

共建安全防线 共治安全环境 共享安全生态

2018 网络安全生态峰会

螳螂捕蝉，黄雀在后 以太坊智能合约的漏洞和陷阱

吴磊

共建安全防线 共治安全环境 共享安全生态

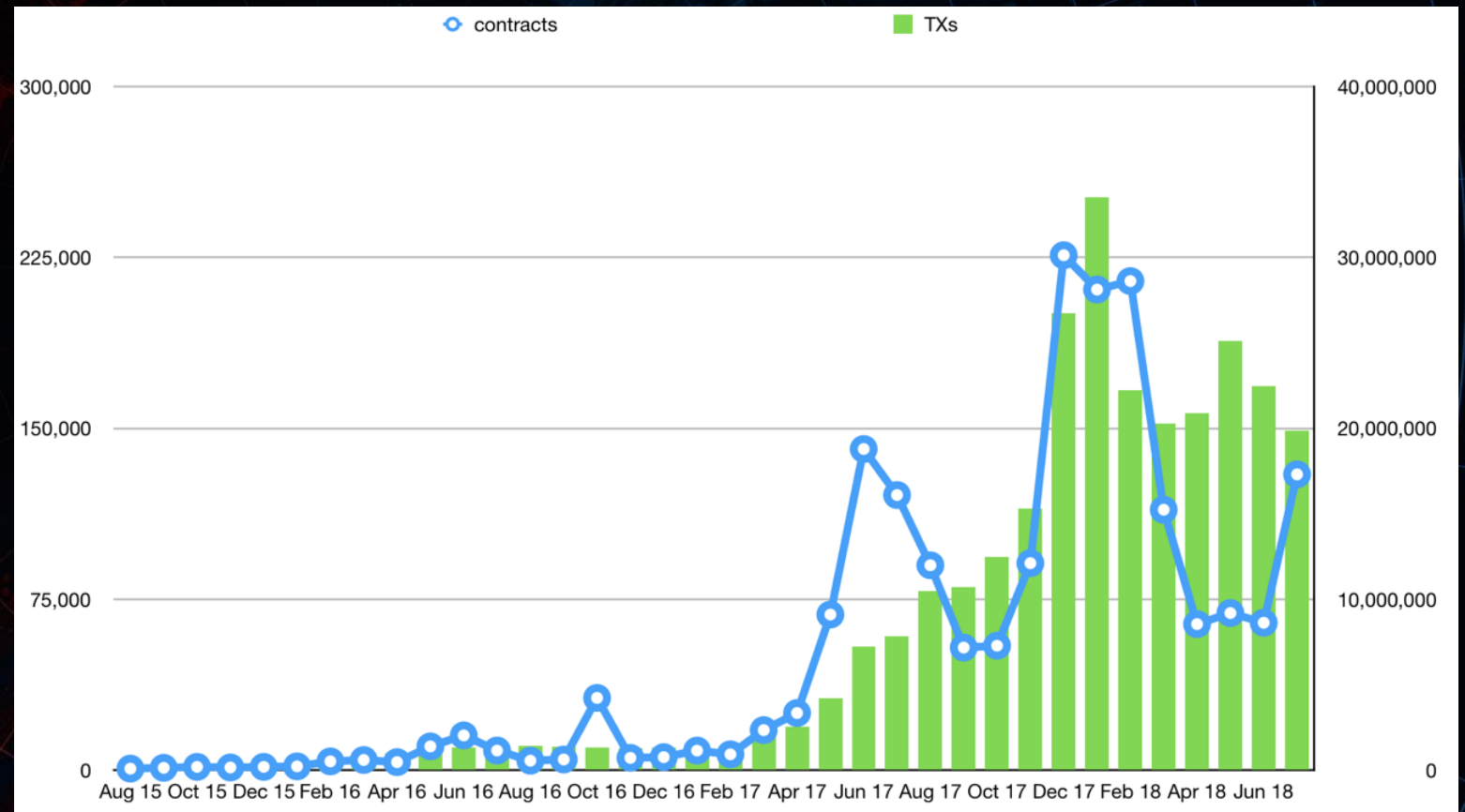
2018 网络安全生态峰会

Who am I ?

- 吴磊
- PeckShield联合创始人兼工程副总裁
- 美国北卡州立大学计算机博士
- 移动安全专家，对安卓平台的安全问题有深入研究
- 目前专注于区块链智能合约安全以及合约安全审计

Blockchain Status Quo

- Ethereum in 2017
 - 1,090 Dapps & 700+ Tokens
 - 100,000 New Users Per Day
 - Daily Trading > 1,000,000
- Market Cap in 2018
 - 1,640 Cryptocurrencies
 - Market Cap > 330 Billion
 - Global GDP Rank: 28th



