

# WEB 7.0 DIDCOMM-ARM

## DIDCOMM AGENT ARCHITECTURE REFERENCE MODEL 0.45

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MICHAEL HERMAN

SELF-SOVEREIGN BLOCKCHAIN ARCHITECT, DEVELOPER, AND FUTURIST

TRUSTED DIGITAL WEB

HYPERONOMY DIGITAL IDENTITY LAB

PARALLELSPACE CORPORATION



# WEB 7.0 DIDCOMM-ARM IN 20 MINUTES

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# First Principles Thinking

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“Sometimes called “reasoning from first principles,” the idea is to break down complicated problems into basic elements and then reassemble them from the ground up. It’s one of the best ways to learn to think for yourself, unlock your creative potential, and move from linear to non-linear results.”

*First Principles: The Building Blocks of True Knowledge*

(<https://fs.blog/2018/04/first-principles/>)

“I think it is most important to reason from first principles rather than by analogy. One of the ways we conduct our lives is we reason by analogy. We do this because something was like something else that was done or it was like what other people were doing. It’s mentally easier to reason by analogy rather than from first principles.”

*First Principles Method Explained by Elon Musk*

(<https://www.youtube.com/watch?v=Nv3sBlRgzTI>)

MICH  
SELF-SO  
HYPERO  
PARALLE  
ALBERTA

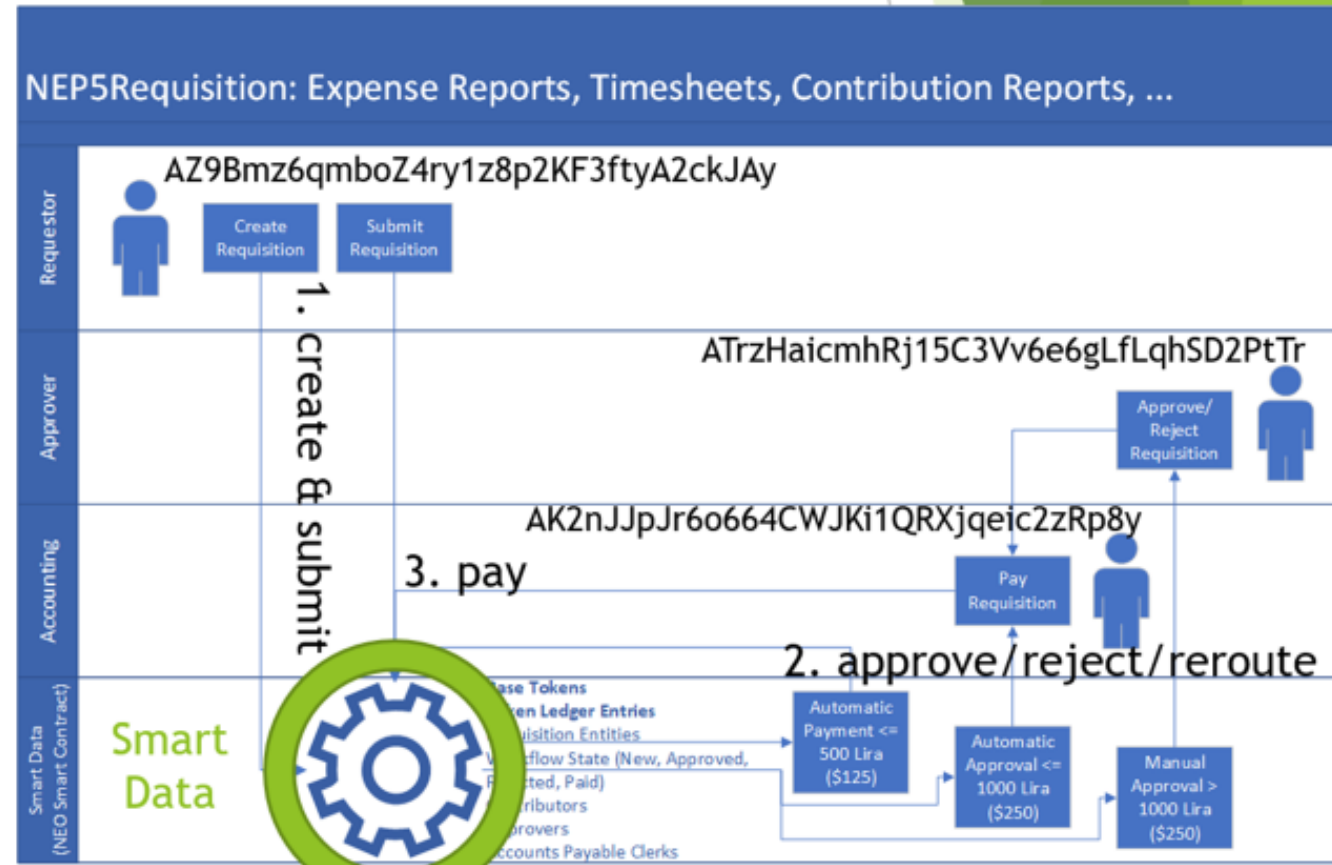
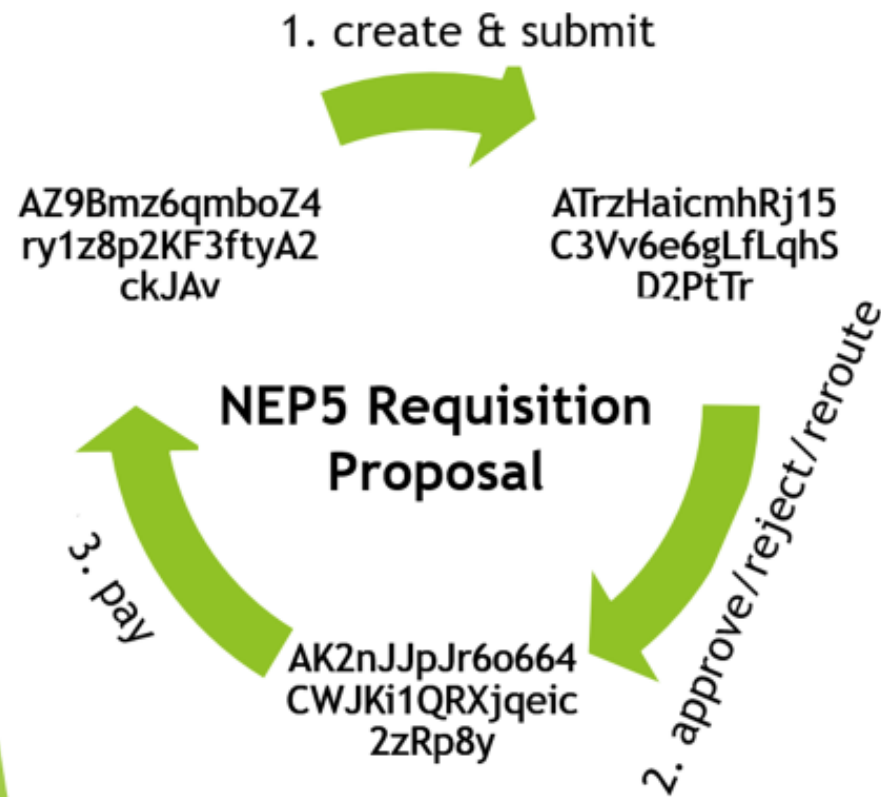
Ranchv

2W4

2023-01-11

# Think Deeply about the Smart Economy

“Future world where the boundary between real assets in the physical world and digital assets in the digital world has been removed.”  
[Malcolm Lerider]



# AGENDA

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1. Introduction / Overview
2. What is DIDComm? (DIDComm Messaging and DIDComm Agents)
3. DIDComm Notation
4. DIDComm Architecture Reference Model (DIDComm-ARM)\*
5. What is Web 7.0?\*
6. Web 7.0 and Web5: Comparison
7. Conclusions / Next Steps / Call to Action\*

*The Web 7.0 Architecture Whitepaper (#web7, @web7arch)*

# DIDComm Agent Architecture Reference Model (DIDComm-ARM)

*A Design Guide for Software Architects and Developers*

Version 0.28 – December 12, 2022

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Trusted Digital Web  
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Parallelspace Corporation

Alberta, Canada

[mwherman@parallelspace.net](mailto:mwherman@parallelspace.net)

# GOALS

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*A guide for software architects and developers designing and building DIDComm Agent-based systems*

- Better understanding of the active components of DIDComm Agent-based software systems and how these components rely on and interact with each other,
- Introduce a new graphical modeling language, DIDComm Notation, to aid architects and developers in visualizing new architectures and designs for DIDComm Agent-based software systems, and
- Describe a layered architecture reference model, DIDComm-ARM, to help guide the design and creation of the broadest range of DIDComm Agent-based software systems possible.

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## APPENDIX D – COPYRIGHT, TRADEMARKS, AND LICENSES

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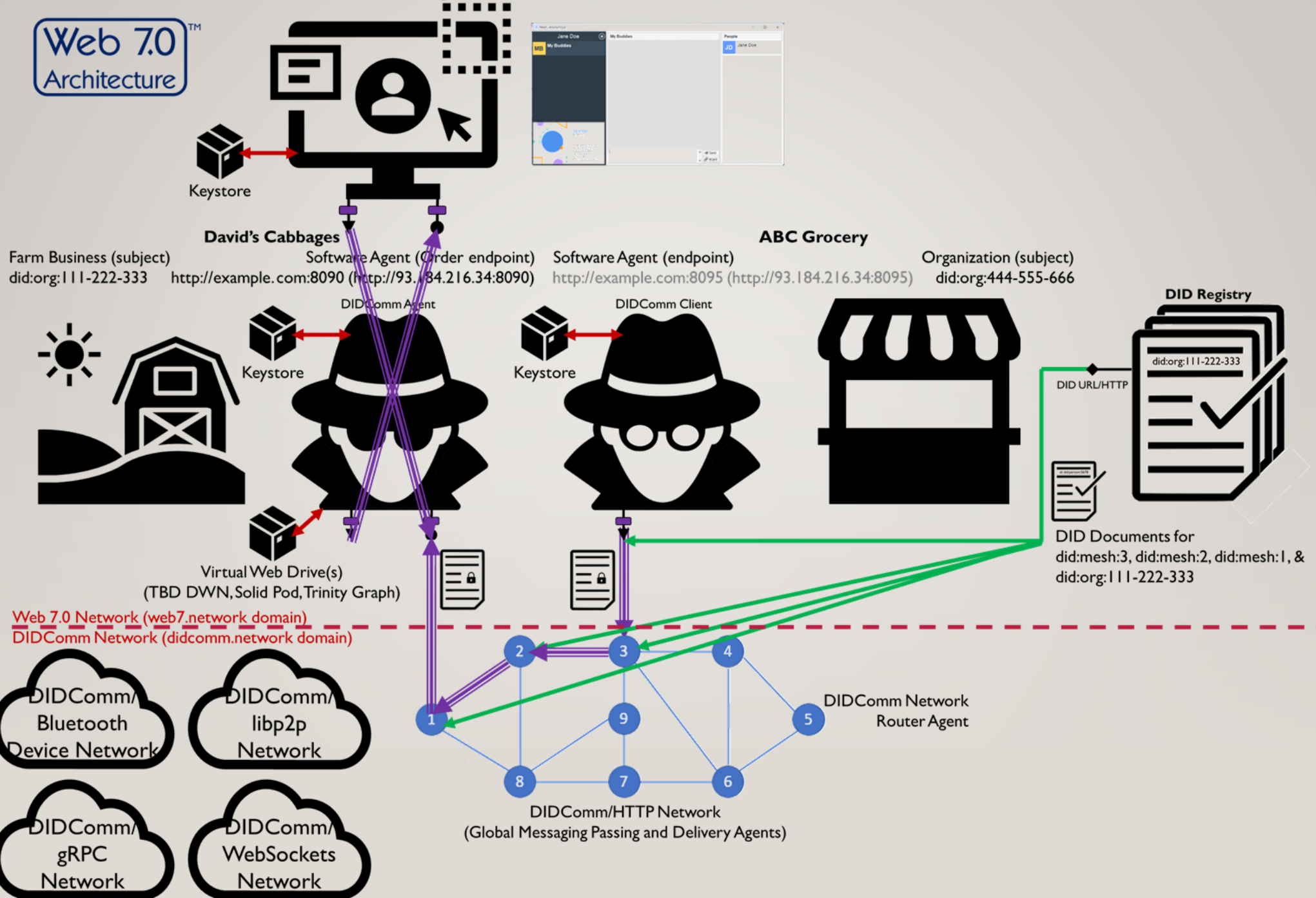
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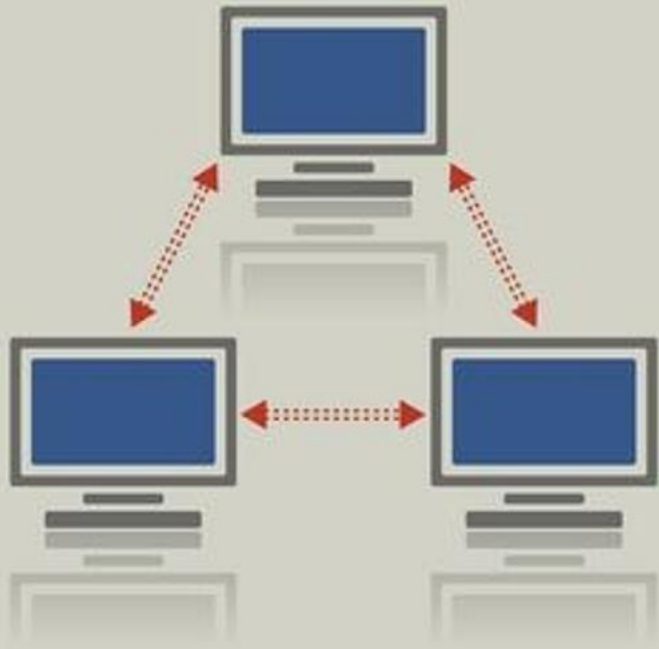
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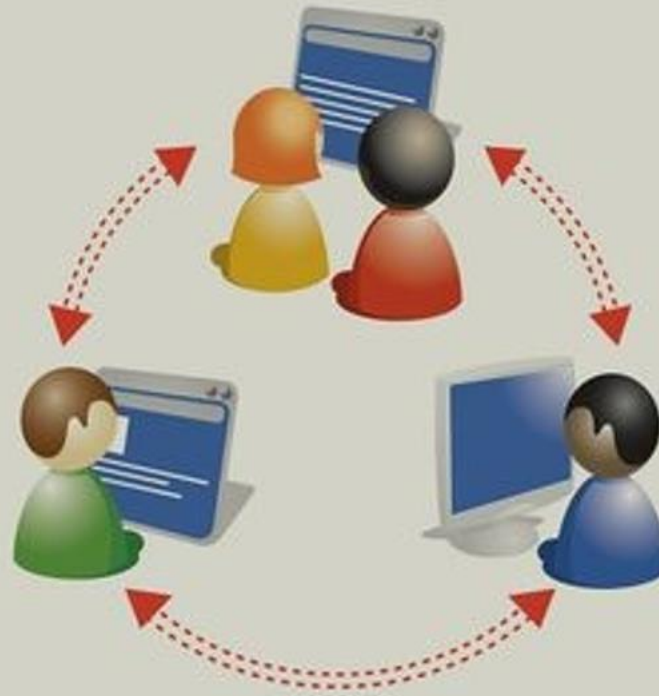
*This whitepaper is neither a W3C, DIF, Sovrin Foundation, nor ToIP publication - unofficial, official, or otherwise.*

