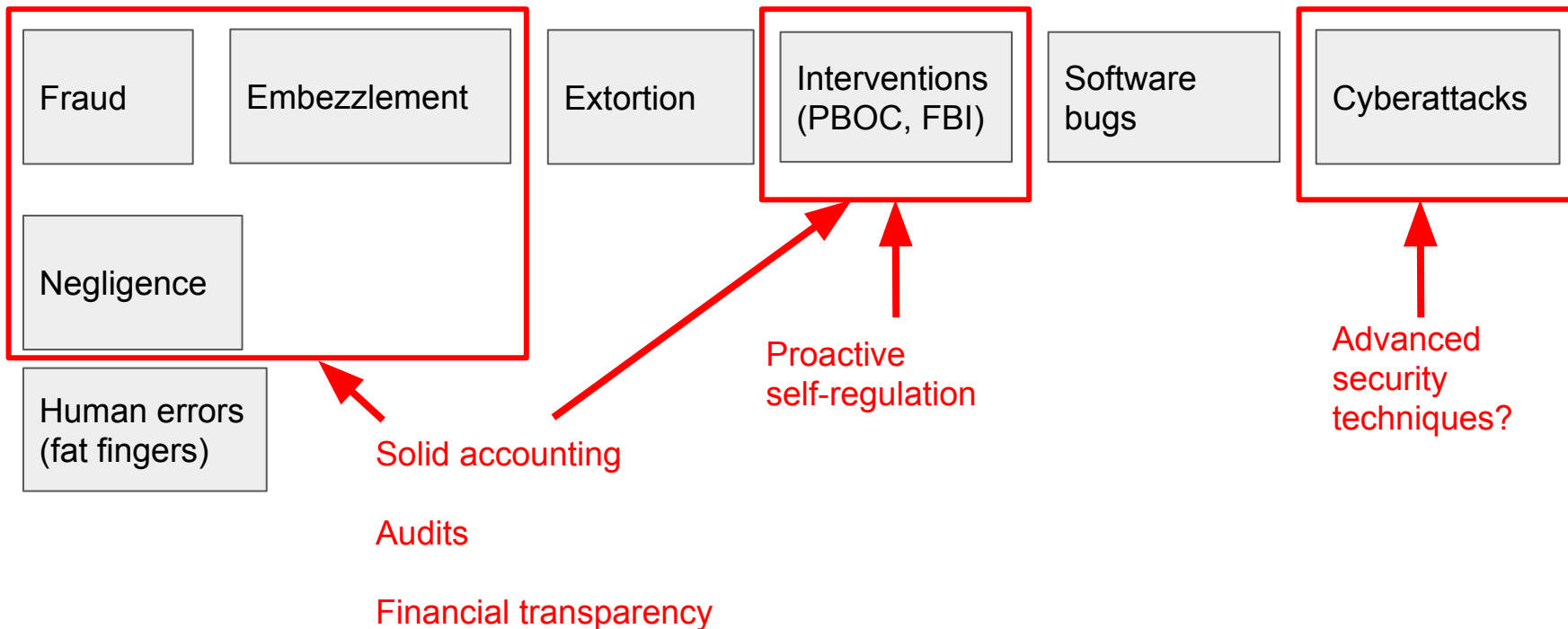
Suggested causes: transaction malleability, loss of keys, hackers, web server or database exploit, seizure by US government, embezzlement