Blockchain Security Incidents

2018/06

Bithumb Hacks with \$31 Million Dollars Stolen

2018/05

EDU, BAIC Smart Contracts Bugs

2018/04

BEC, SMT Smart Contracts Bugs

2018/04

Myetherwallet Suffer from DNS Hijacking

2018/02

BitGrail Hacks with Stolen Nano Tokens of 170 Million Dollars

2018/01

Coincheck Hacks with 530 Million Dollars Stolen

2017/12

Nicehash Hacks with 4700 BTC Missing with 62 Million Dollars

2017/06

Bithumb Hacks with 1 Billion Korean Yuan Loss and 30 Thousand User Info. Leaked

2016/08

Bitfinex Hacks with 120,000 BTC Stolen of 75 Million Dollars

2016/01

Cryptsy Hacks with 13,000 BTC and 300,000 LTC Stolen

2015/01

Bitstamp Hacks with 19,000 BTC Stolen

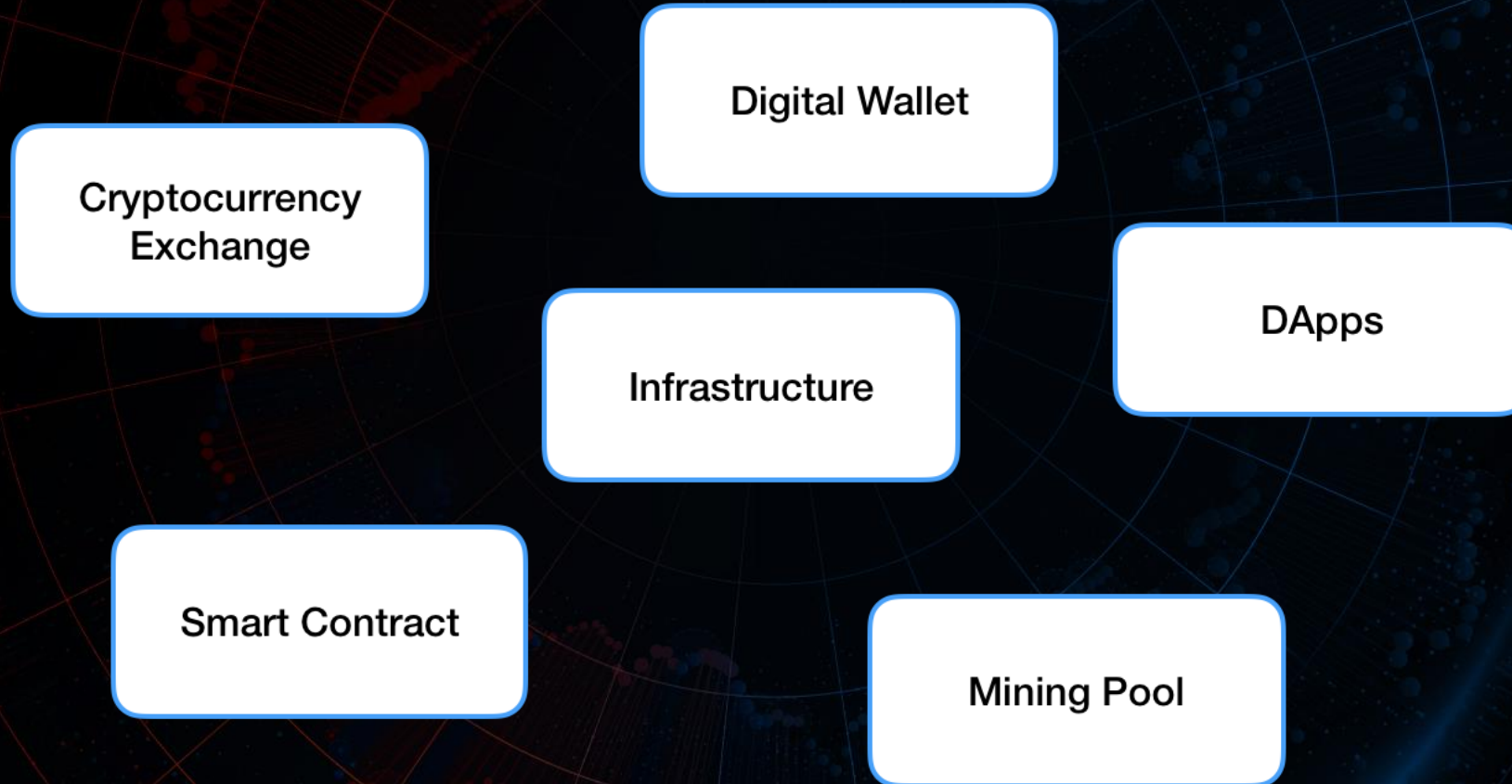
2014/03

Poloniex Hacks with 12.3% BTC Lost

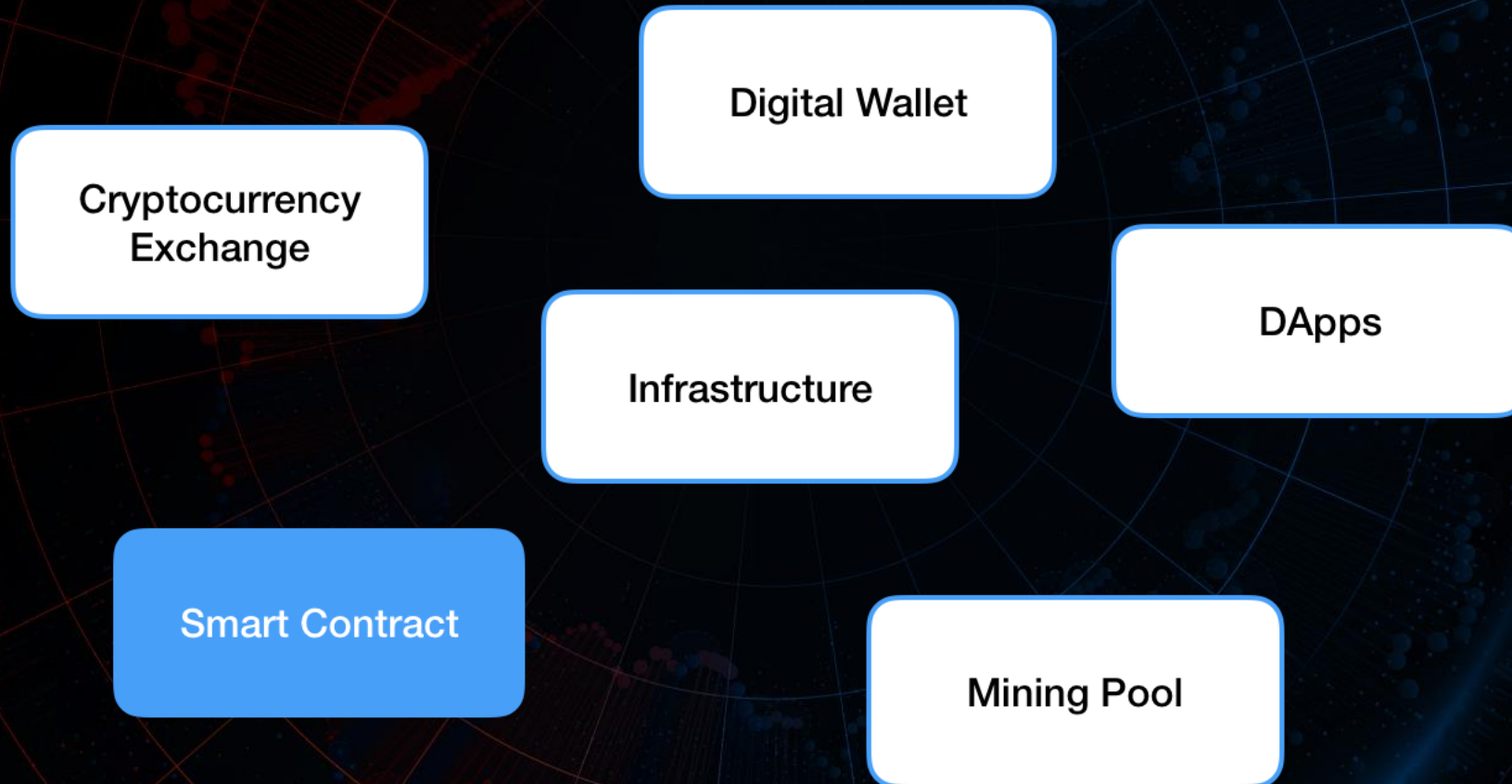
2014/02

Mt.Gox Hacks with Followed Bankruptcy

Blockchain Ecosystem



Blockchain Ecosystem – Smart Contract



Security of Smart Contract

Disclosed by PeckShield	
CodeName	CVE-ID
batchOverflow	CVE-2018-10299
proxyOverflow	CVE-2018-10376
transferFlaw	CVE-2018-10468
ownerAnyone	CVE-2018-10705
multiOverflow	CVE-2018-10706
burnOverflow	CVE-2018-11239
ceoAnyone	CVE-2018-11329
allowAnyone1	CVE-2018-11397
allowAnyone2	CVE-2018-11398
tradeTrap1	CVE-2018-12017
tradeTrap2	CVE-2018-12062
tradeTrap3	CVE-2018-12079
	...

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	...

Secure | <https://cointelegraph.com/news/multiple-exchanges-suspend-erc20-token-trading-due-to-potential-batchoverflow-bug>

By Molly Jane Zuckerman APR 25, 2018

Multiple Exchanges Suspend ERC20 Token Trading Due To Potential BatchOverflow Bug

29984 Total views 385 Total shares



EDITORIAL

- US Fourth L
- Automotive
- Crypto Mar
- Sixth Larg
- UK Crypto B
- Filipino Ban
- IBM and Pa
- Samsung M
- Logistics Pla

For u

Email

9

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	...

