

Welcome Neoxplorers!



Michael Herman

“The NEO Blockchain and
the NEO Smart Economy”

March 12, 2018

Michael Herman

<https://www.meetup.com/NEO-Blockchain-Toronto/>

neotoronto@outlook.com



Agenda

1. Introductions
2. What is NEO?
3. Why do things have value?
4. NEO Smart Economy
5. Why NEO?
6. NEO Events
7. NEO Resources

Who is Michael Herman?

- ▶ Past: Decades of experience on the Microsoft platform, Alberta cattle rancher, scuba diver and downhill skier
- ▶ Now: Work 16 hours a day on the NEO Blockchain
- ▶ Independent Developer
 - ▶ NEO Blockchain C# Center of Excellence
 - ▶ NEO City of Zion (CoZ)
- ▶ Michael Herman is an independent developer and writer who contributes to several NEO Blockchain projects including:
 - ▶ NEO developer tool suite (neo-debugger and neo-gui-developer projects)
 - ▶ mwherman2000/neo-persistableclasses project - home of the NEO Persistable Class Framework (NPC) for efficient object-oriented smart contract development using C#.NEO
 - ▶ mwherman2000/dotnetquickstart project - home of the NEO Blockchain Quick Start Guide for .NET Developers.
- ▶ Michael is also the founder of the **NEO Blockchain C# Center of Excellence** as well as the first Canadian NEO Blockchain Meetup group (Bitcoin North). He has helped bootstrap several additional Meetups worldwide including NEO Blockchain Vancouver, NEO Blockchain Cancun, and NEO Blockchain Turkey.

What is NEO Blockchain Toronto?

- ▶ NEO Blockchain Toronto (<https://www.meetup.com/NEO-Blockchain-Toronto/>) is a **non-profit, community-based Meetup group** for blockchain developers and architects interested in designing and creating **Distributed Ledger Technology (DLT)** (aka blockchain) solutions using the NEO Blockchain platform.
- ▶ We call ourselves *Neoxplorers*
- ▶ Meetup second Wednesday evening of each month
 - ▶ March 14, April 11, May 9, June 13, ...
- ▶ This meetup is a group that it is independent of but supported by the NEO Project (<https://github.com/neo-project>).

What is NEO?

- ▶ PROJECT: NEO (<https://neo.org/>) is a non-profit, community-based blockchain project that utilizes blockchain technology and digital identity to digitize assets, to automate the management of digital assets using smart contracts, and to realize a "smart economy" with a distributed network.
- ▶ DUAL CRYPTOCURRENCY: \$NEO and \$GAS
- ▶ SOFTWARE PLATFORM: Programmable Smart Contract blockchain platform
 - ▶ Multiple languages: C# (reference implementation), Python, Java, Golang, JavaScript
- ▶ NEO SMART ECONOMY
- ▶ GLOBAL COMMUNITY
 - ▶ Discord: <https://discord.gg/gqCYeup> / <https://discord.gg/4TQujHj>
 - ▶ NEO C# Developers Center of Excellence (neo-csharpcoe)
<https://github.com/mwherman2000/neo-csharpcoe/blob/master/README.r>
 - ▶ City of Zion "Home of the Open-source Global NEO Developer Community"
<https://cityofzion.io/>



What is the NEO Smart Economy?



Future world where the boundary between real assets in the physical world and digital assets in the digital world has been removed.

