





Scheduling		Credentia		Data Extraction Form						
REVIEW RESULT	EVALUATE RESULT	Patent ID	Title	Year	Authors	Add Concept	Remove Concept	Formal Model	Novel Problem	Proposed Solution
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20170112126A1	Self-sovereign identity systems and methods for identification documents	2020	Sanjay Gupta, Michael Ra					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20190128169A1	The block chain system including a block chain structure for data self-sovereign identity	2019	Li Q					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20191036141A1	Method and systems relating to the use of blockchain and self-sovereign identity for gift cards, rewards, and incentives programs	2019	Saf Khan					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20190301048A1	System and method for linking connected devices to enable secure and anonymous electronic interaction in a decentralized manner	2018	Jay Fafian, Scott Harshbarger					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20090349353A1	Distributed self-sovereign identities for network function virtualization	2018	Kajal Sood, Neal M. Smith					
Include (Satisfies IC2 The research work makes progress)	Include (Satisfies IC2 The research work makes progress)	US20211123093A1	Contact wallet device and self-sovereign identity and copyright authentication system using same	2020	B. S. J.			No	sensitive data storage and in Details a hardware-based wallet that generates passwords and user IDs using DID, also	
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20200115726A1	Method for user authentication having enhanced reliability and security	2018	B. S. J.					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US2021055214A1	Method and system for reliable authentication of the origin of a website	2020	Mario Antonio CASTELAJE					
Include (Satisfies IC2 The research work makes progress)	Include (Satisfies IC2 The research work makes progress)	US20191004104A1	Computer-implemented transaction system and method	2019	Kajal Sood, Saikat Das			No	perform user authentication Details a user authentication scheme based solely on user interactions with its personal	
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20211028141A1	Computer-implemented blockchain-based system for agricultural products	2021	David BILKIN-KOZLOVA I					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20211202041A1	Cross-network identity provisioning	2021	Phai Novotny, Timothy Owa					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20200300041A1	System and method for secure generation, exchange and management of a user identity data using a blockchain	2021	Alexandra LUPANCIU-CIUPA					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20201014203A1	Method and system for using tunnel extensible authentication protocol (EAP) for self-sovereign identity based authentication	2021	Abdullah Soundararajan/Tar					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US2020112118A1	Self-sovereign identity	2021	O'Neil/Kevin					
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	US20190300041A1	System and method, which using blockchain and mobile devices, provides the validated and authenticated identity of an individual to a va	2021	Sak Khan					















Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.11	11	Self-ownership identity in a globalized world: Decentralized-based identity systems as a driver for economic inclusion
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.12	12	Linear function - decentralized innovation: built on trust
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.13	13	A comprehensive survey on attacks, security issues and blockchain solutions for air and sea
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.14	14	A truly Self-Sovereign Identity system
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.15	15	Blockchain-based identity management systems: A review
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.16	16	Foundations and properties of a secure identity scheme research scenario in cryptography
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.18	18	Blockchain based edge computing: A distributed and trusted authentication system
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.19	19	Emergency based distributed service function blocks architecture for IoT
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.20	20	Open-Source identity management system: An assessment of self-ownership identity and user-centric data platform built on blockchain
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.22	22	SD-WAN: A blockchain identity management system to secure personal data sharing in a network
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.23	23	The Safety function
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.28	28	Trust with web resources (TWC)
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.34	34	Cloudworking for power grids: A review
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.35	35	Enabling the Internet of mobile manufacturing health things: A mobile fog computing, blockchain and IoT based continuous glucose monitoring system
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.37	37	Smart cities: A survey on data management, security, and enabling technologies
Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.38	38	Blockchain convergence in smart cities: Technologies, applications, and future challenges
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.40	40	Performance analysis and comparison of join, join and group based blockchains
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.42	42	Canonic the fog networks based on whole trust model
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.54	54	Blockchain-based identity management: A survey from the enterprise and ecosystem perspective
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Exclude (Does not satisfy neither IC-1 nor IC-2)	221	221.58	58	A conceptual model for attribute aggregation
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250	251.1	30.2	The use of identity				
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250	251.7	184.12	The Knowledge Complexity of Interactive Proof Systems				
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250	251.25		Blockchain-Based Identity Authentication and Intelligent Credit Reporting				