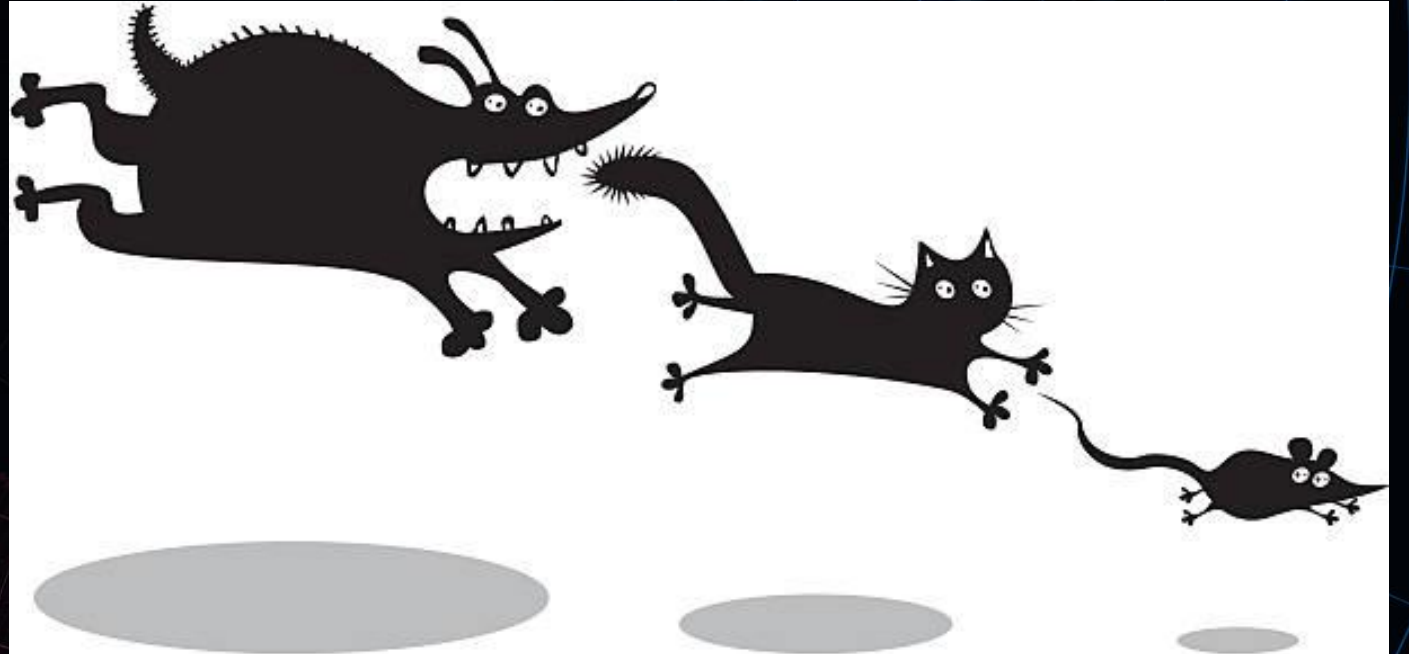
Not Disclosed Yet
CVE-ID
CVE-2018-11310
CVE-2018-11441
CVE-2018-11446
CVE-2018-11520
CVE-2018-11521
CVE-2018-11561
CVE-2018-11582
CVE-2018-11585
CVE-2018-12105
CVE-2018-12340
CVE-2018-12341
CVE-2018-12566
...

Vulnerabilities and Traps

- Vulnerabilities in Ponzi-Like Crypto Games
 - Fomo3D
 - EOS Fomo3D
- Smart Contract Traps
 - tradeTrap
 - Other honeypot contracts

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Ponzi-Like Crypto Games

Fomo3D and other ponzi games consume \$46 million in ether

23 JUL, 2018 BY DAVID BORMAN

NEWS



Fomo3D is a decentralized game hosted on the Ethereum network which asks players to purchase keys for a chance to win a cache of ether. The whole game is clearly a scam, but this hasn't stopped people from throwing money at it and other similar games, to a tune of \$46 million in ether, [bitcoin.com is reporting](#).

The game has an exceedingly simple premise: Each time a key is purchased, the ether goes into the grand prize, and the 24 hour timer is reset. If the timer runs out, the user who last purchased a key will win the whole prize. The current total just for Fomo3D is about 21,460 eth or approximately \$9,678,460 at the time of this writing. There are other games with similar premises also running on ethereum.

FOMO3D: The new Ponzi game champion

FOMO3D has now blown away all old records, and [its contract currently holds about 75,000 ETH worth around US\\$35.5 million](#). It's very much in a league of its own, and the money put into it has also spawned a series of copycats worth about another \$15 million, some of which are actual scams as opposed to just scam-themed games.

The essence of FOMO3D is that people can buy keys with Ether. The keys add time to the countdown timer. Each key increases the timer by 30 seconds up to a maximum of 24 hours. If no one buys a key before the timer runs out, the game ends, and that multi-million dollar pot is distributed among the various winners.

A player joins one of four different teams, but still competes individually. The teams instead affect how a player's resources are distributed between the keys, the P3D tokens and the exit scam itself.