# Web 7.0<sup>TM</sup> Architecture

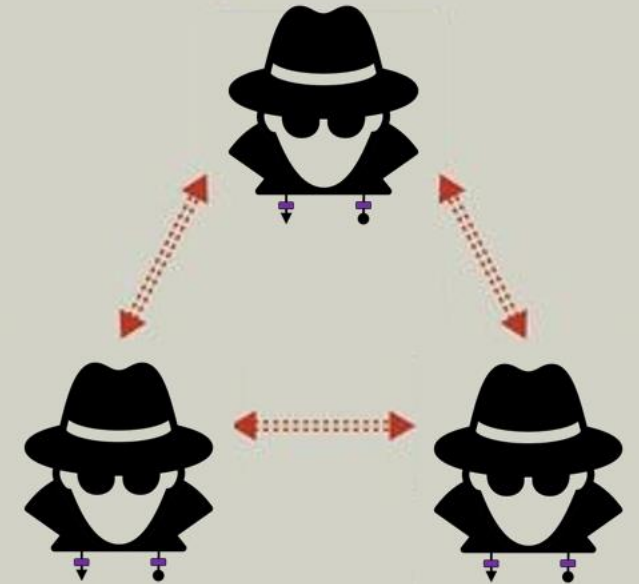




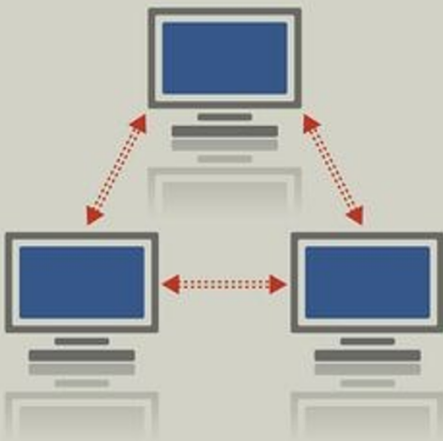
The Internet: Connecting Devices using a  
Global Communications Network



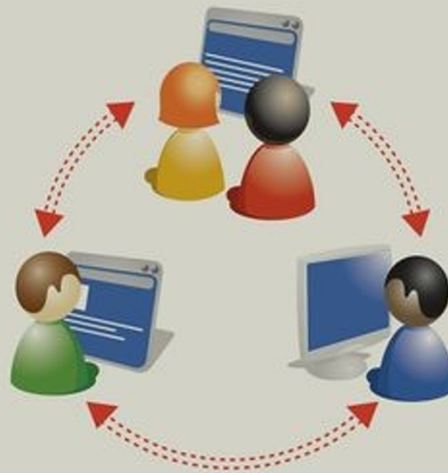
Web 2.0/3.0: Connecting People to  
Centralized Web Sites (and Email Servers)



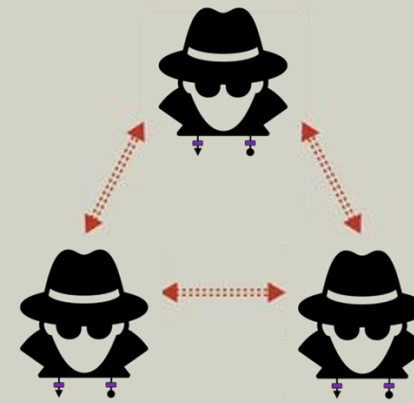
Web 7.0: Connecting Individuals to Each Other  
via their Trusted Personal Agents



The Internet: Connecting Devices using a Global Communications Network



Web 2.0/3.0: Connecting People to Centralized Web Sites (and Email Servers)



Web 7.0: Connecting Individuals to Each Other via their Trusted Personal Agents

### Web 2.0/3.0

Connecting People to Centralized Web Sites & Services

Web Browsers

Web Servers

HTTP

Web Pages

Web Data

### Web 7.0

Connecting Individuals to Each Other via their Trusted Personal Agents

DIDComm

Agents

DIDComm  
Messages

DIDs

DID Registry

VCs

### Devices

Smart Phones

Personal Computers

Big Servers

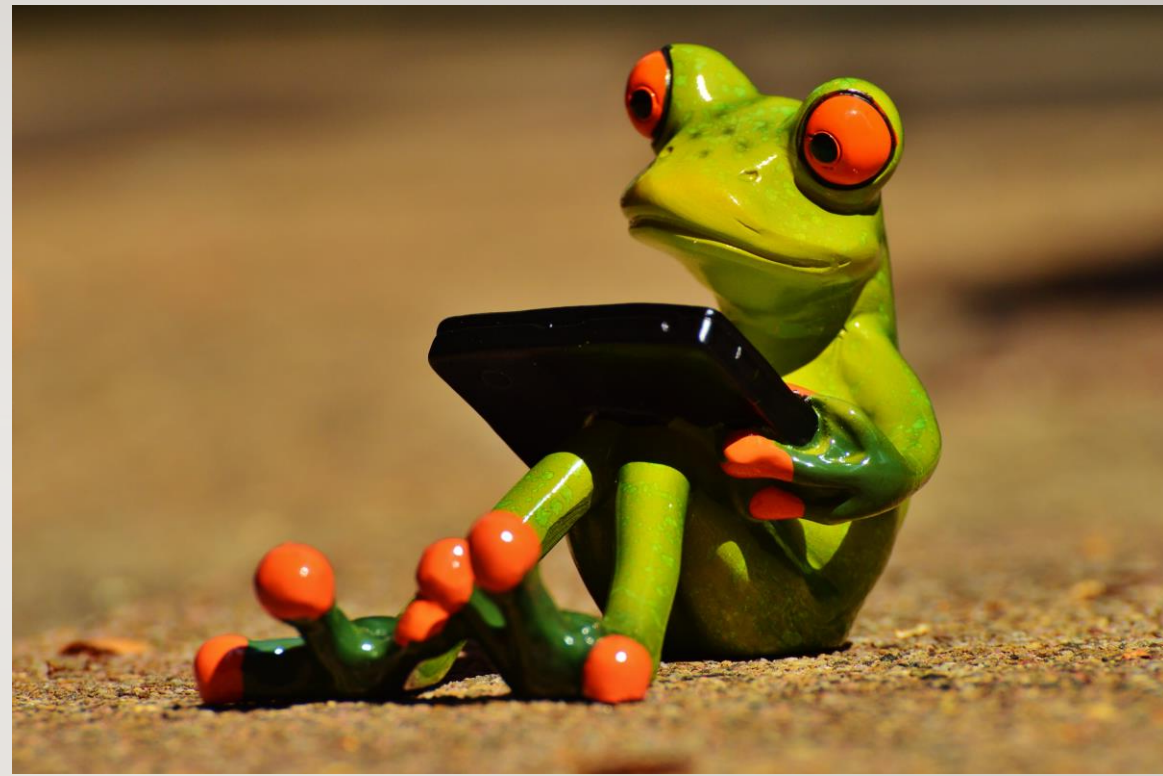
IoT Devices

### Internet

Connecting Devices using a Global Communications Network

# MEET FREDDY

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# WHAT IS DIDCOMM MESSAGING?