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250	251.28	2029	Regulation 2018/757 of the European Parliament and the Council of the European Union				
250	251.29		Learn: Lightweight Signature Agreement Without a Trusted Setup				
250	251.30		Secure Data Migration from Linear Size Universal and Updatable Structured Reference Strings				
250	251.1		Circular Number #11.0				
250	251.2		IBCChain Messaging Specification	2020	David Harrison	DFP	
250	251.3		How zkSNARKs can help you secure digital identity and transparency: OLC-based transactions in the Digital Single Market				
250	251.4		Help Shops: A Safe and Secure Trust Generation System				
250	251.5	113.46	eIDAS regulation (EU) no 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions				
250	251.6		Employee health insurance card				
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	651022	651027	31	The Inevitable Rise of Self-Sovereign Identity	651027.4	29.2	After a Pivotal Self-Sovereign Identity
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Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Minimalist State and Sparse Key Derivation for the Internet of Things	651027.32	35.8	Minimalist State and Sparse Key Derivation for the Internet of Things
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Cryptographic, Efficient Key Derivation: The HOF Scheme	651027.33	35.9	Cryptographic, Efficient Key Derivation: The HOF Scheme
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Recommended Elliptic Curve Domain Parameters	651027.34	35.10	Recommended Elliptic Curve Domain Parameters
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Efficient Construction of Indicia Length Hash Chains with Perfect Forward Secrecy using the Chinese Remainder Theorem	651027.35	35.11	Efficient Construction of Indicia Length Hash Chains with Perfect Forward Secrecy using the Chinese Remainder Theorem
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Blockchain Authentication with Wireless Sensor Networks using Nested Hashing and the Chinese Remainder Theorem	651027.36	35.12	Blockchain Authentication with Wireless Sensor Networks using Nested Hashing and the Chinese Remainder Theorem
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		ECDSA: High-speed high-security signature	651027.37	35.13	ECDSA: High-speed high-security signature
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Instant of Control	651027.38	35.14	Instant of Control
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		SEC: SEC-2018: SEC Standard for Local and Metropolitan Area Networks - Secure Device Identity	651027.39	35.15	SEC: SEC-2018: SEC Standard for Local and Metropolitan Area Networks - Secure Device Identity
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		A One-Time Password Based on the Recent Widespread ECDSA Signatures	651027.40	35.16	A One-Time Password Based on the Recent Widespread ECDSA Signatures
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	36	A Universally Verifiable Certificate (UVC) Scheme	651027.41	36.1	A Universally Verifiable Certificate (UVC) Scheme
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		The Evolution of Layered Protocol Stacks Leads to a Hierarchical Staged Architecture	651027.42	36.2	The Evolution of Layered Protocol Stacks Leads to a Hierarchical Staged Architecture
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Secure Neighbor Discovery	651027.43	36.3	Secure Neighbor Discovery
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Hierarchical Deterministic Keys: BIP32 & Beyond	651027.44	36.4	Hierarchical Deterministic Keys: BIP32 & Beyond
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	37	The Inevitable Rise of Self-Sovereign Identity	651027.45	37.1	The Inevitable Rise of Self-Sovereign Identity
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Aspena Fira	651027.46	37.2	Aspena Fira
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Aspena Fira	651027.47	37.3	Aspena Fira
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Address process whitelists	651027.48	37.4	Address process whitelists
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		No Way, Jose! Javascript Origin Signing and Encryption is a Bad Standard that Everyone Should Avoid	651027.49	37.5	No Way, Jose! Javascript Origin Signing and Encryption is a Bad Standard that Everyone Should Avoid
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Aspena	651027.50	37.6	Aspena
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	38	IRK: Irreversible Key Derivation	651027.51	38.1	IRK: Irreversible Key Derivation
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		IRK: IRK secure hashing	651027.52	38.2	IRK: IRK secure hashing
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Autonomous	651027.53	38.3	Autonomous
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Autonomous Computing	651027.54	38.4	Autonomous Computing
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Autonomous Network System	651027.55	38.5	Autonomous Network System
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Autonomous	651027.56	38.6	Autonomous
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Recommendation for Key Management Part 4 - Best Practices for Key Management Organizations	651027.57	38.7	Recommendation for Key Management Part 4 - Best Practices for Key Management Organizations
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		On The Hoopless Model: The End-to-End Principle and Deployment Scalability	651027.58	38.8	On The Hoopless Model: The End-to-End Principle and Deployment Scalability
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		On The Hoopless Model	651027.59	38.9	On The Hoopless Model
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Can anyone of hash collisions: Will quantum computers make SHA256 obsolete?	651027.60	38.10	Can anyone of hash collisions: Will quantum computers make SHA256 obsolete?
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		High-speed high-security signature	651027.61	38.11	High-speed high-security signature
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		BPZ: recommendations a 2018 test: Why do most Bitcoin wallets only use a 2018 seed?	651027.62	38.12	BPZ: recommendations a 2018 test: Why do most Bitcoin wallets only use a 2018 seed?