Fomo3D

NEW! F3D: SOON

F3D: Long


P3D: Dividends+

Community

Misc ▾

 23:57:52

 1.0000

 0.6% (0.32 ETH)

 Register a name

Tutorials

someone else is

EXIT SCAMMING

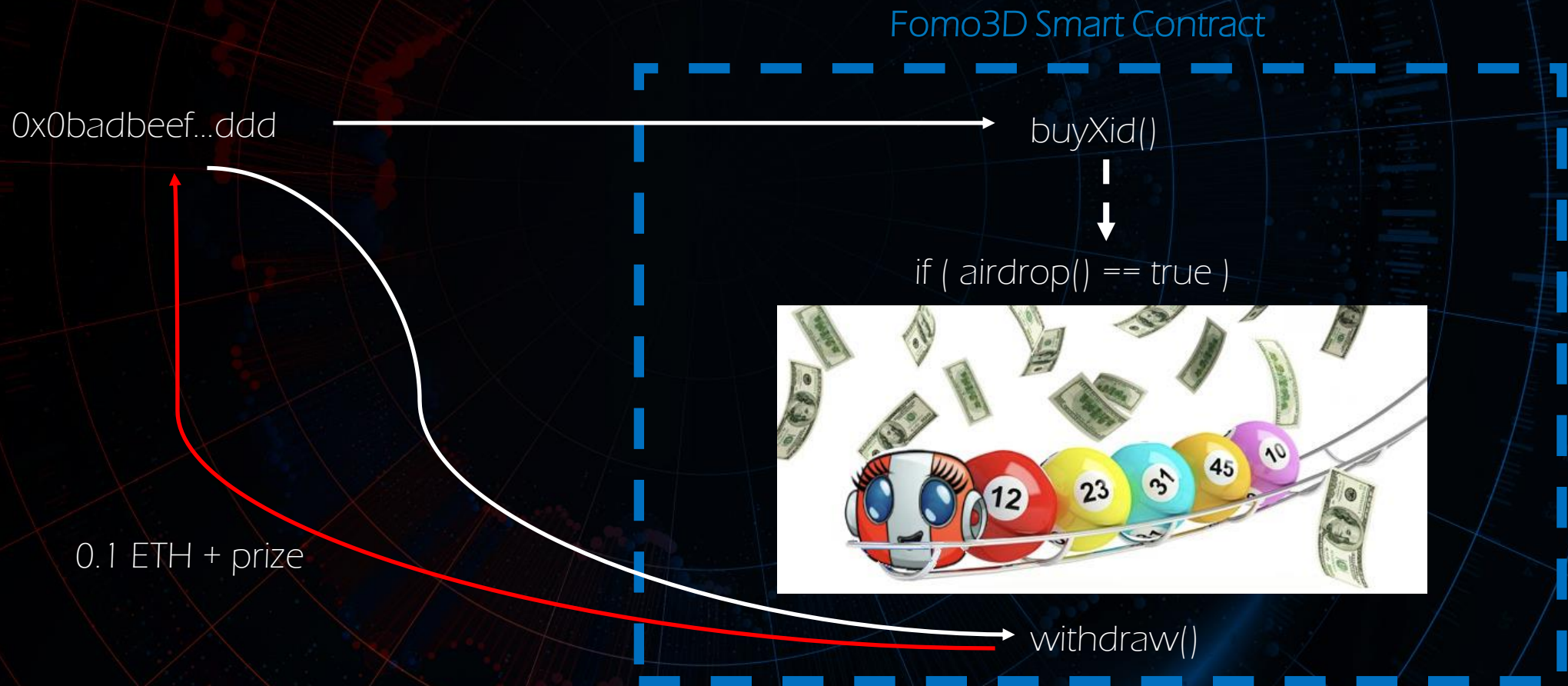
21594.4182 

23:57:52

1x 

Why isnt that your name up there?

Fomo3D Lottery Airdrop Mechanism



Don't Implement Randomness in Ethereum Smart Contract!

```
1409     function airdrop()
1410         private
1411         view
1412         returns(bool)
1413     {
1414         uint256 seed = uint256(keccak256(abi.encodePacked(
1415             (block.timestamp).add
1416             (block.difficulty).add
1417             ((uint256(keccak256(abi.encodePacked(block.coinbase)))) / (now)).add
1418             (block.gaslimit).add
1419             ((uint256(keccak256(abi.encodePacked(msg.sender)))) / (now)).add
1420             (block.number)
1421         )));
1422
1423         if((seed - ((seed / 1000) * 1000)) < airDropTracker_)
1424             return(true);
1425         else
1426             return(false);
1427     }
1428 }
```


What if msg.sender is a contract address?

```
contract human {  
  constructor() {  
    isHuman()  
  }  
}
```



```
---  
270   modifier isHuman() {  
271     address _addr = msg.sender;  
272     uint256 _codeLength;  
273  
274     assembly {_codeLength := extcodesize(_addr)}  
275     require(_codeLength == 0, "sorry humans only");  
276     -;  
277   }  
---
```



0x0badbeef...ddd



7.1. Subtleties. Note that while the initialisation code is executing, the newly created address exists but with **no intrinsic body code⁴**. Thus any message call received by it during this time causes no code to be executed. If






⁴During initialization code execution, **EXTCODESIZE** on the address should return zero, which is the length of the code of the account while **CODESIZE** should return the length of the initialization code (as defined in H.2).

























Pwning Fomo3D: Pre-Calculated Contract Creation For Airdrop Prizes!