# Transaction Malleability? Unlikely...

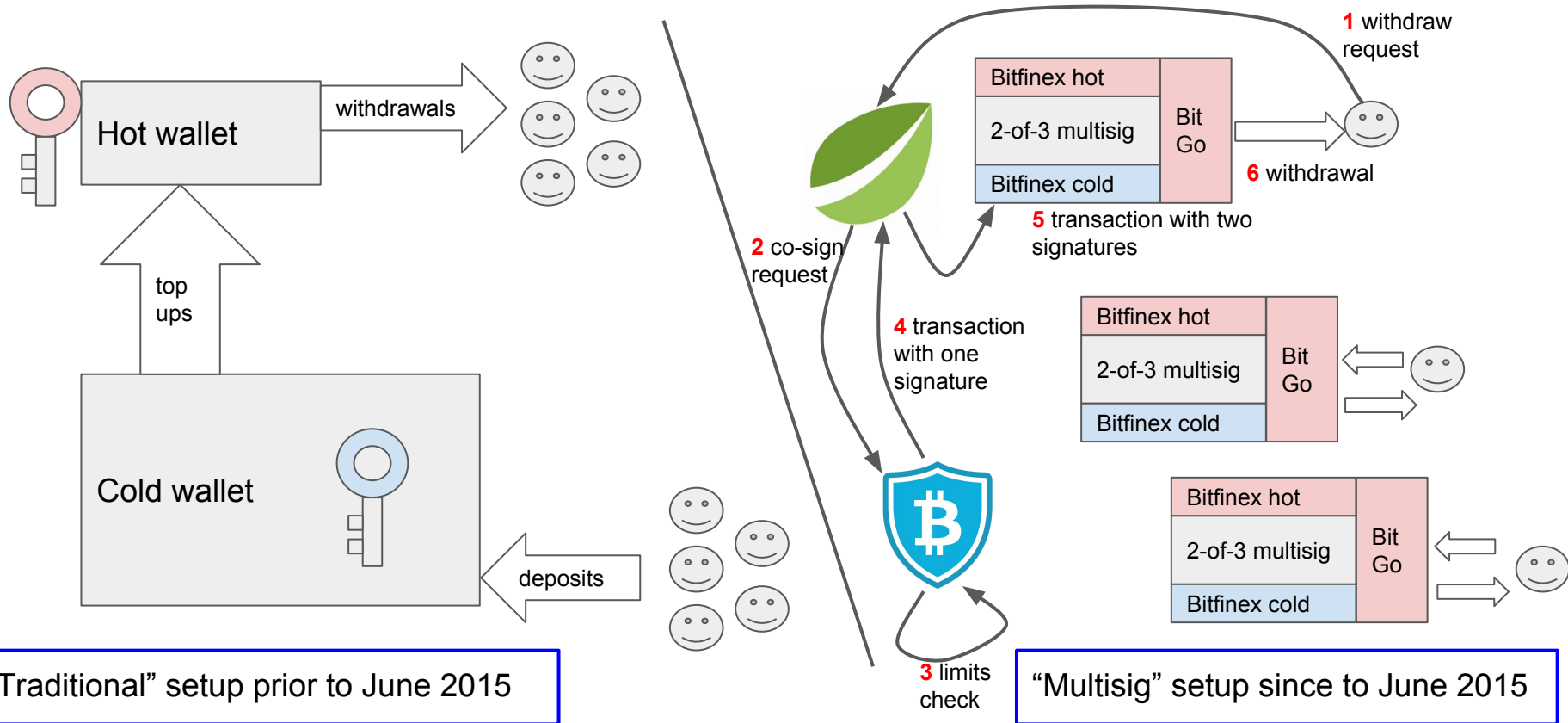
Transaction malleability is very unlikely the cause (see “Bitcoin Transaction Malleability and MtGox” by Christian Decker and Roger Wattenhofer)