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Using BIP32 to acquire legacy TLS certificates	651027.63	38.13	Using BIP32 to acquire legacy TLS certificates
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Renouncing certificate authorities with BIP32	651027.64	38.14	Renouncing certificate authorities with BIP32
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Sis: Surgical interception attacks by manipulating key communications	651027.65	38.15	Sis: Surgical interception attacks by manipulating key communications
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Blind	651027.66	38.16	Blind
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		IRK: IRK is an Extremely Fast, Parallel Cryptographic Hash	651027.67	38.17	IRK: IRK is an Extremely Fast, Parallel Cryptographic Hash
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Handoff	651027.68	38.18	Handoff
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Mobile Edge Of The Internet is Rapidly Moving To IPv6	651027.69	38.19	Mobile Edge Of The Internet is Rapidly Moving To IPv6
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		ECDSA Signatures	651027.70	38.20	ECDSA Signatures
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Blockchain for IoT	651027.71	38.21	Blockchain for IoT
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	39	The Level of Identity	651027.72	39.1	The Level of Identity
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Microsoft's Vision on an Identity Mosaic	651027.73	39.2	Microsoft's Vision on an Identity Mosaic
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	40	Practical Systematic Self-Defense	651027.74	40.1	Practical Systematic Self-Defense
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Certificate authority	651027.75	40.2	Certificate authority
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Blockchain: Open Interfaces, and Protocol Architecture	651027.76	40.3	Blockchain: Open Interfaces, and Protocol Architecture
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Making Byzantine Fault Tolerant Systems Tolerate Byzantine Faults	651027.77	40.4	Making Byzantine Fault Tolerant Systems Tolerate Byzantine Faults
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Convergence (CSP)	651027.78	40.5	Convergence (CSP)
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	41	A DID for Everything	651027.79	41.1	A DID for Everything
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Cryptographically secure pseudorandom number generator	651027.80	41.2	Cryptographically secure pseudorandom number generator
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Efficient sparse matrix base	651027.81	41.3	Efficient sparse matrix base
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		The Stellar Consensus Protocol: A Federated Model for Internet-level Consensus	651027.82	41.4	The Stellar Consensus Protocol: A Federated Model for Internet-level Consensus
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Digital Signatures	651027.83	41.5	Digital Signatures
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Decentralized hash table	651027.84	41.6	Decentralized hash table
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Autonomous Data Consensus	651027.85	41.7	Autonomous Data Consensus
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		DNS Certification Authority Authorization	651027.86	41.8	DNS Certification Authority Authorization
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Do you need more than 128-bit entropy?	651027.87	41.9	Do you need more than 128-bit entropy?
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Domain System	651027.88	41.10	Domain System
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Domain Name System Security Extensions (DNSSEC)	651027.89	41.11	Domain Name System Security Extensions (DNSSEC)
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		ECDSA by Curve25519	651027.90	41.12	ECDSA by Curve25519
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	42	The Elliptic Curve Digital Signature Algorithm (ECDSA)	651027.91	42.1	The Elliptic Curve Digital Signature Algorithm (ECDSA)
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Elliptic curve cryptography	651027.92	42.2	Elliptic curve cryptography
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		ERC-1056 Lightweight Identity	651027.93	42.3	ERC-1056 Lightweight Identity
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		The latest group of BIP consensus	651027.94	42.4	The latest group of BIP consensus
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		ERC-1056: Legacy	651027.95	42.5	ERC-1056: Legacy
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Efficient computing	651027.96	42.6	Efficient computing
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		ERC-1200: Efficient Transport Protocol (HTTTP) v1: Message Signaling and Routing	651027.97	42.7	ERC-1200: Efficient Transport Protocol (HTTTP) v1: Message Signaling and Routing
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Media Type Specifications and Registration Procedures draft-wright-media-type-apple-mp4	651027.98	42.8	Media Type Specifications and Registration Procedures draft-wright-media-type-apple-mp4
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Resolving HTTP/2 on BIP Signing	651027.99	42.9	Resolving HTTP/2 on BIP Signing
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	43	The EU General Data Protection Regulation (GDPR)	651028.00	43.1	The EU General Data Protection Regulation (GDPR)
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Self-certified public keys	651028.01	43.2	Self-certified public keys
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		A DNS Signing zone is a bagging company an almost ungraded standard	651028.02	43.3	A DNS Signing zone is a bagging company an almost ungraded standard
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	44	Certificate Transparency	651028.03	44.1	Certificate Transparency
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Search for Trust: An Analysis and Comparison of CA System Alternatives and Enhancements	651028.04	44.2	Search for Trust: An Analysis and Comparison of CA System Alternatives and Enhancements
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Additional Media Type Subtypes Syntax Software draft-wright-media-type-apple-mp4	651028.05	44.3	Additional Media Type Subtypes Syntax Software draft-wright-media-type-apple-mp4
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		HTTTP: HTTP Status: 401 Unauthorized	651028.06	44.4	HTTTP: HTTP Status: 401 Unauthorized
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		How Close are Digital Certificates	651028.07	44.5	How Close are Digital Certificates
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		How many bits of entropy does an elliptic curve key length provide?	651028.08	44.6	How many bits of entropy does an elliptic curve key length provide?