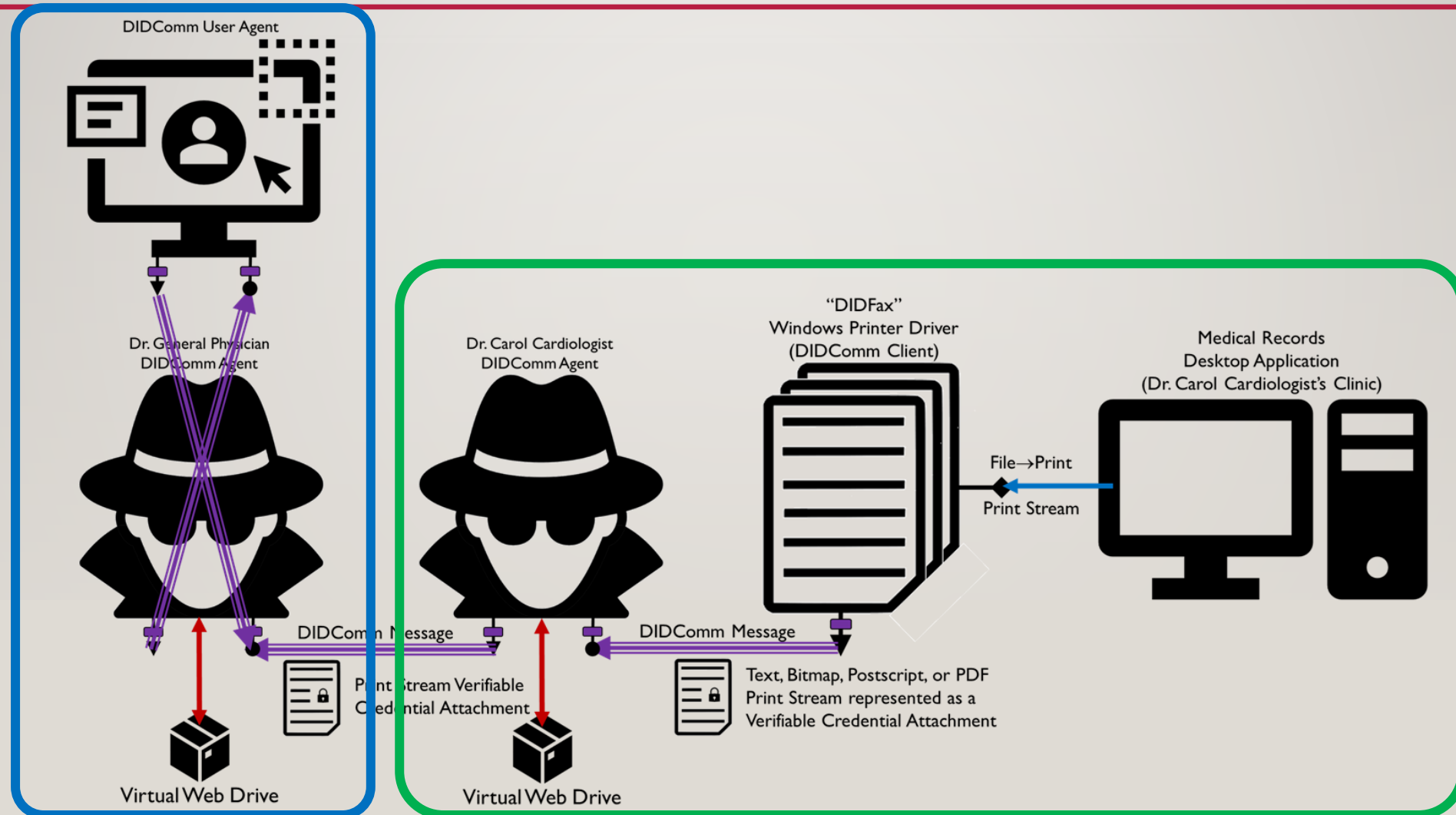
## DECENTRALIZED IDENTIFIER COMMUNICATIONS

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- *Communications methodology that works with the decentralized design of DIDs to provide private, secure interaction.*
- *DIDComm defines how messages are composed into application-level protocols and workflows.*
- *Just as DIDs are a foundational element of decentralized identity by providing non-revocable identifiers, DIDComm provides secure communication between parties based on the service endpoints and keys present in a DID Document.*

# DIDCOMM AGENT USE CASE

## “DIDFAX” WINDOWS PRINTER DRIVER



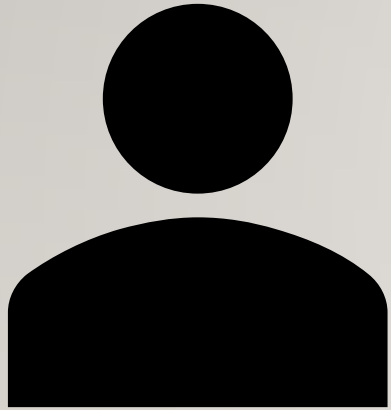
# DIDCOMM NOTATION

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- Web 7.0 graphical modeling language for designing and visualizing DIDComm Agent-based software systems.
- Focused on the needs of software architects and developers with a desire to design and build DIDComm Agent-based software systems.
- DIDComm Agent-based software systems, in turn, are comprised of a networked graph of cooperating software clients, agents, and supporting services that exchange application and platform-level messages based on the DIDComm Messaging specification.

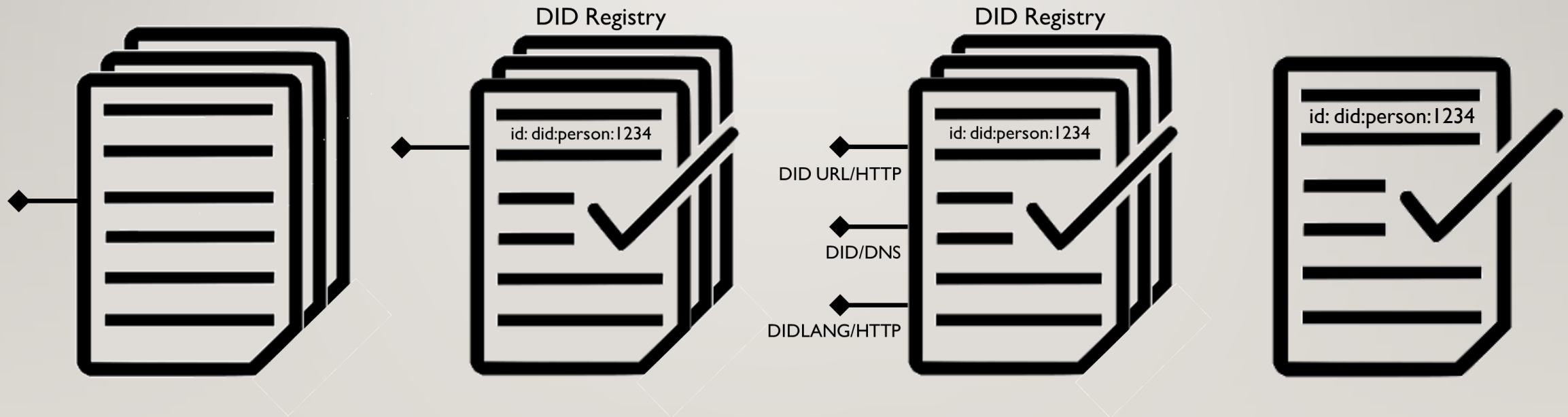
# DIDCOMM NOTATION: ACTORS

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# DIDCOMM NOTATION: SERVICES, DID REGISTRY, AND DID DOCUMENTS

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**PDF**



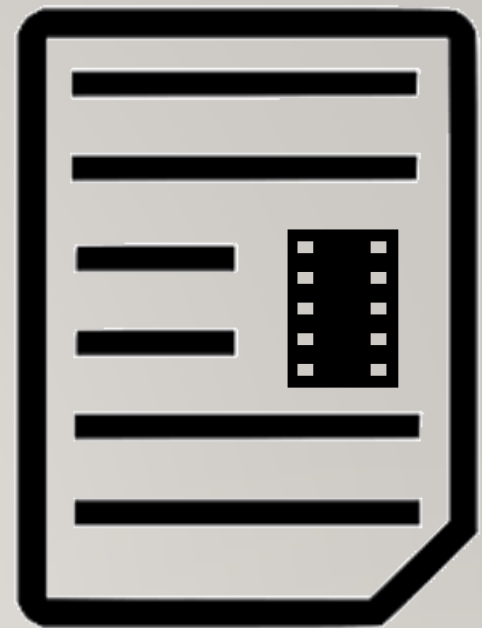
**X.509**



**mDL**







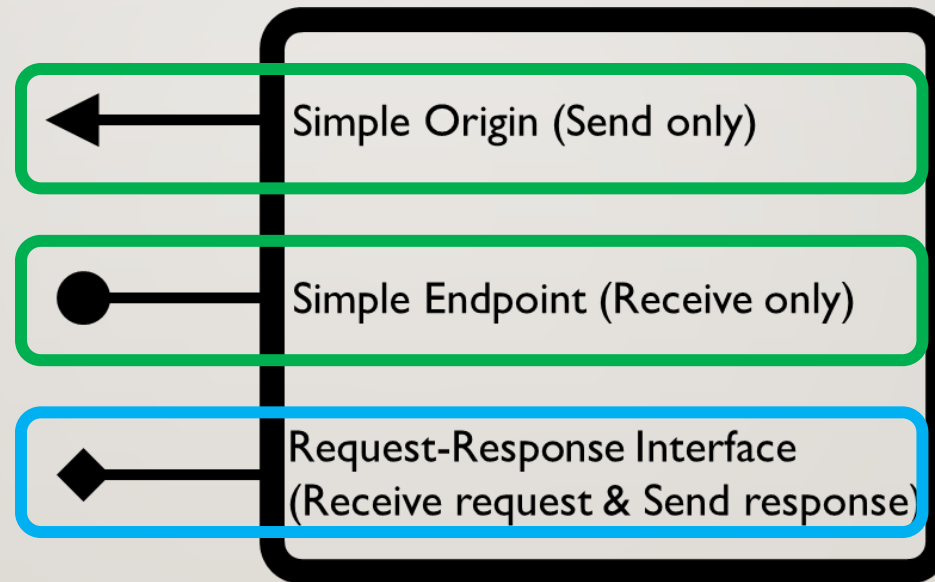
# DIDCOMM NOTATION: VERIFIABLE CREDENTIAL (DIDCOMM MESSAGE ATTACHMENT)

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# DIDCOMM NOTATION: ORIGIN INTERFACES AND ENDPOINT INTERFACES

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# DIDCOMM NOTATION: REST/HTTP CLIENTS AND REST/HTTP AGENTS

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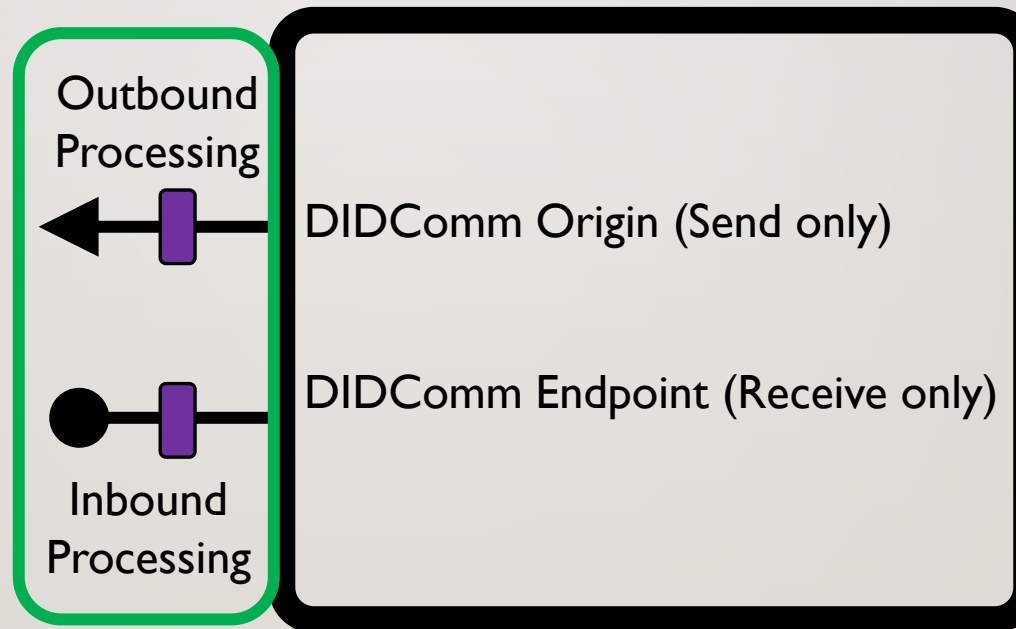
# DIDCOMM NOTATION: DIDCOMM CLIENTS AND DIDCOMM AGENTS

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# DIDCOMM NOTATION: DIDCOMM ORIGIN AND ENDPOINT INTERFACES

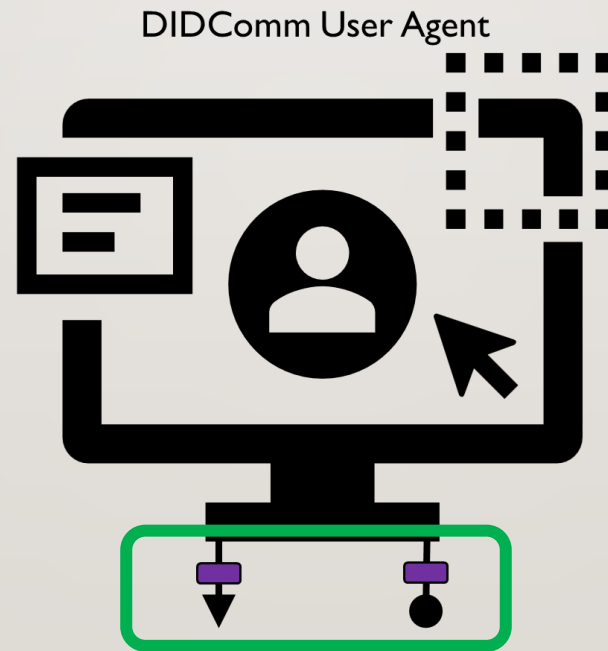
## OUTBOUND PROCESSING & INBOUND PROCESSING