Two Cryptocurrencies: NEO and GAS

- ▶ In the NEO Smart Economy...
 - ▶ NEO represents Voting Power - not divisible
 - ▶ GAS represents Ability to Fund Work (Systems Fees) - divisible
- ▶ NEO
 - ▶ Should hold and retain NEO to maximize your voting power
 - ▶ Receive distributions of GAS
- ▶ GAS
 - ▶ Used to fund the deployment of smart contracts (applications) on the NEO Blockchain
 - ▶ Used to fund transactions executed on the NEO Blockchain
 - ▶ Transfers of NEO from sender to receiver
 - ▶ Transfers of tokens from sender to receiver
 - ▶ Invoke operations in smart contract that update the state of the NEO Blockchain
 - ▶ Operations that just read state (data) back from the NEO Blockchain are essentially free
 - ▶ System fees are recycled and re-distributed back in ratio/proportion to the number of NEO you hold

NEO System Fees

	NEO [Gas]		NEO [Gas]
Runtime.CheckWitness	0.2	OpCode.PUSH16 [or less]	0.00
Blockchain.GetHeader	0.1	OpCode.NOP	0.00
Blockchain.GetBlock	0.2	OpCode.APPCALL	0.01
Blockchain.GetTransaction	0.1	OpCode.TAILCALL	0.01
Blockchain.GetAccount	0.1	OpCode.SHA1	0.01
Blockchain.GetValidators	0.2	OpCode.SHA256	0.01
Blockchain.GetAsset	0.1	OpCode.HASH160	0.02
Blockchain.GetContract	0.1	OpCode.HASH256	0.02
Transaction.GetReferences	0.2	OpCode.CHECKSIG	0.10
Account.SetVotes	1	OpCode.CHECKMULTISIG [per signature]	0.10
Validator.Register	1000	Other OpCodes	0.001
Asset.Create (system asset)	5000		
Asset.Renew (system asset)	5000		
Contract.Create	500		
Contract.Migrate	500		
Storage.Get	0.1		
Storage.Put [per KB]	1.0		
Storage.Delete	0.1		
Other OpCodes	0.001		

Why do things have value? Why do they appreciate?

Michael's Theorem

- ▶ **It's all about Scarcity**
 - ▶ Real or perceived
 - ▶ Simpler terms: Supply and Demand (but I prefer the term scarcity)
- ▶ The difficulty or cost of acquiring new or additional assets
 - ▶ Money, diamonds, gold, ..., cryptocurrencies
- ▶ The difficulty or cost of product or manufacturing new assets
 - ▶ Bitcoin, Ethereum (ETH)
 - ▶ Proof of State (PoS) consensus/verification processes
 - ▶ Millions of miners competing: HUGELY wasteful, expensive, slow
- ▶ Could be through the regulation of price and/or supply - illusion of scarcity
- ▶ “Mining is a **process of validating a transaction or block** in a network by the **process of complex algorithms to prove and validate the correctness of the transaction** and thereby add the new block to the chain.”
[<https://medium.com/@karthik.seshu/cryptocurrency-proof-of-work-vs-proof-of-stake-e1eee1420b10>]

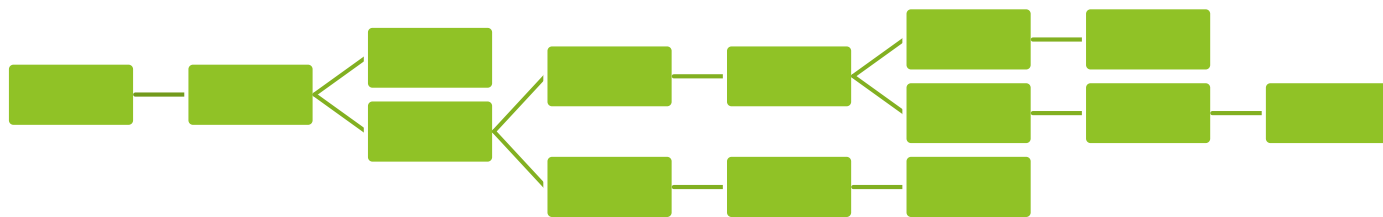
What happens when things become easier to acquire?