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		HTTTP Public Key Signing	651028.09	44.7	HTTTP Public Key Signing
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	45	IRK	651028.10	45.1	IRK
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Information Theory	651028.11	45.2	Information Theory
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		Information-theoretic security	651028.12	45.3	Information-theoretic security
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027	46	Information Theory (IT)	651028.13	46.1	Information Theory (IT)
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		IPV4	651028.14	46.2	IPV4
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		IPV6 exhaustion	651028.15	46.3	IPV6 exhaustion
Exclude (Does not satisfy neither IC-1 nor IC-2)	651022	651027		IPV6	651028.16	46.4	IPV6



104.104.19	104.104.19	2021	A signature scheme with efficient protocols
104.104.20	104.104.20	2019.03.10	Signature schemes and anonymous credentials from bilinear maps
104.104.21	104.104.21		Efficient group signature schemes for large groups
104.104.22	104.104.22	2019	Design and implementation of the Delta anonymous credential system
104.104.23	104.104.23	2019	Organization of knowledge
104.104.24	104.104.24		Unrecoverable electronic mail, return addresses, and digital postmarks
104.104.25	104.104.25		Secure without identification: transaction systems to make life better, absolute
104.104.26	104.104.26	2019	Zero-knowledge proofs of knowledge without interaction (extended abstract)
104.104.27	104.104.27		Composable anonymous credentials from multivariate polynomials
104.104.28	104.104.28		Efficient public key cryptography in the presence of key leakage
104.104.29	104.104.29	2019	How to prove general practical solutions to identification and signature problems
104.104.30	104.104.30	2019	Assessment of attribute-based credentials for privacy-preserving road traffic services in smart cities
104.104.31	104.104.31		Decentralized anonymous credentials
104.104.32	104.104.32		A digital signature scheme secure against adaptive chosen-message attacks
104.104.33	104.104.33		Simulation under NIZK proofs for a practical language and constant group signatures
104.104.34	104.104.34		Efficient fully verifiable zero-knowledge group signatures
104.104.35	104.104.35		Breaking and fixing anonymous credentials for the cloud
104.104.36	104.104.36	2019	Practical group signatures with privacy-friendly openings
104.104.37	104.104.37		On Delegation Complexity and Statistical Zero-Knowledge Arguments
104.104.38	104.104.38		The CLOMPC architecture: witnessless identity management for private user-friendly services
104.104.39	104.104.39		Reusable group signature schemes with constant costs for signing and verifying
104.104.40	104.104.40	2019	Secure and efficient attribute-based credential schemes
104.104.41	104.104.41		Non-interactive zero-knowledge and adaptive chosen-ciphertext security
104.104.42	104.104.42		Efficient signature schemes for attribute-based credentials
104.104.43	104.104.43		Concrete threshold secure selective decommitment credentials with applications to distributed ledgers
104.104.44	104.104.44		Decentralized witnessless anonymous credentials with revocation

Research Horizon - Forward Searchability

Research Horizon	Forward Searchability	Research Horizon	Forward Searchability
104.104.45	104.104.45	104.104.45	104.104.45
104.104.46	104.104.46	104.104.46	104.104.46
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104.104.99	104.104.99	104.104.99	104.104.99
104.105.00	104.105.00	104.105.00	104.105.00

Year	Authors	Published in	Add Concept	Remove Concept	Formal Model	New Problem	Proposed Solution
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Year	Authors	Published in	Add Concept	Remove Concept	Formal Model	New Problem	Proposed Solution
2019	104.104.100	21.30					
2019	104.104.101	175.12					
2019	104.104.102	30.80.1003					
2019	104.104.103	30.80.1004					
2019	104.104.104	30.80.1005					
2019	104.104.105	30.80.1006					
2019	104.104.106	30.80.1007					
2019	104.104.107	30.80.1008					
2019	104.104.108	30.80.1009					
2019	104.104.109	30.80.1010					
2019	104.104.110	30.80.1011					
2019	104.104.111	30.80.1012					
2019	104.104.112	30.80.1013					
2019	104.104.113	30.80.1014					
2019	104.104.114	30.80.1015					
2019	104.104.115	30.80.1016					
2019	104.104.116	30.80.1017					
2019	104.104.117	30.80.1018					
2019	104.104.118	30.80.1019					
2019	104.104.119	30.80.1020					
2019	104.104.120	30.80.1021					
2019	104.104.121	30.80.1022					
2019	104.104.122	30.80.1023					
2019	104.104.123	30.80.1024					
2019	104.104.124	30.80.1025					
2019	104.104.125	30.80.1026					
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2019	104.104.144	30.80.1045					
2019	104.104.145	30.80.1046					
2019	104.104.146	30.80.1047					
2019	104.104.147	30.80.1048					
2019	104.104.148	30.80.1049					
2019	104.104.149	30.80.1050					
2019	104.104.150	30.80.1051					
2019	104.104.151	30.80.1052					
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2019	104.104.155	30.80.1056					
2019	104.104.156	30.80.1057					
2019	104.104.157	30.80.1058					
2019	104.104.158	30.80.1059					
2019	104.104.159	30.80.1060					
2019	104.104.160	30.80.1061					
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2019	104.104.164	30.80.1065					
2019	104.104.165	30.80.1066					
2019	104.104.166	30.80.1067					
2019	104.104.167	30.80.1068					
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2019	104.104.170	30.80.1071					
2019	104.104.171	30.80.1072					
2019	104.104.172	30.80.1073					
2019	104.104.173	30.80.1074					
2019	104.104.174	30.80.1075					
2019	104.104.175	30.80.1076					
2019	104.104.176	30.80.1077					
2019	104.104.177	30.80.1078					
2019	104.104.178	30.80.1079					
2019	104.104.179	30.80.1080					
2019	104.104.180	30.80.1081					
2019	104.104.181	30.80.1082					
2019	104.104.182	30.80.1083					
2019	104.104.183	30.80.1084					
2019	104.104.184	30.80.1085					
2019	104.104.1						

Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	20,102	25 1015 1019	Blockchain backed autonomous vehicles as a part of IoT backbone threat																
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	20,104	100, 1004, 1005	Improved Contributions of Anonymous Credentials From Blockchain-Preserving Signatures on Explanatory Classes																