# DIDCOMM NOTATION

## DIDCOMM USER AGENT

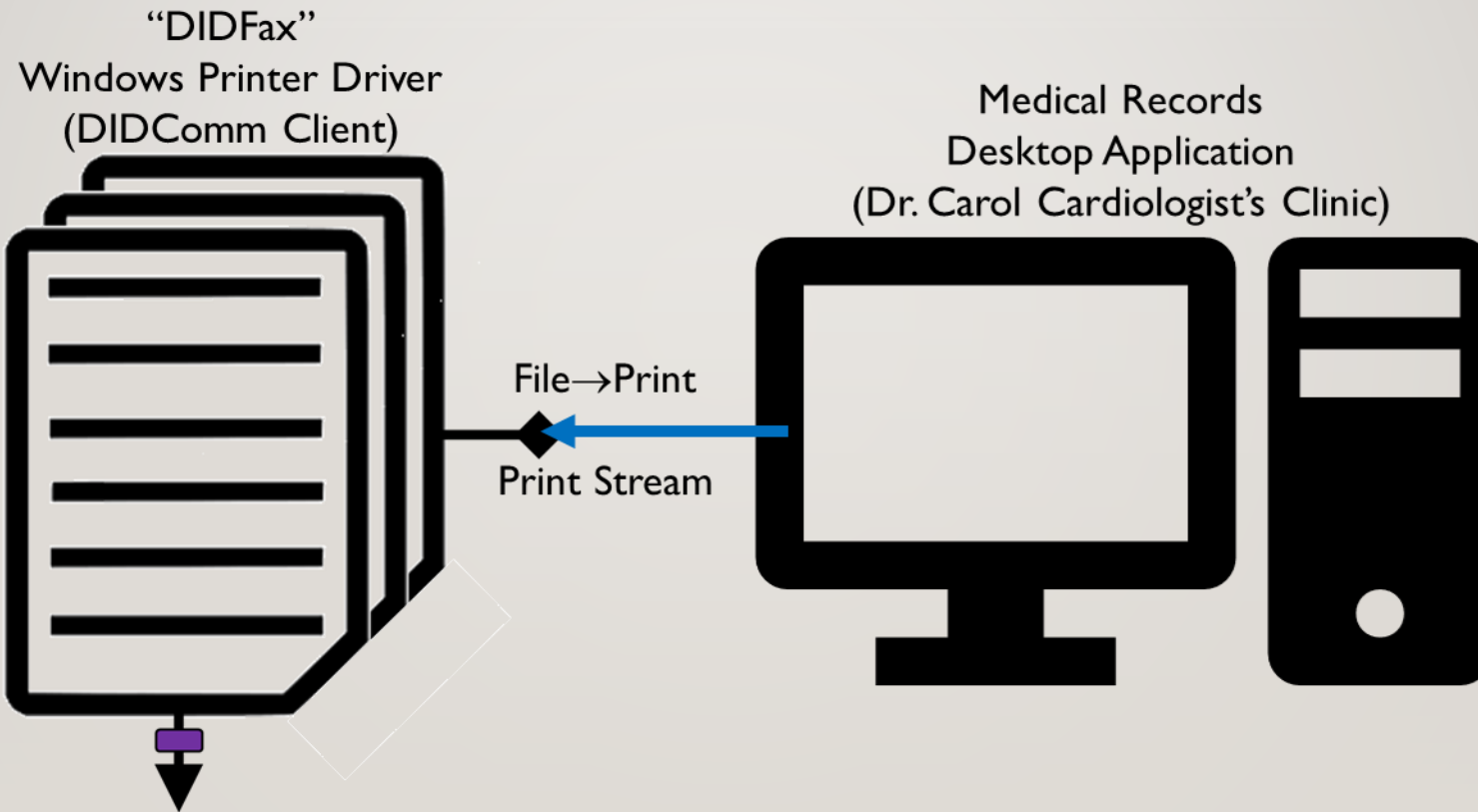
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# DIDCOMM NOTATION

## DIDCOMM AGENT GATEWAY

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# QUESTIONS?

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# DIDCOMM AGENT ARCHITECTURE REFERENCE MODEL (DIDCOMM-ARM)

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DIDComm-ARM Feature Matrix

DID Addressable Agents

Yes	Layer 1	Layer 2	Layer 6 Web 7.0 Model	
			Layer 3	Layer 4
Layer 5 DIDComm User Agent Model				
No	Layer 0	n/a	n/a	n/a
	REST/HTTP	DIDComm Messaging	DIDComm Messaging w/Attach	DIDComm Agent Mesh Networks

Message Passing Protocol

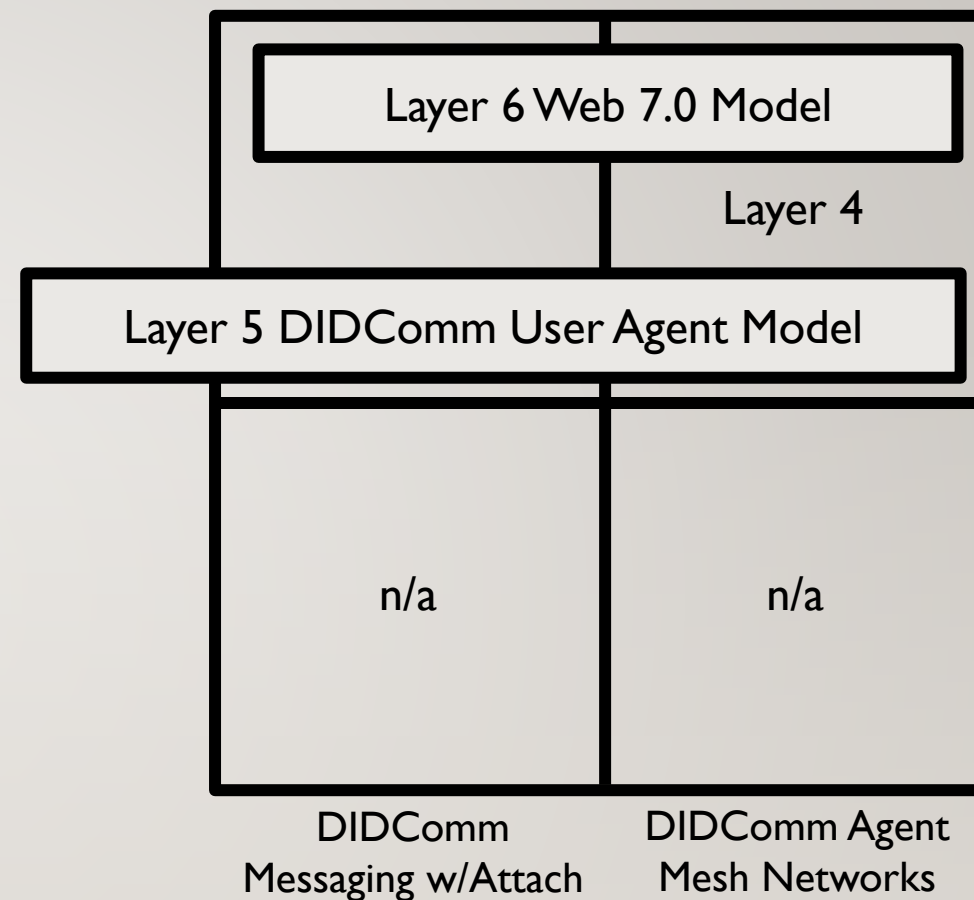
DID Addressable Agents

## DIDComm-ARM Core Layers

Yes	Layer 1	Layer 2	Layer 3
No	Layer 0	n/a	n/a
	REST/HTTP	DIDComm Messaging	DIDComm Messaging w/Attach

Message Passing Protocol

## DIDComm-ARM Web 7.0 Layers



# WEB 7.0 DIDCOMM-ARM WHITEPAPER

## Part 1

### DIDComm Notation

- Layer 0 REST/API Agents & Clients
- Layer 0 Origins & Endpoints
- Layer 1 DID Registries
- Layer 2 DIDComm Agents & Client
- Layer 2 Origins and Endpoints
- Layer 3 Verifiable Credentials
- Key Actors

### DIDComm-ARM Overview

- Layer 0
- Layer 1
- Layer 2
- Layer 3
- Layer 4

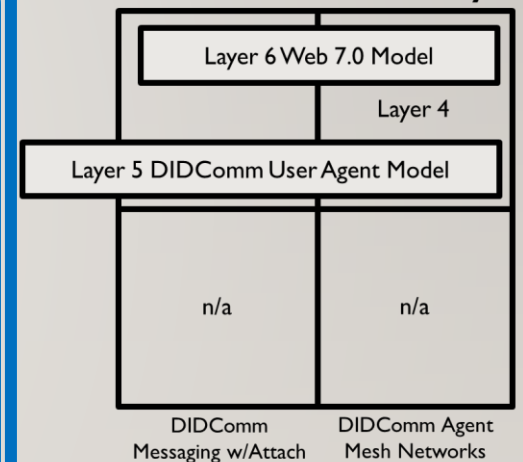
## Part 2

### DIDComm-ARM Core Layers

DID Addressable Agents	Yes	Layer 1	Layer 2	Layer 3
	No	Layer 0	n/a	n/a
		REST/HTTP	DIDComm Messaging	DIDComm Messaging w/Attach

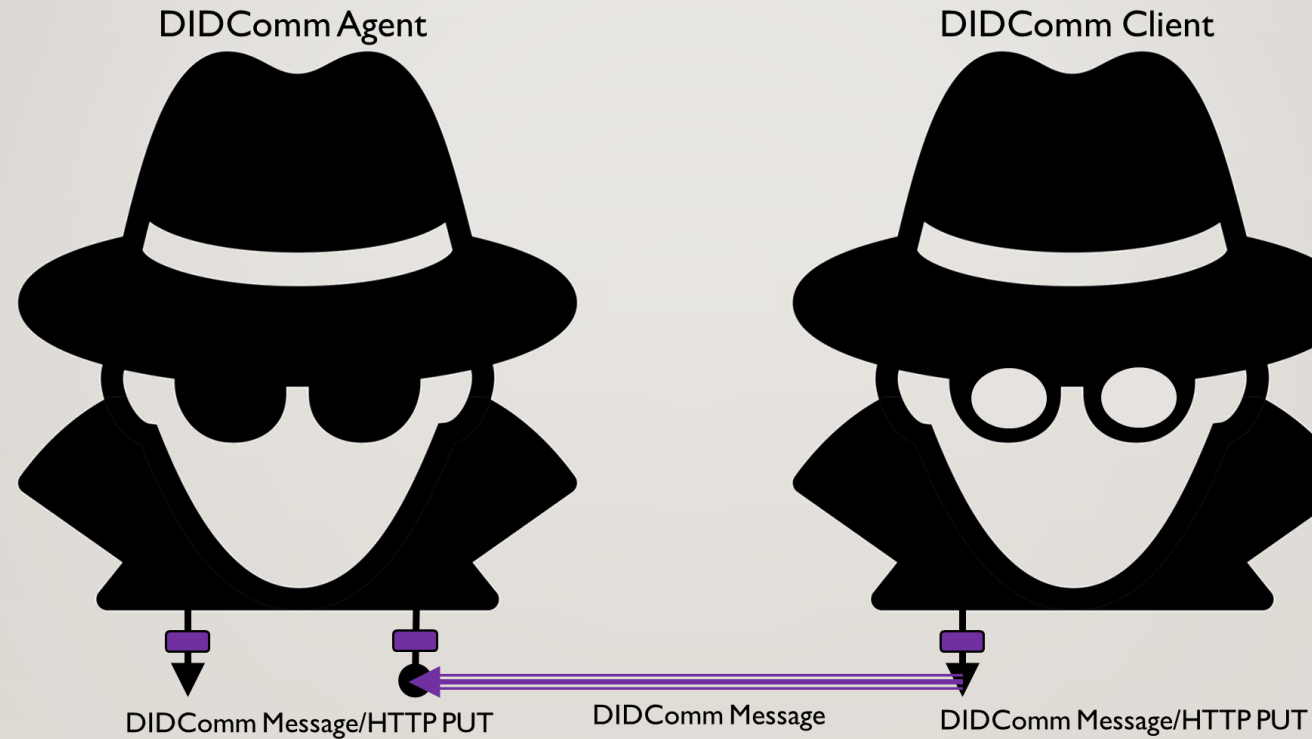
Message Passing Protocol

### DIDComm-ARM Web 7.0 Layers



# LAYER 2 DIDCOMM AGENT MODEL SCENARIOS

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# LAYER 2 DIDCOMM AGENT MODEL SCENARIOS