Michael's Theorem

- ▶ What happens when things become easier to make/manufacture?
- ▶ What happens to the price of ETH when Ethereum moves to Proof of Work (PoW)?
 - ▶ Millions of competing miners aren't needed for Ethereum anymore
 - ▶ Maybe they move back into Bitcoin mining - perhaps driving down the cost of a Bitcoin?
- ▶ NEO Blockchain uses Delegated Byzantine Fault Tolerance (dBFT)
 - ▶ Currently runs 8 nodes WW to support about 1000TPS throughput
 - ▶ By 2020, NEO estimates this will need to grow to 12 nodes to achieve 100,000TPS
 - ▶ Very small number of nodes

PoW and PoS compared to dBFT

Consensus algorithm: PoW and PoS



Consensus algorithm: dBFT



One and only one branch

The Problems with PoW* and PoS*

Block creators are incentivized by economic rewards

If a transaction does not include a transaction fee, then the block creators have no interest in resolving it.

This is just how PoW and PoS has to be structured. If there is no economic reward in creating blocks, then there will be less nodes participating in the network, directly influencing network security.

This structure is however in direct conflict with the interest of decentralized applications.

Many large scale applications need the transactions to be free of charge for the end user, while still ensuring stable service (transaction time). This will always be a conflict of interest for PoW and PoS systems.

*PoW - Proof of Work

*PoS - Proof of State

NEO Blockchain as a Enterprise Application Platform

Let's compare/contrast the Ethereum and the NEO Blockchain from a software platform perspective

Ethereum

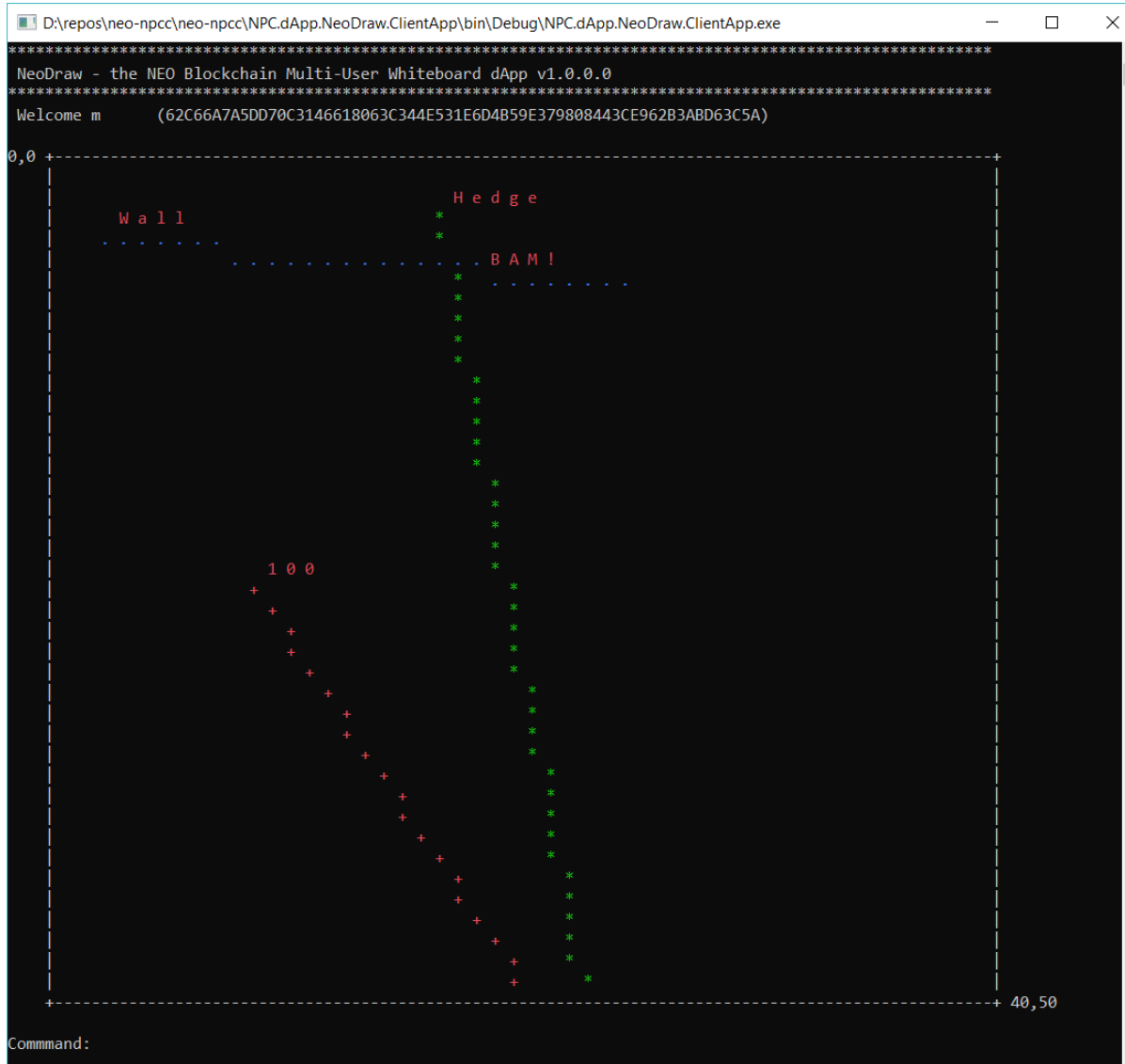
- ▶ Smart contract == single object/entity with a simple set of methods and simple types of data
- ▶ The Ideal Application?
 - ▶ Blockchain version 2.0 Alt tokens
 - ▶ Simple, single entity with a few methods
- ▶ Beyond that?
 - ▶ Very little future for Ethereum as an Enterprise Application platform