<b>Second Iteration - Snowballing Totals</b>																				
Results	942																			
Duplicates	307																			
Excluded by IC-1	17																			
Excluded by not (IC-1 and IC-2)	309																			
Included (Both IC-1 and IC-2)	1																			
<b>Third Iteration - Backwards Snowballing</b>																				
<b>Relevance Evaluation</b>																				
Exclusion	Criteria	From ID	Page ID	Duplicate of	Title	Year	Authors	Published in	Add Concept	Remove Concept	Formal Model	Novel Problem	Proposed Solution							
REVIEW RESULT	EVALUATE RESULT	From ID	Page ID	Duplicate of	Title	Year	Authors	Published in	Add Concept	Remove Concept	Formal Model	Novel Problem	Proposed Solution							
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1024	37,29,1001		Adding attributes to one-based access control															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1025	37,29,1002		Keeping authorizer 'normal or host' with decentralized witness co-siging															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1026	37,29,1003	20,10	Proposals for secured communication															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1027	37,29,1004		Foundations of garbled circuits															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1028	37,29,1005		How to exchange secrets with oblivious transfer															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1029	37,29,1006		Zero-knowledge proofs of identity															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1030	37,29,1007		Fast secure two-party ecchae signing															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1031	37,29,1008		Practical two-party signatures for user authentication															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1032	37,29,1009		Encrypted key exchange: Password based protocols secure against dictionary attacks															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1033	37,29,1010		Strong password-only authenticated key exchange															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1034	37,29,1036,11		Refinement and extension of encrypted key exchange															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1035	37,29,1036,12		The secure simple password protocol															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1036	37,29,1036,13		One-round protocols for two-party authenticated key exchange															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1037	37,29,1036,14		Signer: The sign-and-verify approach to authenticated off-the-helium and its use in the protocols															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1038	37,29,1036,15		Simple authenticated key exchange without DH															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1039	37,29,1036,16		A method for making password-based key exchange resistant to server compromise															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1040	37,29,1036,17		Changes an asymmetric public protocol secure against pre-computation attacks															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1041	37,29,1036,18	37,29,1001	Federated authorization over access to personal data for decentralized identity management															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1042	37,29,1036,19	20,23	The next 2.0 authentication framework															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1043	37,29,1036,20	20,23	Decentralized identifiers (dids)															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1044	37,29,1036,21	20,23	Verifiable credential data model															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1045	37,29,1036,22		The verifiable credential data model															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1046	20,29,1036,23	27,29	PKI 700: Signed web page (SWP)															
Exclude (Does not satisfy neither IC-1 nor IC-2)	Exclude (Does not satisfy neither IC-1 nor IC-2)	22,29,1047	27,29,1036,24		Blockchain transaction malleability and rigging															
<b>Third Iteration - Forward Snowballing</b>																				
<b>Relevance Evaluation</b>																				
Exclusion	Criteria	From ID	Page ID	Duplicate of	Title	Year	Authors	Published in	Add Concept	Remove Concept	Formal Model	Novel Problem	Proposed Solution							
REVIEW RESULT	EVALUATE RESULT	From ID	Page ID	Duplicate of	Title	Year	Authors	Published in	Add Concept	Remove Concept	Formal Model	Novel Problem	Proposed Solution							
Results	0																			
Duplicates	0																			
Excluded by IC-1	0																			
Excluded by not (IC-1 and IC-2)	0																			
Included (Both IC-1 and IC-2)	0																			

ID	Abstract	Keywords	Concepts
26	This document provides three main contributions. First, it details the Self-Sovereign Identity concept including its underlying blockchain technology. Second, related technologies are identified; evaluation criteria are defined and used to evaluate these technologies. Finally, the SSI potential is identified and described.	theoretical; definitions; concepts; requirements	Proposes six requirements for SSI systems
27	Centralized identity services tend to fail to provide transparency and protect the rights of users. Single points of trust present content operational risks for both companies and individuals. Self-sovereign identity is a solution to address this, which specifies a user-focused approach that gives full control of an identity back to the individual. This paper proposes the blockchain, a secure and decentralised trust-less system, as the platform to achieve this. A proof-of-concept identity system for the Ethereum blockchain is designed and developed in this paper. Smart contracts are used to facilitate the secure storage and open processing of user data. It also presents a novel approach to the secure recovery of encrypted private data. Emphasis is placed on the implementation security, information privacy and data recovery procedures of the system.	theoretical; definitions; concepts; requirements	Despite implementing a SSI system, introduce a few requirements which can be used for all SSI systems.