## David's Cabbages

Farm Business (subject)

Software Agent (Order endpoint)

DIDComm Agent



DIDComm Message/HTTP PUT

<http://example.com:8090>  
(<http://93.184.216.34:8090>)

[did:org:111-222-333](https://did.org/111-222-333)

## ABC Grocery

Software Agent (endpoint)

Organization (subject)

DIDComm Client



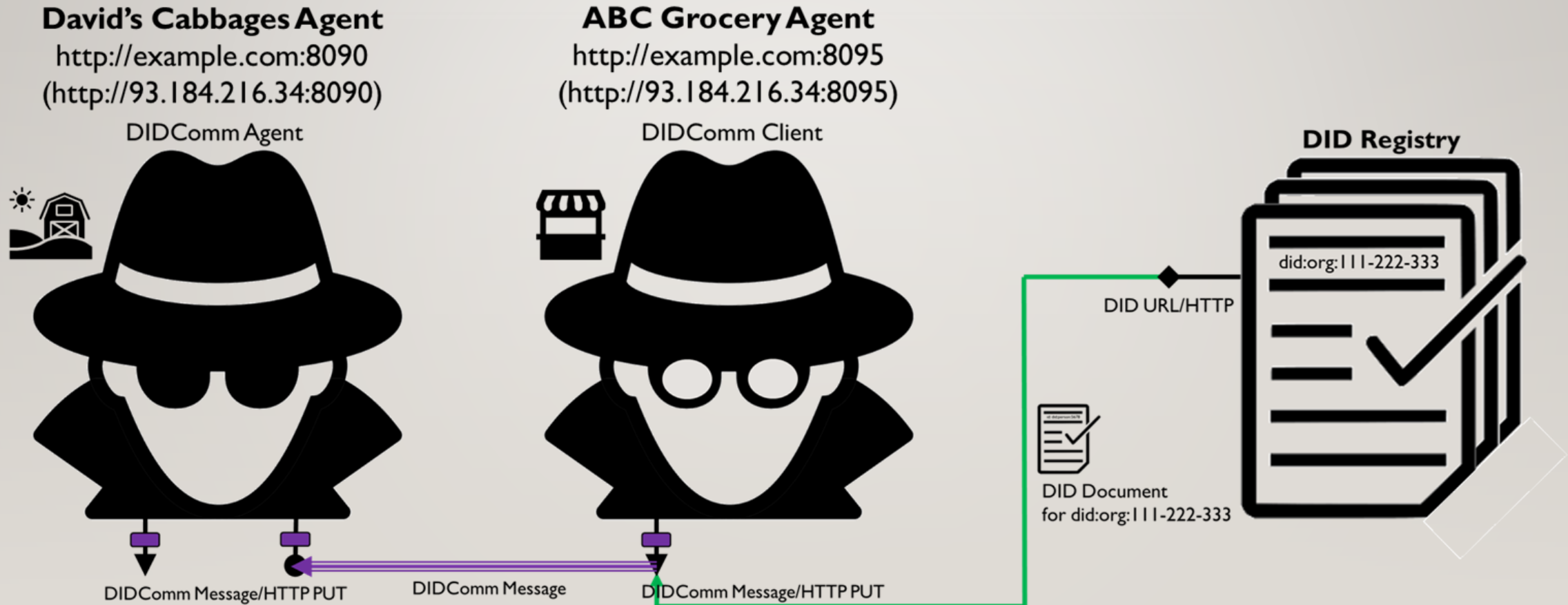
DIDComm Message/HTTP PUT

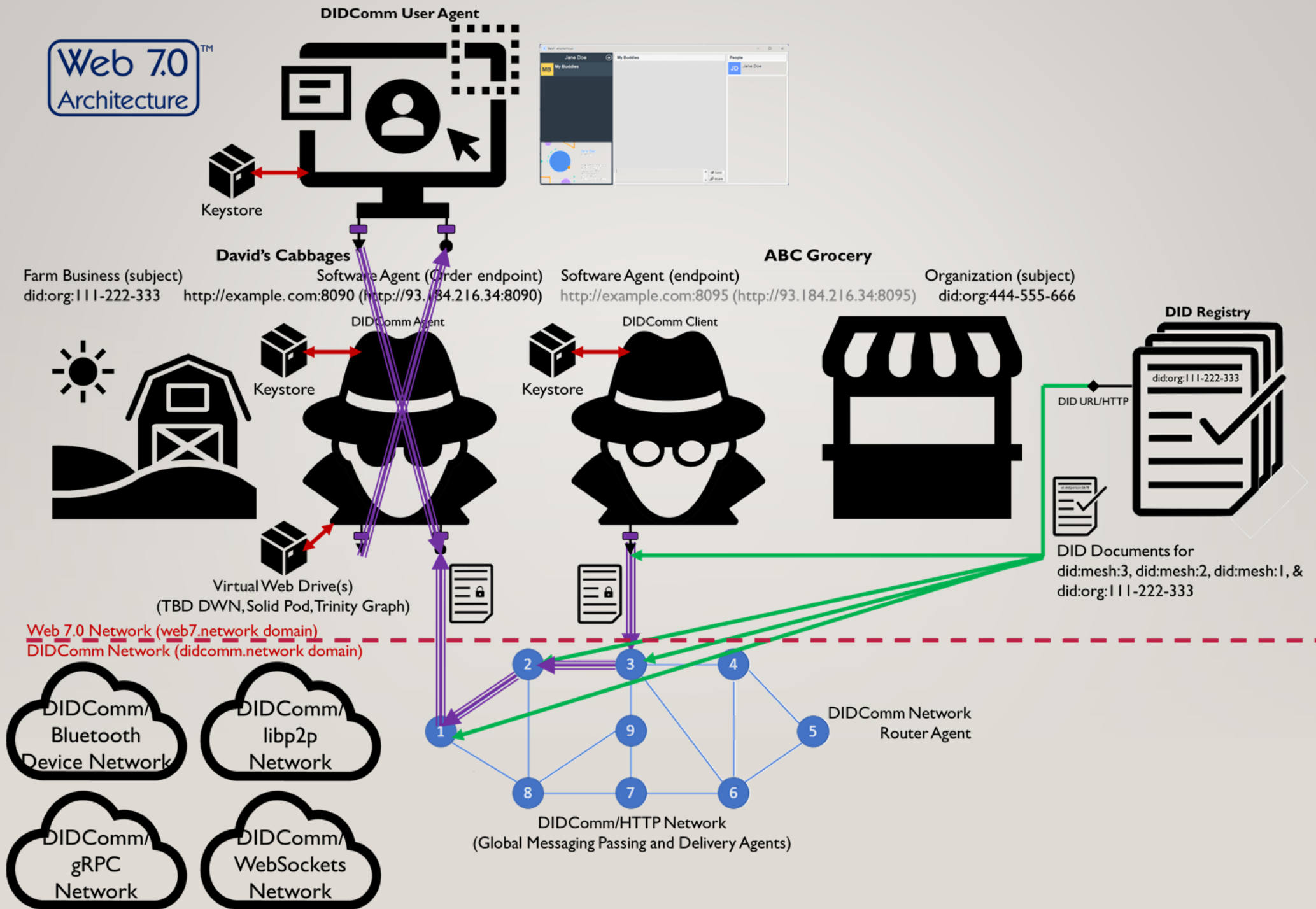
<http://example.com:8095>  
(<http://93.184.216.34:8095>)

[did:org:444-555-666](https://did.org/444-555-666)

DIDComm Message

# LAYER 2 DIDCOMM AGENT MODEL SCENARIOS





# QUESTIONS?

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# WHAT IS WEB 7.0?

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Web 7.0 DIDComm-ARM (6-layer model)

Web 7.0 Body of Knowledge (10+ volumes)

Web 7.0 Versions

Web 7.0 Distributions

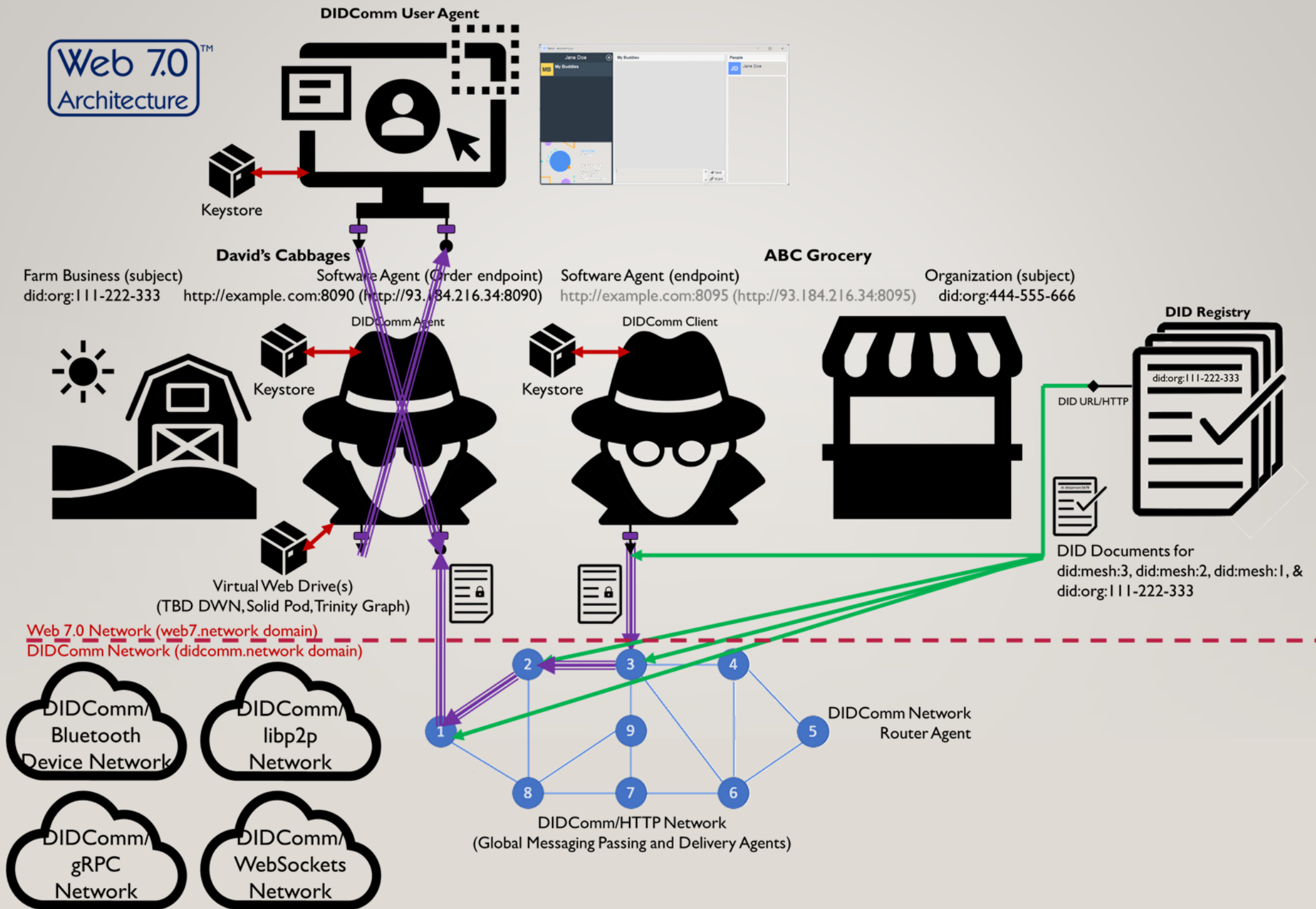
DID-DOS 7.0

# WHAT IS WEB 7.0?

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*Web 7.0 is a unified software and hardware ecosystem for building trustable systems using decentralized identifiers, DIDComm agents, and verifiable credentials.*