NEO

- ▶ Smart contract == a program capable of working with few up to dozens of different types of objects/entities
- ▶ Unlimited potential as an Enterprise Application Platform
- ▶ Will drive acquisition of NEO
- ▶ Automatic accumulation of GAS
- ▶ Increased ability to participate in the NEO Smart Economy
 - ▶ Voting as well as having operating funds

NEO Blockchain as a Enterprise Application Platform

NeoDraw - NEO Multi-Person Shared Whiteboard dApp



- ▶ NeoDraw is advanced proof-of-concept distributed application (dApp) for the NEO Persistable Classes (NPC) Entity-based dApp (e-dApp) Platform running on the NEO Blockchain.
- ▶ Uses 3 entities
 - ▶ UserCredentials
 - ▶ User name and User Password
 - ▶ UserPoint
 - ▶ Array of (X,Y) coordinates/user
 - ▶ NeoCounter
 - ▶ Tracks number points/user

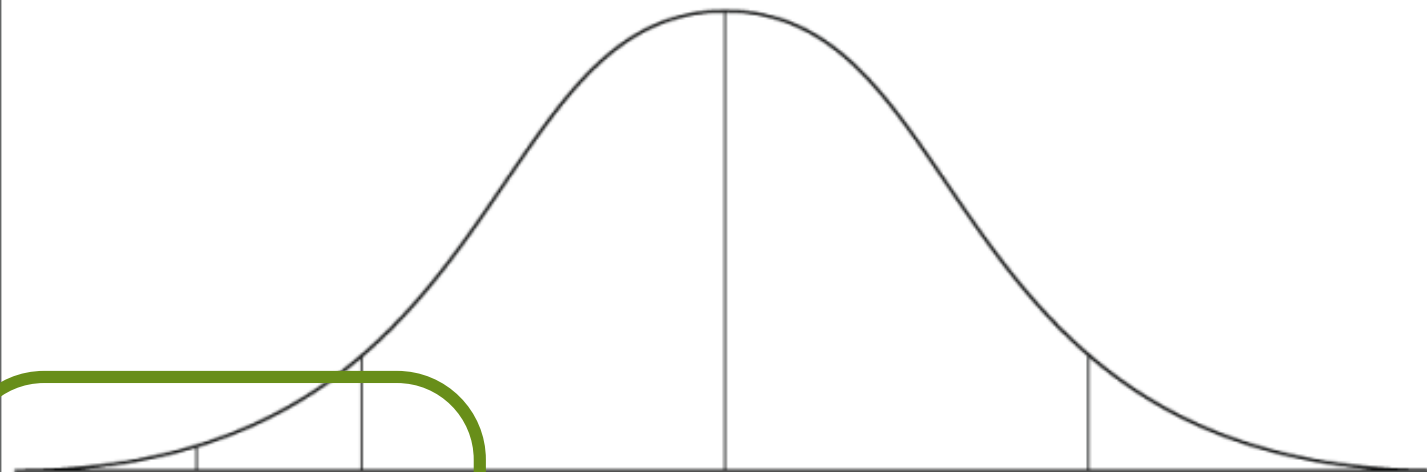
NEO Blockchain as a Enterprise Application Platform