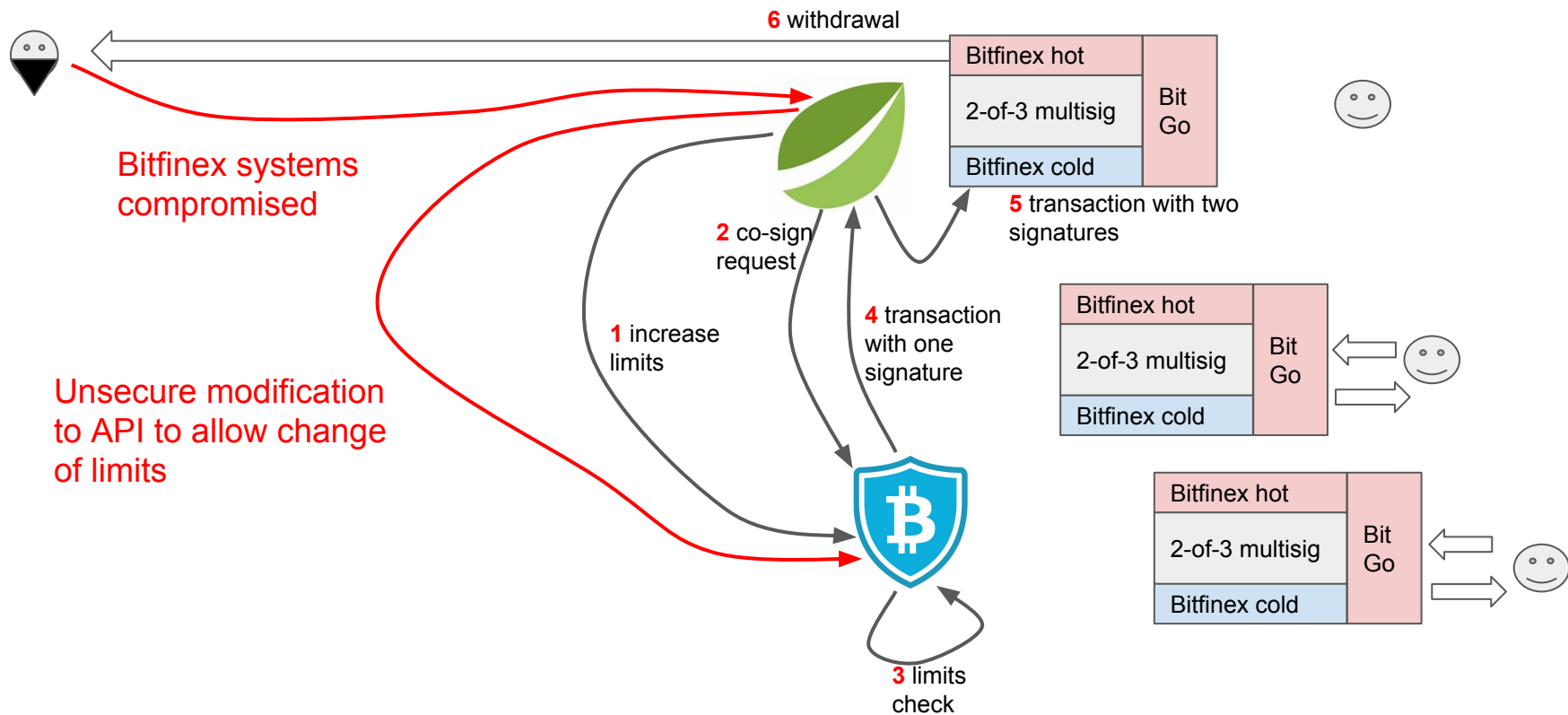
# Lessons learnt?