Now, the exploitation steps could be summarized in the following:




1. Pre-calculate the address X of the next contract that the attacker address is about to create [2];
2. If X can't be used to generate a *good seed* with the current *airDropTracker_*, goto step 1;
3. Create contract at address X ;
4. Invoke *buyXid()* function from X to win the airdrop prize;
5. Invoke *withdraw()* function from X to get earnings calculated by the airdrop prize;
























Attack in-the-wild

TxHash	Block	Age	From		To	Value	[TxFee]
 0x1bfa7ae79e2bd7...	6080907	14 hrs 21 mins ago	0x73b61a56cb93c1...		 0x54833d94b55202...	0.1 Ether	0.0001995893
0x7eacc82c50ed9...	6076768	1 day 7 hrs ago	0x73b61a56cb93c1...		 0x54833d94b55202...	0.1 Ether	0.0037952116

Type_TraceAddress	From		To	Value	GasLimit
 call_2	Attacker Contract 0x54833d94b55202...		 0xa4bb1d29ca4efa...	0.1 Ether	2137597
 create_2_0	0xa4bb1d29ca4efa...		  0xfd108e175998de...	0.1 Ether	2072360
 call_2_0_0	0xfd108e175998de...		 0xa62142888aba83...	0.1 Ether	2032384
 call_2_0_0_3	0xa62142888aba83...		 0xdd4950f977ee28...	0.002 Ether	1696395
 call_2_0_0_3_0	0xdd4950f977ee28...		 0x4c7b8591c50f4a...	0.002 Ether	1660858
 call_2_0_0_4	0xa62142888aba83...		 0xf9ba0955b0509a...	0.001 Ether	1663435
 call_2_0_1_0	0xa62142888aba83...		 0xfd108e175998de...	0.101039563771909293 Ether	2300
 suicide_2_0_2	0xfd108e175998de...		0x73b61a56cb93c1...	0.101039563771909293 Ether	0 ₁₉

Attack in-the-wild

TxHash	Block	Age	From	To	Value	[TxFee]
 0x1bfa7ae79e2bd7...	6080907	14 hrs 21 mins ago	0x73b61a56cb93c1...	 0x54833d94b55202...	0.1 Ether	0.0001995893
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Type_TraceAddress	From	To	Value	GasLimit
 call_2	0x54833d94b55202...	  0xa4bb1d29ca4efa...	0.1 Ether	2137597
 create_2_0	0xa4bb1d29ca4efa...	  0xfd108e175998de...	0.1 Ether	2072360
 call_2_0_0	0xfd108e175998de...	  0xa62142888aba83...	0.1 Ether	2032384
 call_2_0_0_3	0xa62142888aba83...	  0xdd4950f977ee28...	0.002 Ether	1696395
 call_2_0_0_3_0	0xdd4950f977ee28...	  0x4c7b8591c50f4a...	0.002 Ether	1660858
 call_2_0_0_4	0xa62142888aba83...	  0xf9ba0955b0509a...	0.001 Ether	1663435
 call_2_0_1_0	0xa62142888aba83...	  0xfd108e175998de...	0.101039563771909293 Ether	2300
 suicide_2_0_2	0xfd108e175998de...	 0x73b61a56cb93c1...	0.101039563771909293 Ether	0 ₂₀

(1) This pre-created contact will create a "good" contract addr

(2) Create the "good" contract addr

(3) Send 0.1 ETH to buy keys

(4) Get the airdrop which is ≥ 0.1 ETH

(5) Withdraw

(6) Suicide and send everything to the boss

EOS Fomo3D: 狼人游戏

EOS版Fomo3D因漏洞终结 资金盘游戏背后现多重风险

2018-07-27 19:38



7月25日中午，火了两天的EOS狼人游戏(eosfo.io)遭到恶意攻击，致使奖励池内累积的94000个EOS变成负数。次日，该游戏开发团队声称，6万个EOS被攻击者套现。这个EOS版本的Fomo3D游戏在上线4天后宣告终结。

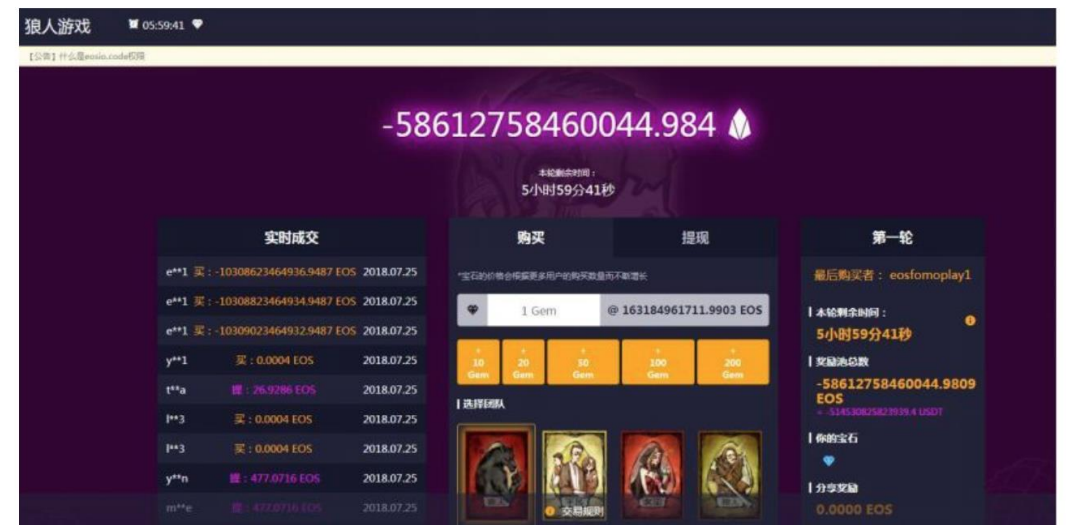
在该游戏停止运营前，国内有区块链安全团队提醒，由于该游戏的合约未开源，无法确认更多细节，存在风险。