► Like any new platform...

- Scalability
- Reliability
- Inexperience
- Right tools
- Knowledge
- Education
- Training
- ...

The Technology Adoption Curve

As captured by Everett Rogers in his book Diffusion of Innovations, people tend to adopt new technologies at varying rates. Their relative speed of adoption can be plotted as a normal distribution, with the primary differentiator being individuals' psychological disposition to new ideas.



Innovators

(2.5%) are risk takers who have the resources and desire to try new things, even if they fail.

Early Adopters

(13.5%) are selective about which technologies they start using. They are considered the "one to check in with" for new information and reduce others' uncertainty about a new technology by adopting it.

Early Majority

(34%) take their time before adopting a new idea. They are willing to embrace a new technology as long as they understand how it fits with their lives.

Late Majority

(34%) adopt in reaction to peer pressure, emerging norms, or economic necessity. Most of the uncertainty around an idea must be resolved before they adopt.

Laggards

(16%) are traditional and make decisions based on past experience. They are often economically unable to take risks on new ideas.

NEO is created for large scale dApps*

No transaction fees
Initial 10 GAS fee is for free. Simple Smart Contracts can be run for free.

Confirmations needed
NEO 1 and only 1
BTC 6+
ETH 20+

Mainchain speeds

NEO 1000 - 10,000 TPS (single core)
BTC 3 - 4 TPS
ETH 10 - 20 TPS

More freedom for application developers to choose the business model that are most suitable to their business. Service and usage fees can be charged in any way off-chain.

*dApps - Distributed Apps

Smart Contracts: “Have it your way”

```
using Neo.SmartContract.Framework;  
using Neo.SmartContract.Framework.Services.Neo;
```

```
namespace Neo.SmartContract
```

```
{  
    public class Lock : VerificationCode  
    {  
        public static bool Verify(byte[] signature)  
        {  
            Header header = Blockchain.GetHeader(Blockchain.GetHeight());  
            if (header.Timestamp < 1499328600) // 2017-6-6 18:10  
                return false;  
            // Paste the public key  
            return VerifySignature(  
2, 122, 213, 170 }, signature);  
        }  
    }  
}
```

```
import org.neo.smartcontract.framework.SmartContract;
```

```
public class ContractAuthentication extends SmartContract {
```

```
    static boolean Main(byte[] signature)  
    {
```

```
        Header header = Blockchain.getHeader(Blockchain.height());  
        if (header.timestamp() < 1506933900)  
            return false;
```

```
        // Paste the public key byte array here
```

```
        byte[] b = { 2, -99, 6, 102, 4, -41, 48, -96, -116, 23, 9, 72, -89, -104, -107, 2, -8, -70, -2,  
                    96, 60, -21, 105, 105, -93, 103, -80, -113, 17, -61, 7, 20, -85 };
```

```
        return verifySignature(b, signature);
```

```
    }
```

```
}
```

NEO Events



Second Wednesday evening of each month



HackCU Episode IV • University of Colorado Boulder
600 Hackers • 24 Hours • February 24th and 25th 2018



NEO Events (con't)



Second Thursday evening of each month



1 Week \$NEO Wallet Design Challenge!

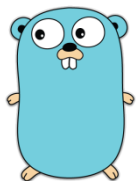
I will select 3 designs to each win 5 GAS.