*Take what you need; leave the rest.*



# GLOBAL SCOPED AND SCALED APPLICATIONS

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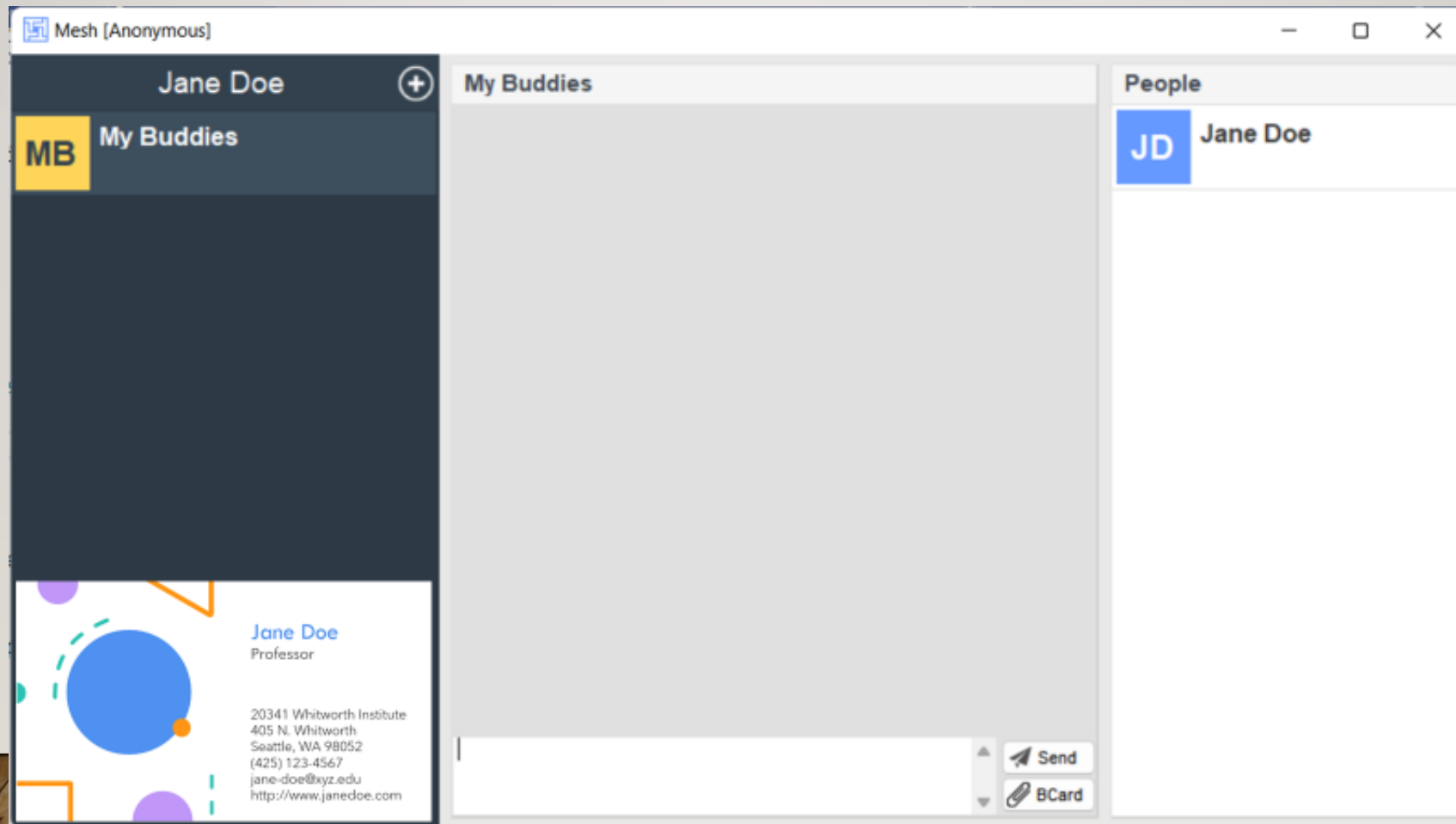
Create a unified decentralized solution whose scope includes:

- a) Global Air Traffic Control #ATC
- b) Aircraft Crew Scheduling #CrewSched
- c) Baggage Handling, Tracking #BagBash
- d) Passenger Ticketing, Seating, Credentialing #PTSC
- e) Food and Beverage Service #FoodBev



# LAYER 5 DIDCOMM USER AGENT MODEL

## GROUP COLLABORATION/CHAT REFERENCE APP



## Pick a Ledger...

## Subledgers

- Erin Anderson 2
  - Deleted Items (16)
  - Drafts (3)
  - Inbox [4]
    - Customers
    - Everett
    - Internal
    - W/bidh...

## Troubleshooting

## Master Secrets

## Key Rings

## Wallets

## Authorizations

## VDR: Identifiers

## VDR: Service Endpoints

## VDR: Revocation List

## VDR: Ledgers

## VDR: Accounts

## VDR: Smart Contracts

## Inbox

Arranged By: Date		Newest on top
✉	Michael Harsh Butter for your PDC talk	Mon 3/15
✉	Mark Boulter Some_more_information on your PDC ...	Fri 10/17
✉	Mike Henderlight Perf numbers looking great	Thu 10/16
✉	External Caller (RED-UMS-05) Voice Mail Message (2062267972) (2 mi...	Wed 10/15
✉	Mike Harsh PDC Demonstration	Tue 10/14
✉	Mark Rideout RE: PDC Preview	Tue 10/14
✉	Mark Rideout RE: Data Talk	Tue 10/14
✉	Mark Boulter RE: Data Talk	Tue 10/14
✉	Iain Heath RE: Data Talk	Tue 10/14
✉	Steve Lasker RE: Sync out PDC Talks	Tue 10/14
✉	Simon Muzio Are you leaving Sunday?	Tue 10/14
✉	Erick Ellis RE: Office Look and Feel in ToolStrip	Tue 10/14
✉	Shawn Burke Latest bits for my talk?	Tue 10/14

## Butter for your PDC talk

Michael Harsh

You have not responded to this message

To: Erin Anderson

Cc:

Dude - here's an idea for you - pretend to show the real Outlook and instead show the Outlook 11 Windows Forms app.

That would be the bizomb.

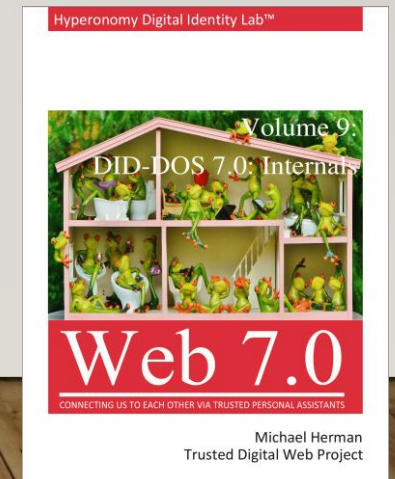
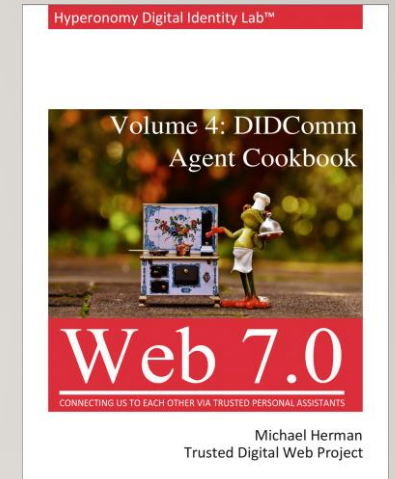
Mike