一个未经长时间测试、没有安全审计就上线的智能合约游戏，如同定时炸弹一样，令用户资产随时存在被炸可能。

类“Fomo3D”游戏涌现，这些被看作庞氏骗局的博彩Dapp依旧吸引大批玩家，高赔率背后是币圈投机贪婪的图集。

EOS狼人游戏失窃6万EOS

2天时间，94000个EOS，EOS狼人游戏短时间内筹集了近550万人民币。昨日（7月26日）狼人游戏团队以一纸公告宣称有人中奖，也承认了“溢出漏洞”的存在导致了“数据混乱”，漏洞致使攻击者提现了6万多个EOS。



EOS狼人游戏奖池币量出现负数

EOS Fomo3D: 狼人游戏

EOS Asset Multiplication Integer Overflow Vulnerability

```
66 asset& operator*=( int64_t a ) {
67     eosio_assert( a == 0 || (amount * a) / a == amount, "multiplication overflow or underflow" );
68     eosio_assert( -max_amount <= amount, "multiplication underflow" );
69     eosio_assert( amount <= max_amount, "multiplication overflow" );
70     amount *= a;
71     return *this;
72 }
```

tokens (such as the official EOS token or some custom tokens defined by user). Recently we discovered a bug in asset's multiplication operator (operator *) which makes the integer overflow check in the function to have no effect. If a developer uses asset multiplication in his EOS smart contract, he may need to face the risk of integer overflow.

Vulnerabilities and Traps

- Vulnerabilities in Ponzi-Like Crypto Games
 - Fomo3D
 - EOS Fomo3D
- **Smart Contract Traps**
 - tradeTrap
 - Other honeypot contracts



tradeTrap: Trap of Highly-Manipulatable ERC20 Tokens

Quoted from our last blog [1], “publicly tradable ERC-20 tokens have considerable high market value. Various exchanges, either centralized (e.g., *Binance*, *Huobi.pro*, and *OKex*) or decentralized (e.g., *IDEX*, *EtherDelta*, *ForkDelta*), provide the marketplace by listing them, especially with high-liquidity ones, for public trading. Evidently, the transparency and security of their corresponding smart contracts is paramount. In practice, there is a de-facto requirement for these contract to be publicly verifiable on etherscan.io.

Moreover, reflecting the fundamental ‘code-is-law’ spirit and trust of blockchain technology, these contracts once deployed should not be further subject to centralized control or manipulation.”

Security Issue 1: Arbitrary Increase in Token Balance

```
131 function mintToken(address target, uint256 mintedAmount) onlyOwner {  
132     balanceOf[target] += mintedAmount;  
133     Transfer(0, owner, mintedAmount);  
134     Transfer(owner, target, mintedAmount);  
135 }
```

Security Issue 2: Manipulatable Prices and Unfair Arbitrage

```
217 function setPrices(uint256 newSellPrice, uint256 newBuyPrice) onlyOwner public {
218     sellPrice = newSellPrice;
219     buyPrice = newBuyPrice;
220 }
221
222 /// @notice Buy tokens from contract by sending ether
223 function buy() payable public {
224     uint amount = msg.value / buyPrice;           // calculates the amount
225     _transfer(this, msg.sender, amount);         // makes the transfers
226 }
227
228 /// @notice Sell `amount` tokens to contract
229 /// @param amount amount of tokens to be sold
230 function sell(uint256 amount) public {
231     require(this.balance >= amount * sellPrice); // checks if the contract has enough ether to buy
232     _transfer(msg.sender, this, amount);         // makes the transfers
233     msg.sender.transfer(amount * sellPrice);     // sends ether to the seller. It's important to do t
234 }
```

Additional Overflows

```
230 function sell(uint256 amount) public {
231     require(this.balance >= amount * sellPrice); // checks if the contract
232     _transfer(msg.sender, this, amount); // makes the transfers
233     msg.sender.transfer(amount * sellPrice); // sends ether to the sender
234 }

390 //user is buying grx
391 function buy() payable returns (uint256 amount){
392     if(!usersCanTrade && !canTrade[msg.sender]) revert();
393     amount = msg.value * buyPrice; // calculates the amount
394
395     require(balanceOf[this] >= amount); // checks if it has enough ether
396     balanceOf[msg.sender] += amount; // adds the amount to buyer's balance
397     balanceOf[this] -= amount; // subtracts amount from contract's balance
398     Transfer(this, msg.sender, amount); // execute an event reference
399     return amount; // ends function and returns amount
400 }
```