- 1) Create a UI & UX Design for a slick NEO Wallet for desktop.
- 2) Email your submission to challenge@dean.press
- 3) Submission deadline is March 7th.
- 4) Winners announced within a few days.

Good luck! 🍀



NEO dApp Competitions ~USD\$500K in prizes



1st NEO Dev Competition

Nov. 20, 2017 - Mar. 31, 2018



CITY OF ZION IS LAUNCHING ITS SECOND DAPPS COMPETITION

And we want you to get involved

The City of Zion council is promoting a decentralised apps (dApps) competition to further elevate the NEO developer community.

NEO News: Switchers

- ▶ [QTUM to NEO] THEKEY, a Decentralized Ecosystem of Identity Verification Tool Using National Big-data and [NEO] Blockchain
https://www.reddit.com/r/NEO/comments/7areac/ama_on_9th_nov_thekey_a_decentralized_ecosystem/
- ▶ [Blockchain agnostic strategy] Jibrel Network founder looking to switch from Ethereum to NEO
<https://imgur.com/oHYTYi2>
- ▶ [ETH to NEO] Guardian Circle announce switch to NEO platform
<https://neonewstoday.com/general/guardium-announce-switch-to-neo-platform/>
"...the more we dug into NEO, the more we realized that they had really great answers to every one of our concerns with Ethereum and many additional benefits that are unique to the NEO ecosystem."
- ▶ [ETH to NEO] Narrative project: Big News: KYC and Our Switch to NEO
<https://blog.narrative.network/big-news-kyc-and-our-switch-to-neo-2f34215beef9>
- ▶ [ETH to NEO] Concierge.io NEO Token Sale
<https://medium.com/@concierge.io/concierge-io-neo-token-sale-f870a0a27b04>
- ▶ [ETH to NEO] IMPORTANT NEWS FOR THE WOWOO COMMUNITY
http://wowoonet.com/news.html#news_2018_6
- ▶ [ETH to NEO] Three things to consider when choosing a blockchain for your project—or why Veris chose NEO.
<https://medium.com/verisfoundation/three-things-to-consider-when-choosing-a-blockchain-for-your-project-or-why-veris-chose-neo-b4483135c382>



A Decentralized Ecosystem of
An Identity Verification Tool
Using National Big-data and Blockchain

GUARDIUM

Decentralized 9-1-1



NARRATIVE



Wowoo

Create Inspiring Value with Wowoo!
Wowoo is the service platform which is designed to create value
towards inspiring contents using the Wowoo tokens.

What is NEO?

Summary

For large scale decentralized applications, transaction cost, transaction time (including confirmations) is a big obstacle and restriction to possible business models.

NEO is built for large scale dApps and is free to use for the end user. Fees (GAS) are instead charged for deploying contracts and registering assets.

Transaction volume is not an issue with 1000TPS+ on main chain and plenty off-chain scaling possibilities.

NeoX will make the NEO ecosystem quite unique. NEO contain the public ledger for digital assets, identity and smart contracts.

NEO Resources: Videos and Webcasts

- ▶ The New Vision - Da Hongfei
<https://www.youtube.com/watch?v=th7jZlmoZBc>
- ▶ Malcolm Lerider: Clarification on NEO, GAS and Consensus Nodes
<https://www.youtube.com/watch?v=iV4WREWtCil>
- ▶ A Deep Dive into NeoVM & NeoContract [English Subtitles]
<https://www.youtube.com/watch?v=fLppte-guYE>
- ▶ NEO Persistable Classes (NPC) e-dApp Smart Contract Platform 2.0: Deep Dive
<https://www.youtube.com/watch?v=Nj4-m2o94VE>