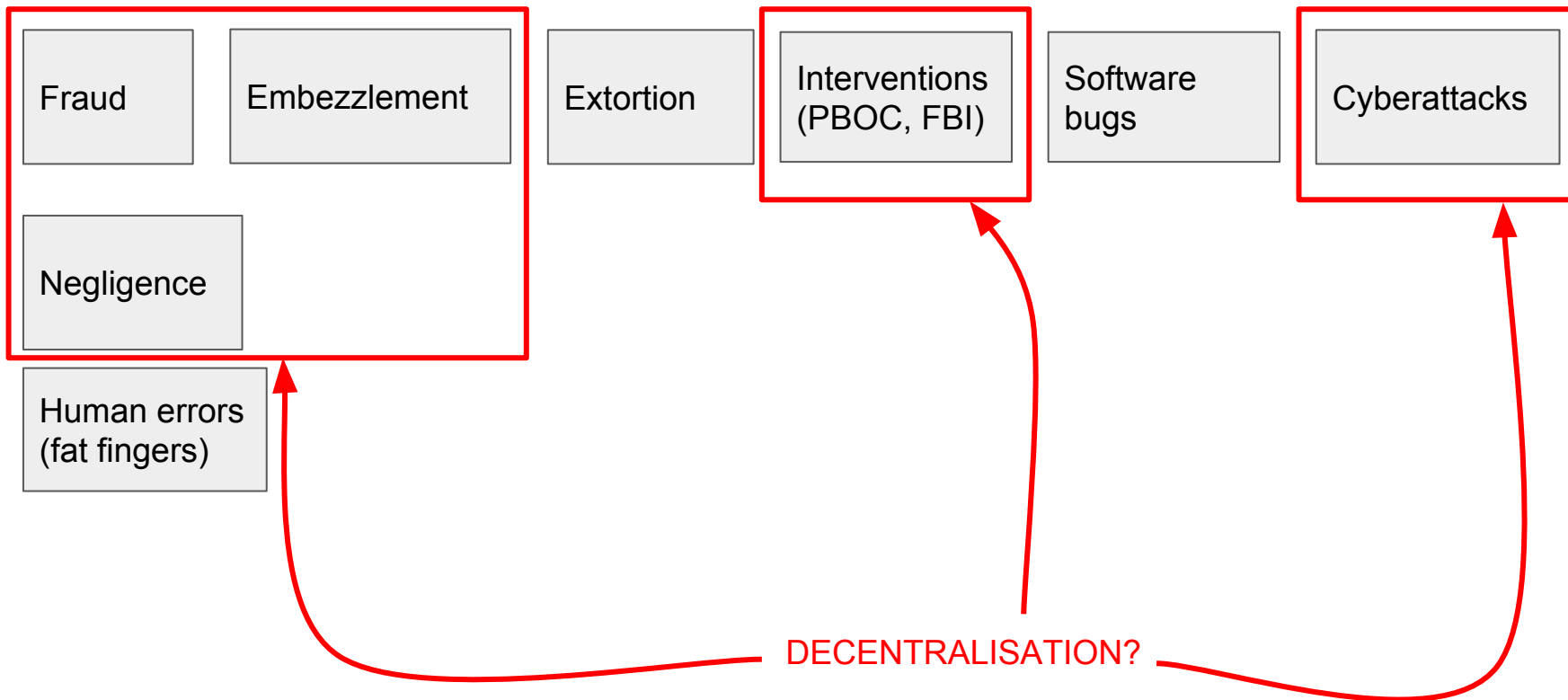
# Bitfinex - August 2016 (~120'000 bitcoins stolen)



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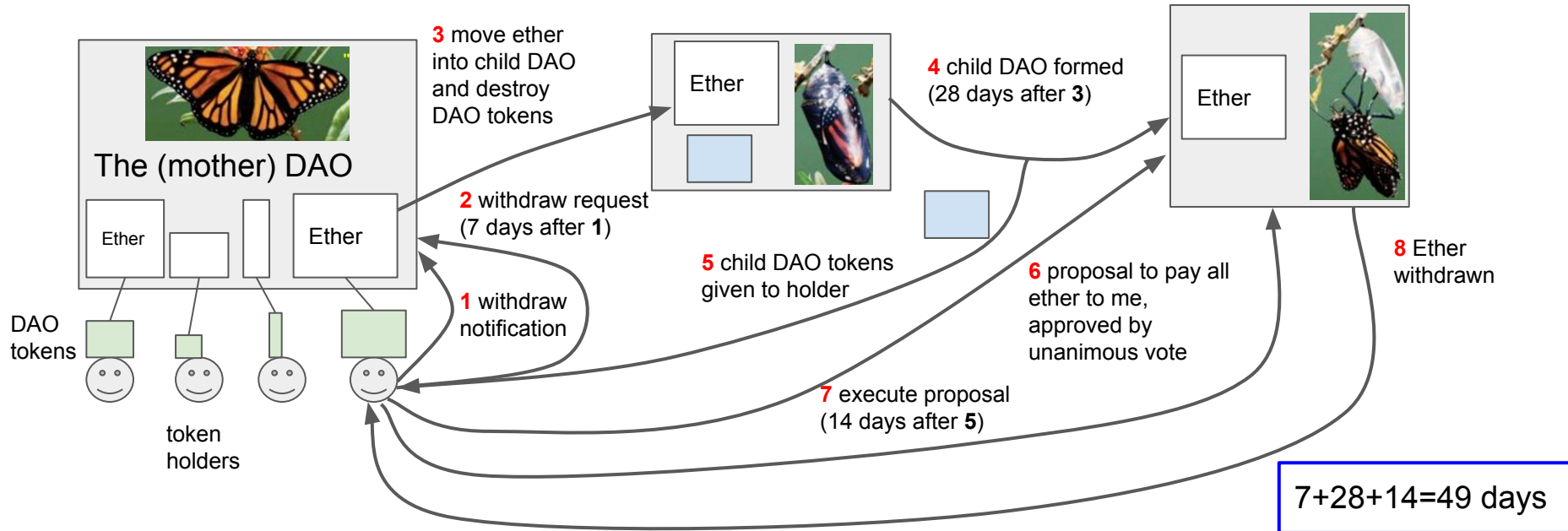