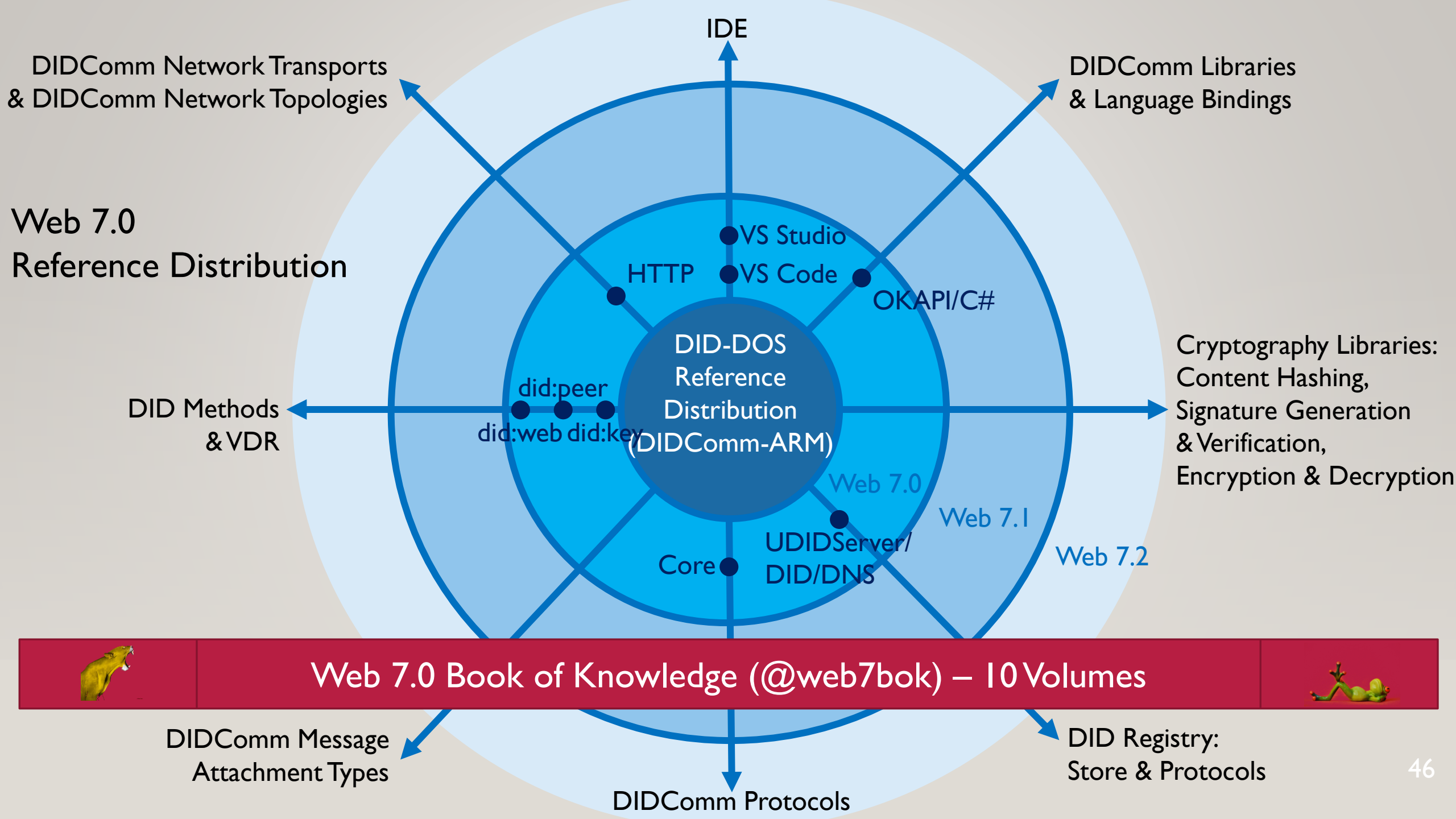
# WEB 7.0 BO

# EB7BOK)



Michael Herman  
Trusted Digital Web Project





# WEB 7.0 ALWAYS-ON DIDCOMM AGENT “DIDCOMM AGENT APPLIANCE”

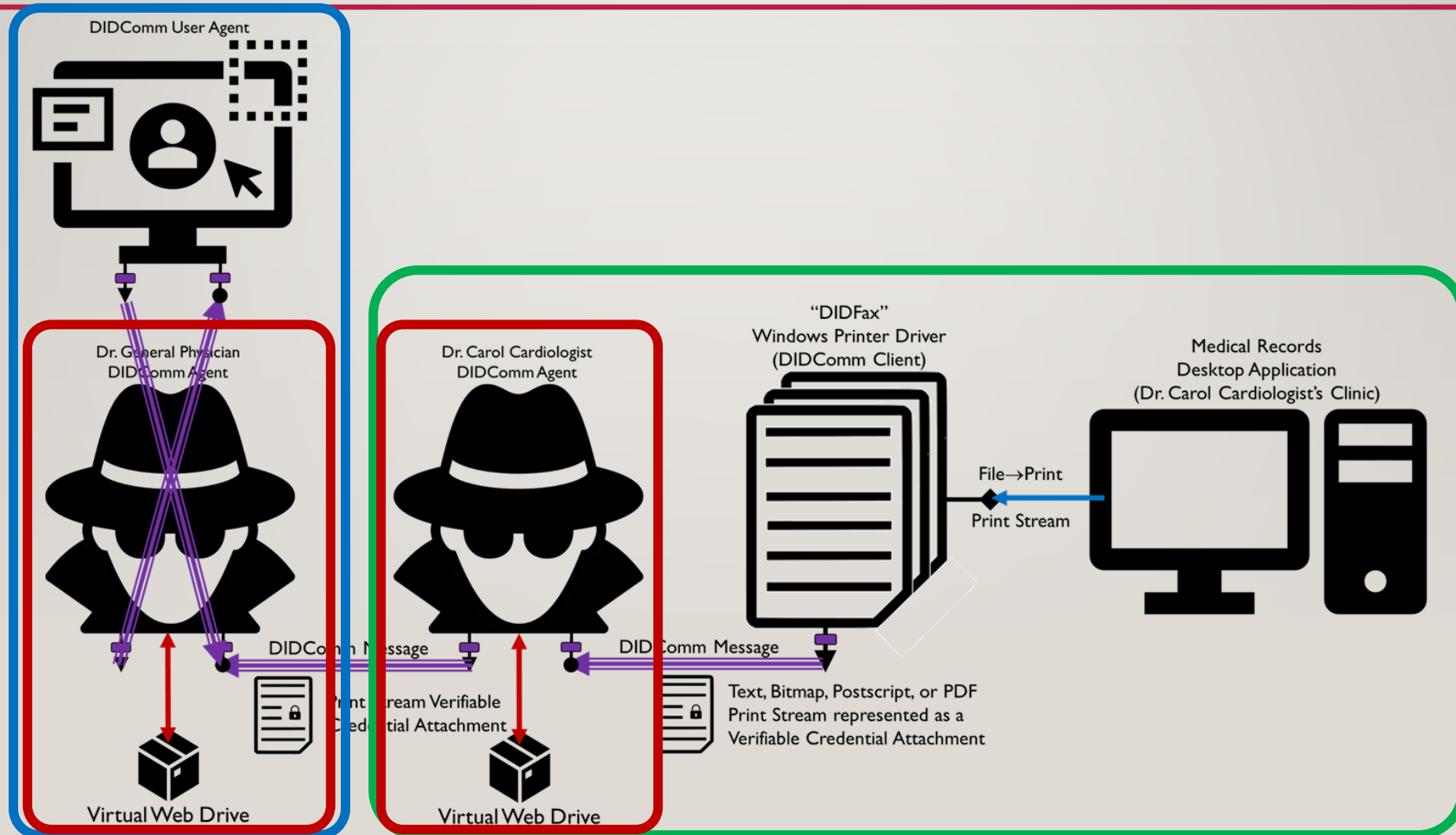
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## REFERENCE DEVELOPER HARDWARE

- SNAPDRAGON® 8CX GEN 3 ARM PROCESSOR
- 32GB DDR4 RAM
- 512GB NVME SSD



# DIDCOMM USER AGENT / AGENT GATEWAY SCENARIO “DIDFAX” WINDOWS PRINTER DRIVER



# QUESTIONS?

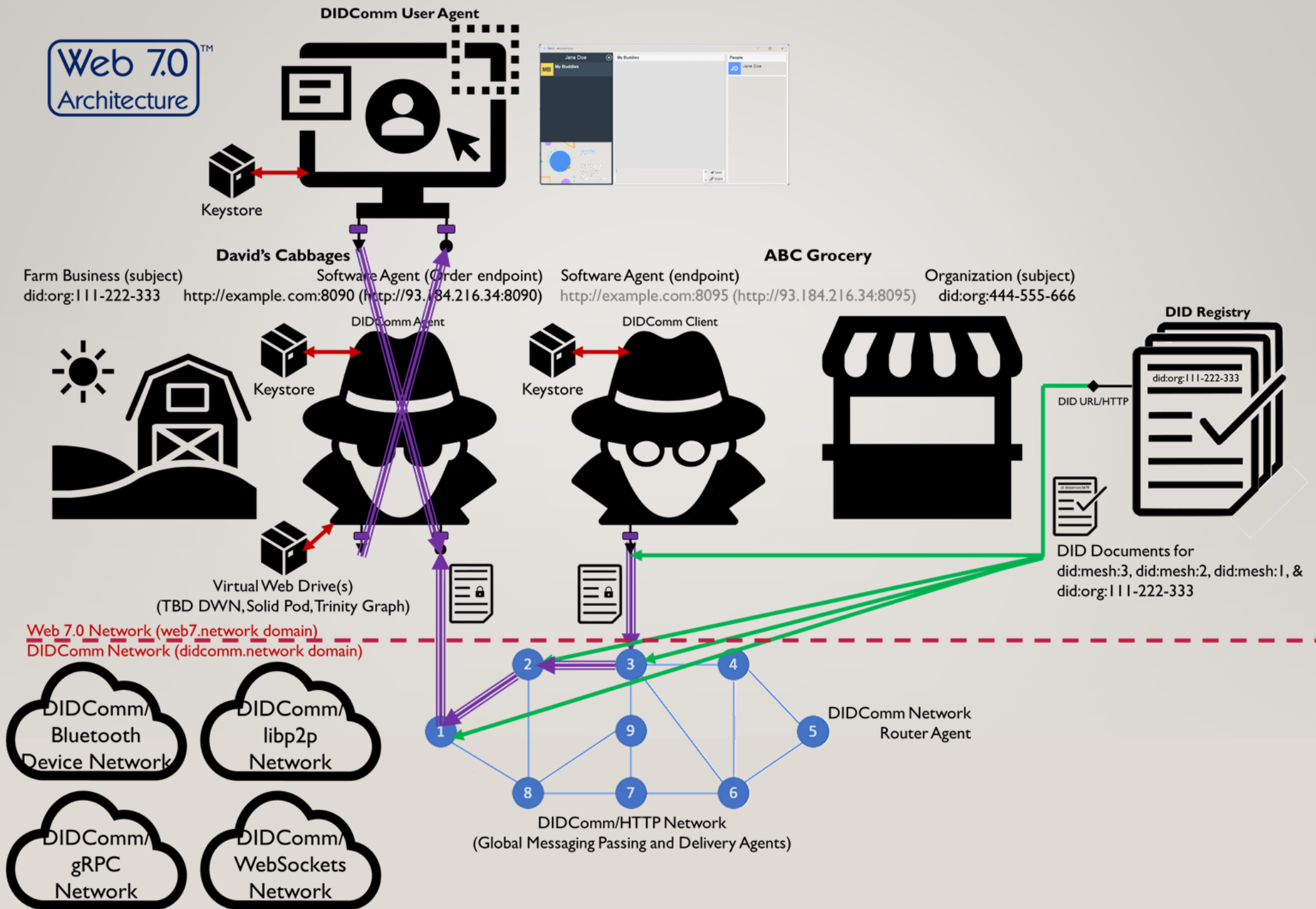
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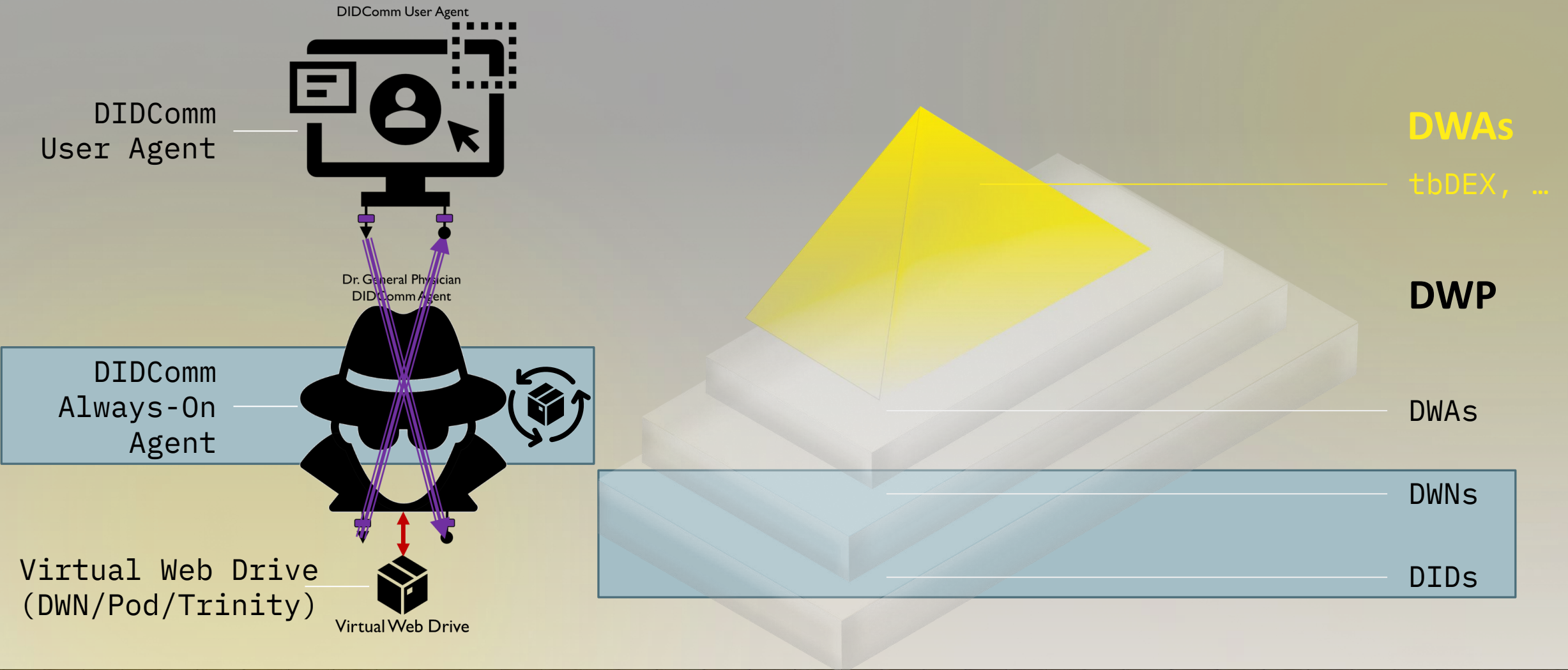
# WEB 7.0 AND WEB5

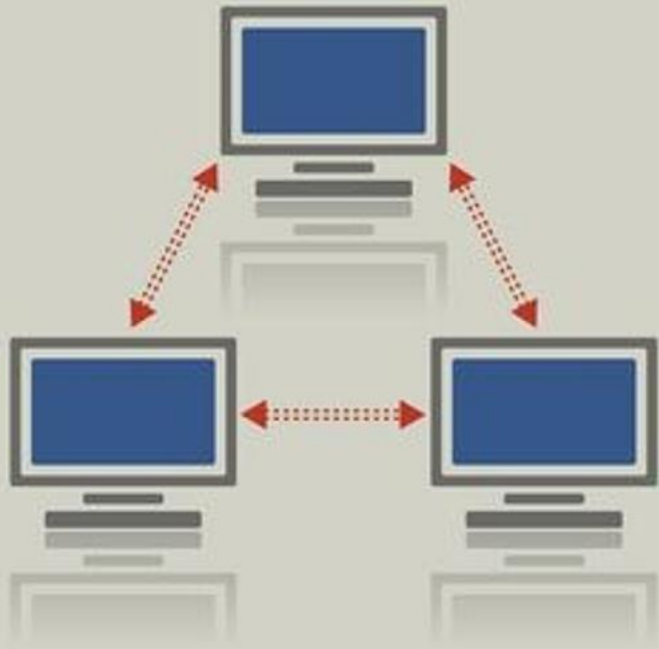
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Side-by-Side Comparison