NEO Resources

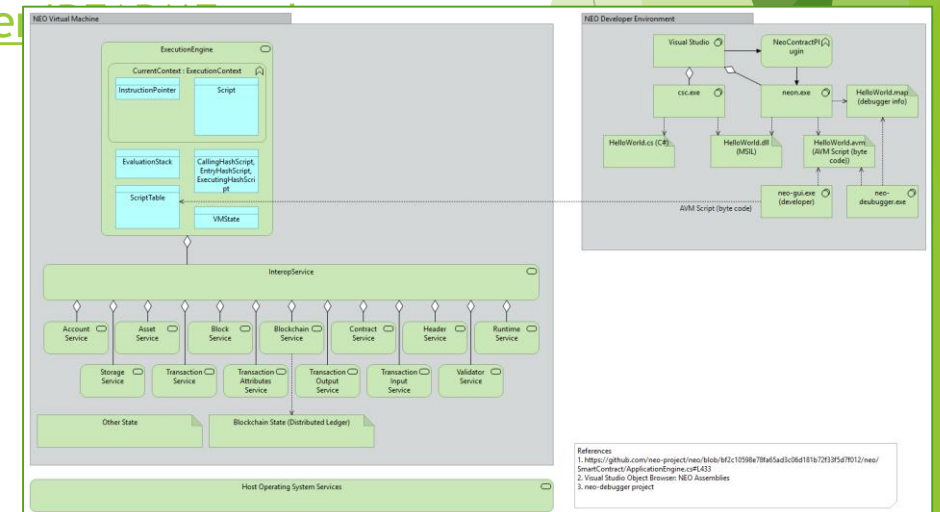
General

- ▶ NEO.org
<http://neo.org>
- ▶ NEO Tutorials (C#, Java, Python), API docs
<http://docs.neo.org>
- ▶ NEO Devcon “The New Vision” Keynote by NEO Founder
https://www.youtube.com/watch?time_continue=3&v=th7jZlmoZBc



Developers

- ▶ N NEO C# Developers Center of Excellence (neo-csharpcoe)
<https://github.com/mwherman2000/neo-csharpcoe/blob/master>
- ▶ Discord NEO Community (like Slack)
<https://discord.gg/gqCYeup>
- ▶ The NEO Project
<https://github.com/neo-project>
- ▶ City of Zion **awesome-neo** project: Developer Docs
<https://github.com/CityOfZion/awesome-neo/#developer-documentation>