# Lessons learnt?



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

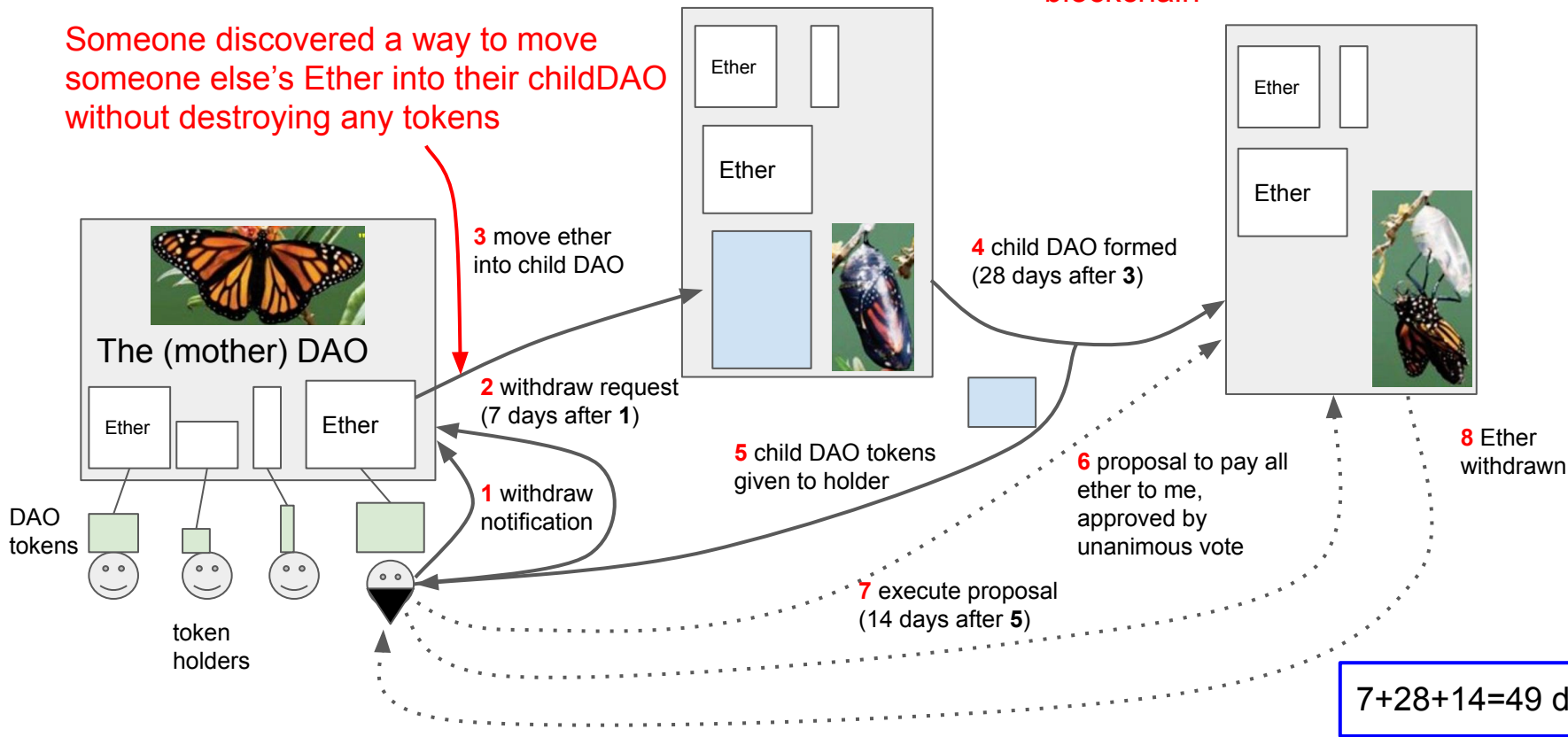
DAO is not an exchange, it is Decentralised Autonomous Organisation