30	Self-sovereign identity management is a new paradigm, ignited by blockchain technology. The field of identity management currently faces issues in multiple areas. Identity theft and data breaches are not uncommon, and are often the result of insecure identity management practices. Identity management is largely centralized, harming the privacy of subjects. The general public has to trust large corporations and governments to correctly handle their personal data. In contrast to centralized identity management, the self-sovereign identity paradigm places trust in their own administration. To facilitate a self-sovereign identity system, a decentralized information system is needed. Blockchain technology might fulfil this need, as it makes use of a distributed ledger, on which consensus about its state is reached by decentralised cryptographic protocols. However, as with most emergent technologies, there is a lack of scientific research into the concept of self-sovereign identity. Therefore, this research answered the following research question: "What are the system requirements for a regulatory compliant Self-Sovereign Identity identity system, and how can blockchain technology solutions serve as a solid foundation?" To be able to formulate an answer to this question, a set of requirements and constraints have been developed by using design science research. Two design iterations have been conducted. In the first iteration, an initial set of requirements have been developed through introspection and semi-structured interviews with industry experts from multiple industries. In the second iteration, the set of requirements and constraints have been analysed and optimised, and sent to the same industry experts for peer-review. After the set of requirements and constraints were developed, blockchain technology is evaluated using partial requirement satisfaction. Lastly, two practical and current state-of-the-art implementations, namely Sovrin and uPort, have been evaluated using binary requirement satisfaction. At this moment, Sovrin better satisfies the requirements. Based on the findings, we can conclude that indeed, blockchain can serve as a solid foundation for a self-sovereign identity system. However, it became evident that blockchain is not an absolute solution, additional technology is needed. Blockchain does aid in maintaining integrity of personal data and providing subjects the freedom to privately exchange verifiable claims about their identity, with a lower need for trust in large institutions.	theoretical; definitions; concepts; requirements	Through expert foundation, a set of requirements were conceived for a SSI system
34	Removing the need for a trusted third party, blockchain technology revolutionizes the field of identity management. Service providers rely on digital identities to securely identify, authenticate and authorize users to their services. Traditionally, these digital identities are offered by a central identity provider belonging to a specific organisation. Trust in the digital identity mainly originates from the identity provider's reputation, organizational functioning and contractual obligations. Blockchain technology enables the creation of decentralized identity management without a central identity provider as trusted third party. Therefore, the derivation of trust in digital identities within this paradigm requires a distinct approach. In this paper we propose a novel general quantifiable trust model and a specific implementation variant for blockchain-based identity management. Applying the model, trust is deduced in a decentralized manner from attestations of claims and applied to the associated digital identity. This concept replaces trust with a central identity provider by aggregated trust into attestation issuers. Thus, promoting self-sovereign identities to be fit for purpose. The calculated numerical trust metric serves as independent basis for the definition of assurance levels to simplify and automate reasoning about trust by service providers without requiring a dedicated recovery of a trusted third party.	application; trust; distributed ledger; reputation; trust model	a trust model for blockchain based SSI
35	Digital identity is unresolved: After many years of research there is still no trusted communication over the Internet. To provide identity within the context of mutual distrust, this paper presents a blockchain-based digital identity solution. Without depending upon a single trusted third party, the proposed solution achieves passport-level legally valid identity. This solution for making identities Self-Sovereign, builds on a generic provable claim model for which attestations of truth from third parties need to be collected. The claim model is then shown to be both blockchain structure and proof method agnostic. Four different implementations or realizations of these claims are shown to offer substantial performance or claim verification. Through the properties of Self-Sovereign Identity, legally valid status and acceptable performance, our solution is considered to be fit for adoption by the general public.	theoretical; definition; concept; claim format; claim metamodel; verifiable claims;	Proposed a metamodel for claims and the requirement that claims must be verifiable in a SSI system
37	Self-sovereign identity promises prospective users greater control, security, privacy, portability and overall greater convenience, however the immaturity of current distributed key management solutions results in general disregard of security advisories in favour of convenience and accessibility. This research proposes the use of intermediate certificates as a distributed key management solution. Intermediate certificates will be used to allow multiple keys to authenticate to a single self-sovereign identity. Keys may be freely added to an identity without requiring a distributed ledger, any other third-party service or sharing private keys between devices. This research will also show that key rotation is a superior alternative to existing key recovery and escrow systems in helping users recover when their keys are lost or compromised. These features will allow remote credentials to be used to issue, present and appraise remote attestations, without relying on a constant internet connection.	application; certificates; key-rotation; recovery; key management;	propose key rotation for sovereign entities instead of key recovery through DID's key rotation
38	This paper provides an overview of the Self-Sovereign Identity (SSI) concept, focusing on four different components that we identified as essential to the architecture. Self-Sovereign Identity is enabled by the new development of decentralised databases that store the decentralised identity information, namely the Identifier Registry Model and the Claim Registry Model. Subsequently we discuss identifiers in such a system, presenting past research in the area and current approaches in SSI in the context of Zooko's Triangle. As the user of an SSI, we discuss the concept of an SSI as the verifiable claims that are presented to relying parties. Resources in the field are only loosely connected. We will provide a more coherent view of verifiable claims in regards to blockchain based SSI and clarify differences in the used terminology. Storage solutions for the verifiable claims, both on- and off-chain, are presented with their advantages and disadvantages.	theoretical; definitions; concept; components	On top of Allen's principles, four components are defined as essentials.