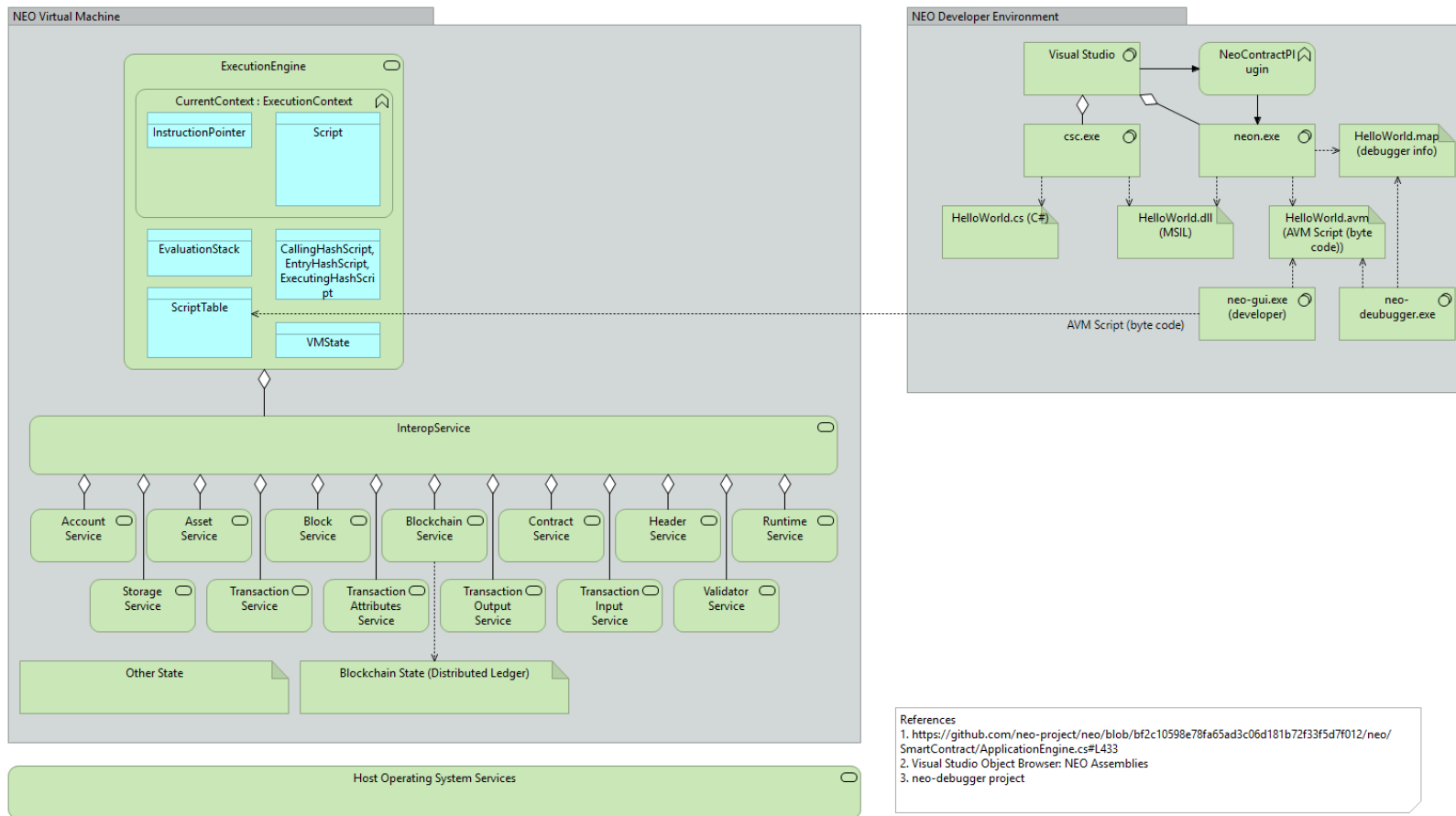
NEO Blockchain C# Developers Center of Excellence

<https://github.com/mwherman2000/neo-csharpcoe>

- ▶ Founder: Michael Herman (neotoronto@outlook.com)
- ▶ NEO Blockchain end-to-end, detailed guidance for .NET developers
- ▶ Content purposely designed to help .NET developers ramp up and become productive more quickly
- ▶ Repository for content presented at the Bitcoin North meetup group
- ▶ Contents
 - ▶ NEO Blockchain Quick Start Guide for .NET Developers
<https://github.com/mwherman2000/neo-windocs/tree/master/windocs/quickstart-csharp/README.md>
 - ▶ NEO Blockchain Architecture Reference Model (ARM) for .NET Developers (neo-charm)
<https://github.com/mwherman2000/neo-windocs/blob/master/windocs/neo-charm/README.md>
 - ▶ NEO Blockchain Toronto
<https://github.com/mwherman2000/neo-windocs/tree/master/events/2018-neo-blockchain-toronto>

NEO Blockchain Architecture Reference Model (ARM) for .NET Developers (neo-charm)

<https://github.com/mwherman2000/neo-charm/blob/master/README.md>



I leave you with a challenge...
Become part of the NEO Smart Economy

**TOKENIZE
EVERY LITTLE THING
#ELT**

hyperonomy.com - digital intelligence (my blog)

<https://hyperonomy.com/2018/01/24/tokenization-of-every-little-thing-elt/>

Happy St.
Patrick's Day
Neoxplorers!



Questions?

Thank you for coming out this evening