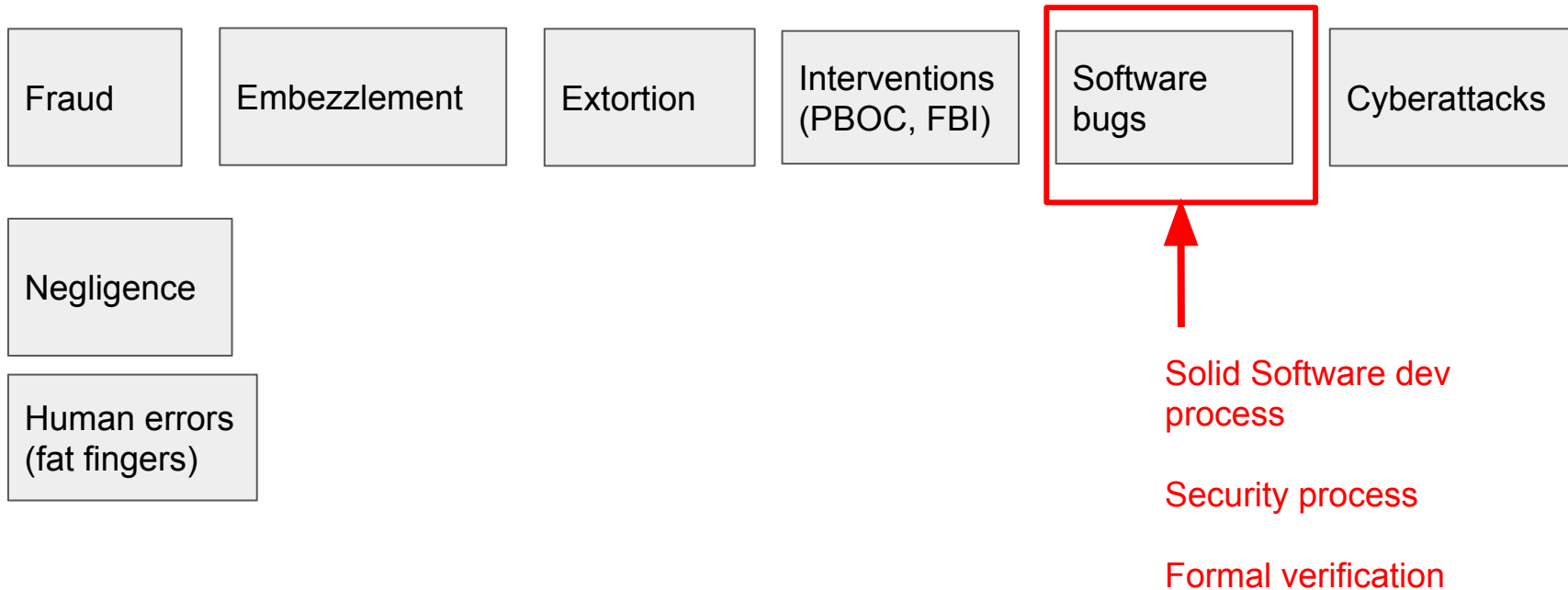


Due to DAO recover hard fork of Ethereum, some steps happened only on Ethereum Classic blockchain

Someone discovered a way to move someone else's Ether into their childDAO without destroying any tokens



# Lessons learnt?



# What is next?

Promising mitigation techniques for

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

Likely future risks:

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