Additional Overflows

After publishing our blog [1], we have been contacted by a number of affected cryptocurrency exchanges. As we believe the corresponding mitigation mechanism is now in place, it is the time to disclose the details of **tradeTrap**. As emphasized in [1], once smart contracts of publicly tradable ERC-20 tokens are deployed, they should not be further subject to centralized control or manipulation. **Unfortunately, tradeTrap plagues 700+ ERC20 tokens and we have so far confirmed at least dozens of them are publicly tradable on current exchanges, including *Binance, Huobi.pro, OKex, OKCoinKR, CoinEgg, Kucoin, Allcoin, HitBTC, Bitbns, ZB, OTCBTC, CoinBene, COSS, EtherDelta, ForkDelta, IDEX, YEX, Tidex, Radar Relay, Yobit, WazirX, CoinExchange, CoinSpot, Bluetrade, CEX, and Livecoin.*** The full list of tradeTrap-affected ERC20 tokens is available [here](#).

Other honeypot Contracts

An analysis of a couple Ethereum honeypot contracts

[Etherscan](#) is an Ethereum blockchain explorer that, besides other features, allows developers to submit the code of the smart contracts they deploy. The main benefit of this feature is that it allows users to check what contracts do by reading their source code. Etherscan makes sure that the code matches the smart contract as deployed.

The list of verified contracts is long. As of this writing, Etherscan offers the source code for 26055 contracts, which can be browsed [here](#).

On a lazy Sunday afternoon I decided to casually browse it to see what kind of contracts people were running and get a sense of what people use the blockchain for, and how well written and secure these contracts are. Most contracts I found implemented tokens, crowdsales, multi-signature wallets, ponzis, and.. honeypots!

Honeypot contracts are the most interesting findings to me. Such contracts hold ether, and *pretend* to do so insecurely. In short, they are scam contracts that try to fool you into thinking you can steal the ether they hold, while in fact all you can do is *lose* ether.

以太坊蜜罐智能合约分析

 [Knownsec知道创宇](#)  2018-06-28 共87401人围观 区块链安全

0x00 前言

在学习区块链相关知识的过程中，拜读过一篇很好的文章 [《The phenomenon of smart contract honeypots》](#)，作者详细分析了他遇到的三种蜜罐智能合约，并将相关智能合约整理收集到Github项目 [smart-contract-honeypots](#)。

本文将对文中和评论中提到的 [smart-contract-honeypots](#) 和 [Solidity-Vulnerable](#) 项目中的各蜜罐智能合约进行分析，根据分析结果将蜜罐智能合约的欺骗手段分为以下四个方面：

- 古老的欺骗手段
- 神奇的逻辑漏洞
- 新颖的赌博游戏
- 黑客的漏洞利用

基于已知的欺骗手段，我们通过内部的以太坊智能合约审计系统一共寻找到 118 个蜜罐智能合约地址，一共骗取了 34.7152916 个以太币（2018/06/26 价值 102946 元人民币），详情请移步文末附录部分。

PrivateBank: Another TheDAO ?

```
27  function CashOut(uint _am)
28  {
29      if(_am<=balances[msg.sender])
30      {
31
32          if(msg.sender.call.value(_am)())
33          {
34              balances[msg.sender]-=_am;
35              TransferLog.AddMessage(msg.sender,_am,"CashOut");
36          }
37      }
38  }
39
40  function() public payable{}
41
42 }
```

PrivateBank: Another TheDAO ?

```
3 contract Private_Bank
4 {
5     mapping (address => uint) public balances;
6
7     uint public MinDeposit = 1 ether;
8
9     Log TransferLog;
10
11     function Private_Bank(address _log)
12     {
13         TransferLog = Log(_log);
14     }
```



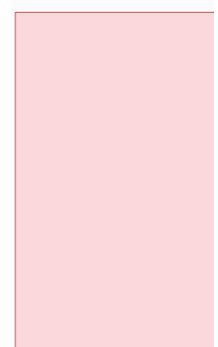
```
44 contract Log
45 {
46
47     struct Message
48     {
49         address Sender;
50         string Data;
51         uint Val;
52         uint Time;
53     }
54
55     Message[] public History;
56
57     Message LastMsg;
58
59     function AddMessage(address _adr,uint _val,string _data)
60     public
61     {
62         LastMsg.Sender = _adr;
63         LastMsg.Time = now;
64         LastMsg.Val = _val;
65         LastMsg.Data = _data;
66         History.push(LastMsg);
67     }
68 }
```




PrivateBank: Another TheDAO ?

Here is the diff check between the bytecode in the Honey Pot and the code that has actually been deployed on the network.

(Left is the by **Simple, they exploit their contract’s re-entrancy bug! But they’ve essentially made themselves the only address allowed to execute that exploit.**



It’s an amazing exploit hiding in plain sight. The attacker immediately assumes their victim does not know that the re-entrancy exploit but the Honey Pot owner is literally saying “Oh yes I do.” before the would-be hacker first sees the code.



It contains almost three times as much logic. So what else is going on?

Mitigations?

Better Blockchain Ecosystem Together



Website: <https://peckshield.com>

Email: contact@peckshield.com