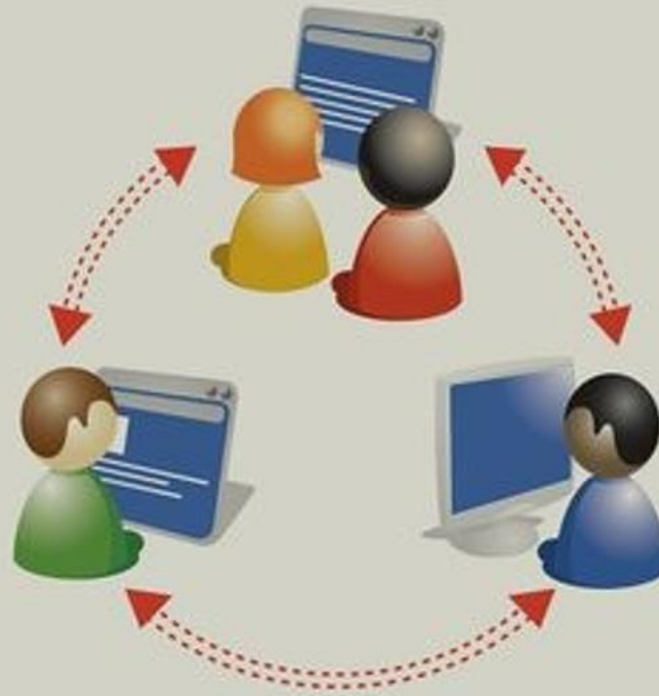


# WEB 7.0 DIDCOMM-ARM vs. DWP STACK

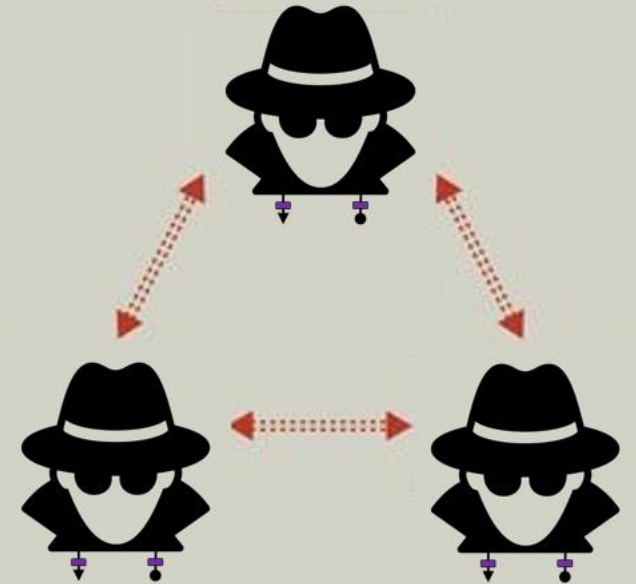




The Internet: Connecting Devices using a  
Global Communications Network



Web 2.0/3.0: Connecting People to  
Centralized Web Sites (and Email Servers)



Web 7.0: Connecting Individuals to Each Other  
via their Trusted Personal Agents

## Web 2.0/3.0

Connecting People to Centralized Web Sites & Services

Web Browsers

Web Servers

HTTP

Web Pages

Web Data

## Web 7.0

Connecting Individuals to Each Other  
via their Trusted Personal Agents

DIDComm

Agents

DIDComm  
Messages

DIDs

DID Registry

VCs

## Devices

Smart Phones

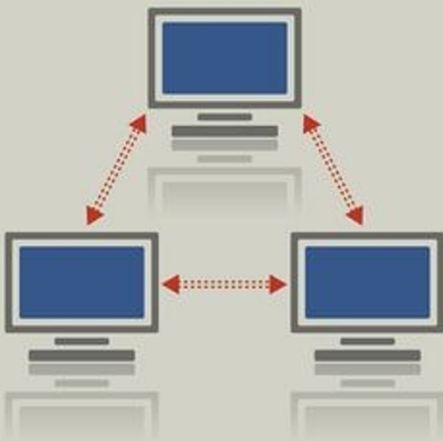
Personal Computers

Big Servers

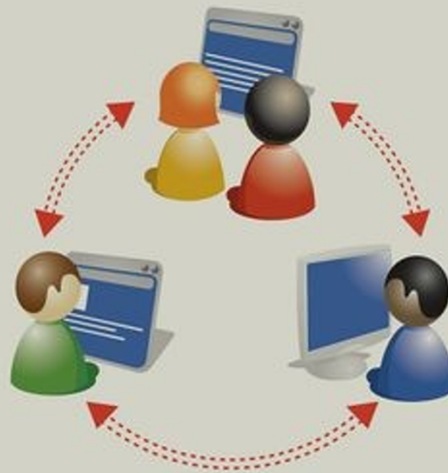
IoT Devices

## Internet

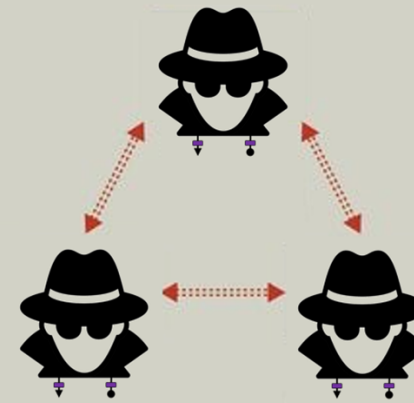
Connecting Devices using a Global Communications Network



The Internet: Connecting Devices using a Global Communications Network



Web 2.0/3.0: Connecting People to Centralized Web Sites (and Email Servers)



Web 7.0: Connecting Individuals to Each Other via their Trusted Personal Agents

### Web 2.0/3.0

Connecting People to Centralized Web Sites & Services

Web Browsers

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Connecting Individuals to Each Other via their Trusted Personal Agents

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### Devices

Smart Phones

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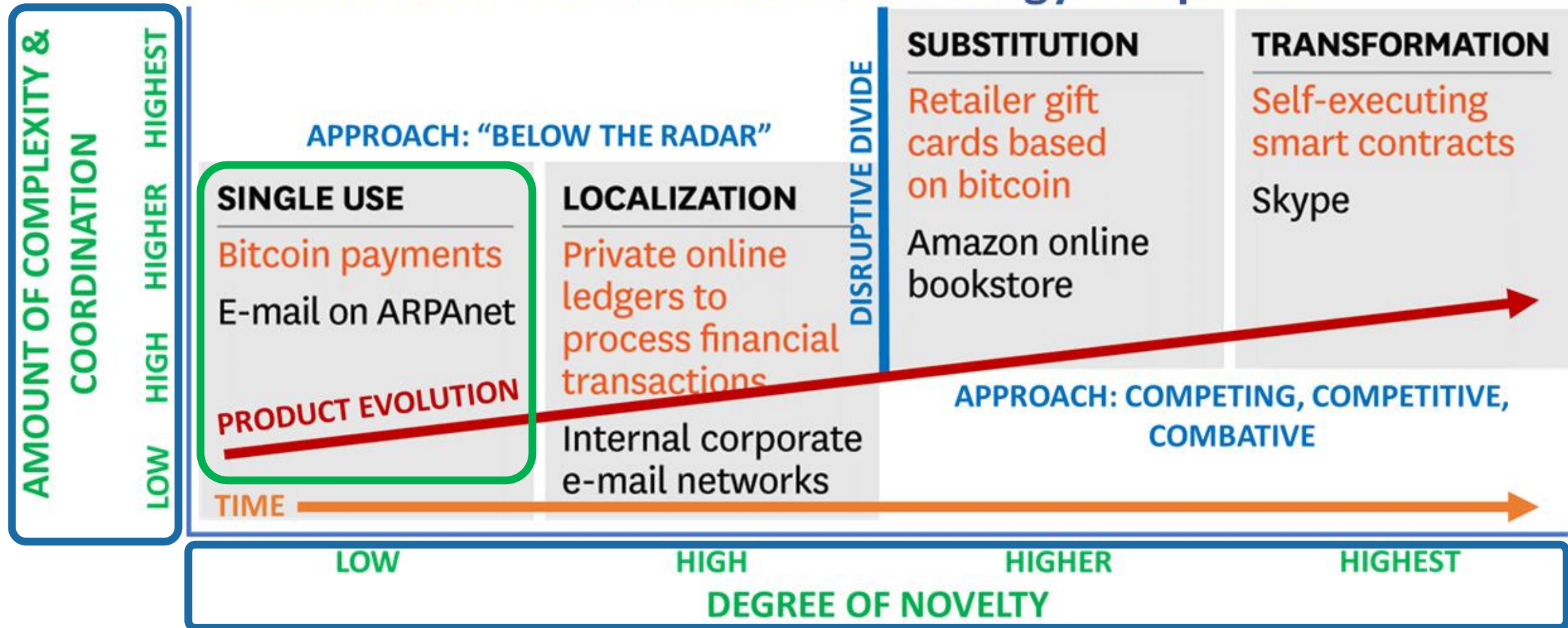
IoT Devices

### Internet

Connecting Devices using a Global Communications Network

# FOUNDATIONAL TECHNOLOGY ADOPTION MODEL

## 3. Phases of Foundational Technology Adoption



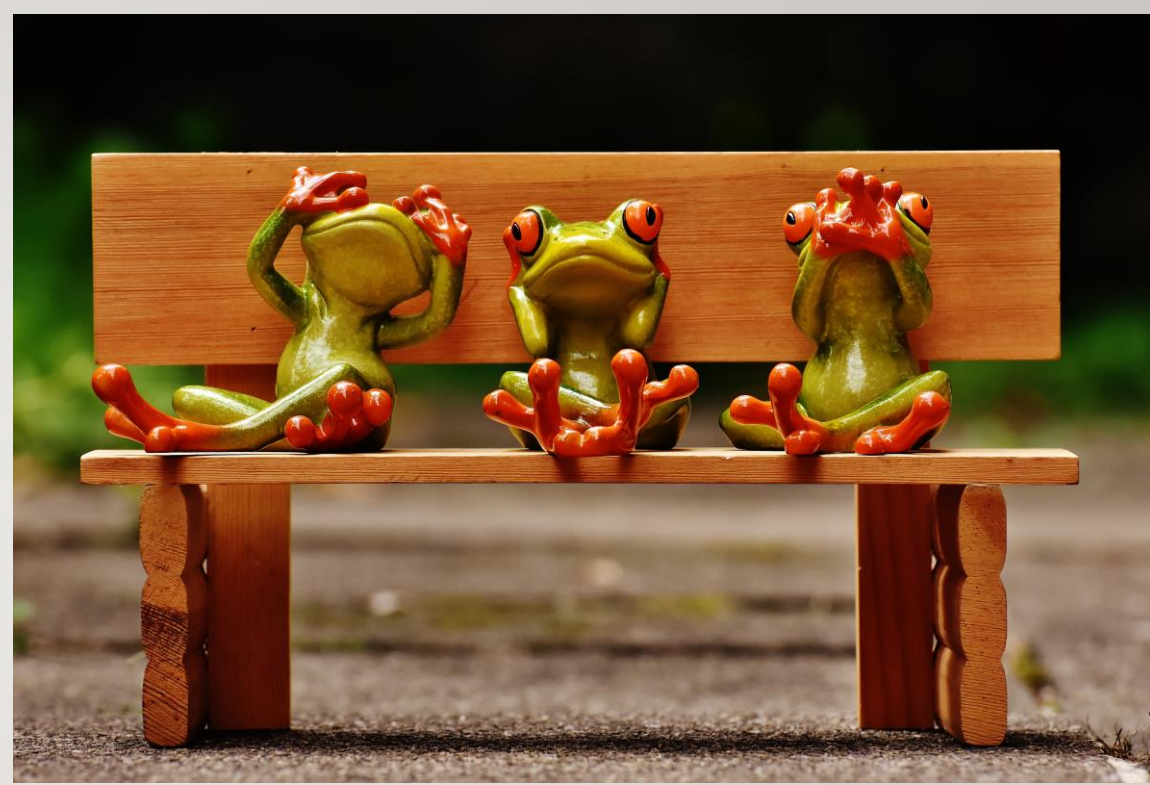
# NEXT STEPS

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1. Start building out the sample projects provided for each layer of the DIDComm-ARM
2. Start using DIDComm Notation to design simple Web 7.0 Network(s) using direct, point-to-point message routes
3. Implement your Web 7.0 Network(s) using the DIDComm Super Stack (or any toolset of your choosing)
4. Consider evolving your design to include a DIDComm Network to support the advanced message routing and disconnect agent requires of your Web 7.0 Network(s)
5. Have fun!

# QUESTIONS?

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THE END

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