45	In this paper we present reclaimID: An architecture that allows users to reclaim their digital identities by securely sharing identity attributes without the need for a centralised service provider. We propose a design where user attributes are stored in and shared over a name system under user-owned namespaces. Attributes are encrypted using attribute-based encryption (ABE), allowing the user to selectively authorize and revoke access of reclaiming parties to subsets of his attributes. We present an implementation based on the decentralised GNU Name System (GNS) in combination with cipher-text-policy ABE using type-1 pairings. To show the practicality of our implementation, we carried out experimental evaluations of selected implementation aspects including attribute resolution performance. Finally, we show that our design can be used as a standard for implementing a self-sovereign identity compliant system.	application; attribute management; authorization; revoke; claim management;	propose to manage attributes (provided by IDPs) by versioning attributes and granting and revoking access to attributes through tickets
53	The self-sovereign identity management model emerged with the rise of blockchain technology. This paradigm focuses on user-centricity and strives to place the user in full control of the digital identity. Numerous implementations embrace the self-sovereign identity concept, leading to a fragmented landscape of solutions. At the same time, traditional identity and access management protocols are largely disregarded and facilities to issue verifiable claims as attributes are not available. Therefore, service providers barely adopt these solutions. We propose a component-based architecture for integrating self-sovereign identity solutions into web applications provided by service providers. Furthermore, we outline a sample implementation as a gateway that enables uPort and Jolocom for authentication, via the OpenID Connect protocol, as well as the retrieval of email address attestations for these solutions.	integration; adoption; authentication;	a framework for integration non-SSI apps and non-SSI identity and attribute providers with SSI-users authorization;
57	Identity management is an essential cornerstone of securing online services. Service provisioning relies on correct and valid attributes of a digital identity. Therefore, the identity provider is a trusted third party with a specific trust requirement towards a verified attribute issuer. This trust demand implies a significant dependency on users and service providers. We propose a novel attribute aggregation method to reduce the reliance on one identity provider. Trust in an attribute issuer is replaced by a combined trust based on the aggregated trust of multiple attribute issuers. The proposed attribute aggregation method. The resulting trust model is implemented in a gateway that is used for authentication with self-sovereign identity systems. Thereby, we devise a service provider specific web of trust that constitutes an intermediate approach bridging a global hierarchical model and a locally decentralized peer to peer scheme.	application; attribute management; decentralized attribute management; trust; reputation	calculates trust from multiple attribute providers where the RP assigns a probability of validity for attributes from different IDPs
58	We live in a connected world that requires us to identify ourselves every time we want to access our emails, work stations, bank accounts, health care records, etc. Every system we interact with requires us to remember a username and password or to use some other private key to log in. Today, our entire lives have a digital counterpart that become an integral part of everyday life. Self-Sovereign Identity (SSI) is the next step in the evolution of digital identity management systems and distributed ledgers have provided necessary building blocks for Self-Sovereign Identity Systems. But what exactly is an ideal Self-Sovereign Identity? In this research we propose a definition and set of principles that characterizes the nature of successful SSI systems. Based on our criteria and principles we present a systematic analytical study of the current SSI landscape, represented by uPort, Sovrin, ShoCard, and Civic. A system for truly self-sovereign online identities are not yet archived in the current state of the field. It is our conclusion that it is paramount that a non-profit organization or academia take the reins on this effort and deliver a standardized way of managing online identities.	application; authentication; biometric; identification	developed a functional biometric by using filters, noise and one-way functions on a user's selfie
60	In recent times, with the advent of blockchain technology, there is an optimism surrounding the concept of self-sovereign identity which is regarded to have an impact on how we interact with each other over the Internet in future. There are a few works in the literature which examine different aspects of self-sovereign identity. Unfortunately, the existing works are not methodological and comprehensive at all. Moreover, there exist different notions of what the term self-sovereign identity means. To exploit its full potential, it is essential to ensure a common understanding in a formal way. This paper aims to achieve this goal by providing the first-ever formal and rigorous treatment of the concept of self-sovereign identity using a mathematical model. This paper examines the properties that a self-sovereign identity should have and explore its impact of the self-sovereign identity over the latter identity. It also highlights the cycles of an identity management system and inter-relates how the notion of self-sovereign identity be applied in these life-cycles. In addition, the paper illustrates several envisioned flows involving a self-sovereign identity leveraging blockchain technology covering different aspects of an identity management system. All in all, this paper presents the first formal and comprehensive step toward an academic investigation of self-sovereign identity.	theoretical; formalization; mathematical definitions;	introduce mathematical formalizations and new concepts to SSI
65	Self-sovereign identity (SSI) is a paradigm shift for digital identity that promises a better and back to a central consensus. Herein, we update nine properties of self-sovereignty proposed by credible sources, propose five new properties, and apply the features of our architecture for digital identity to reason about and validate these properties.	theoretical; new concepts;	introduce five new properties and refute three from Allen
66	Recent years have seen an increased interest in digital wallets for a multitude of use cases including online banking, cryptocurrency, and digital identity management. Digital wallets play a pivotal role in the secure management of cryptographic keys and credentials, and for providing certain identity management services. In this paper, we examine a proof-of-concept digital wallet in the context of Self-Sovereign Identity and provide a practical decentralized key recovery solution using Shamir's secret sharing scheme and Hyperledger Indy distributed ledger technology.	application; wallet; key management; credential management; backup; recovery; group	digital wallet to store identity, keys, credential in secure enclave of mobile devices. Splits keys to multiple trusted peers for recovery
68	Self-sovereign identity (SSI) powered by distributed ledger technologies enables more flexible and faster digital identification workflows, while at the same time limiting the control and influence of central authorities. However, a global identity solution must be able to handle myriad credential types from millions of issuing organizations. As metadata about types of digital credentials is readable by everyone on the public permissionless ledger, and metadata about credential types for their own cases by looking at the content of the credential, a search mechanism is needed to allow users to search for credential types in a simple and efficient fashion lightly integrated into their applications. In this work, we propose a full-text search framework based on the publicly available metadata on the Hyperledger Indy ledger for retrieving matching credential types. The proposed solution is able to find credential types based on textual input from the user by using a full-text search engine and maintaining a local copy of the ledger. Thus, we do not need to rely on information about credentials coming from a very large candidate pool of third parties we would need to trust, such as the website of a company displaying its own identifier and a list of issued credentials. We have also proven the feasibility of implementing and evaluating a prototype of the full-text credential metadata search service.	application; search; text-search; metadata; credential; claims search; attribute search; credential search; credential metadata; claims metadata; meta;	introduced the problem of searching for claims/credentials metadata search and presented a solution for it
74	Digital identity systems has been around for almost as long as the computer and have evolved with the increased usage of online services. Digital identities have traditionally been used as a way of authenticating to the computer systems at work, or a personal online service, such as an email. Today, our physical existence has a digital counterpart that become an integral part of everyday life. Self-Sovereign Identity (SSI) is the next step in the evolution of digital identity management systems and distributed ledgers have provided necessary building blocks for Self-Sovereign Identity Systems. But what exactly is an ideal Self-Sovereign Identity? In this research we propose a definition and set of principles that characterizes the nature of successful SSI systems. Based on our criteria and principles we present a systematic analytical study of the current SSI landscape, represented by uPort, Sovrin, ShoCard, and Civic. A system for truly self-sovereign online identities are not yet archived in the current state of the field. It is our conclusion that it is paramount that a non-profit organization or academia take the reins on this effort and deliver a standardized way of managing online identities.	theoretical; definition; concepts; requirements	Rewrite Allen's ten principles focusing on why they are needed, removed Existence and added Inheritance
82	Blockchain, which is a useful tool for providing data integrity, has emerged as an alternative to centralized servers. Concentrating on the integrity of the blockchain, many applications have been developed. Specifically, a blockchain can be utilized in proving the user's identity using its strong integrity. However, since all data in the blockchain is publicly available, it can cause privacy problems if the user's identity is stored in the blockchain unencrypted. Although the encryption of the private information can diminish privacy problems in the blockchain, it is difficult to transparently utilize encrypted user information in the blockchain. To provide integrity and privacy of user information simultaneously in the blockchain, we propose a SIMS (Self-Sovereign Identity Management System) framework based on a zk-SNARK (zero-knowledge Succinct Non-interactive ARGument of Knowledge). In our proposed SIMS, the user information is preserved in a privacy-preserving way due to the zero-knowledge property of the zk-SNARK. We construct a SIMS scheme and prove its security. We describe applications of SIMS and demonstrate its practicality through efficient implementations.	application; definitions; proofs; implementation; identity creation; zero-knowledge proof; attribute claim; verifiable claim	A zero-knowledge proof system that creates identities without revealing them.
90	The self-sovereign identity (SSI) model entails the full responsibility of a user regarding his identity data. This identity data can contain private data which is solely known to the user. The user himself is therefore required to manage the whole lifecycle of his private data, including the backup and restore. We show that prior work on how to backup and restore the user's identity data does not meet the requirements of the SSI setting, and we present the first solution which does meet the requirements. Automated backup with auditing by remote entities (AWARE) combines SSI sustaining aspects and extends them to create a truly self-sovereign backup-and-restore protocol. In AWARE, trusted, physically met humans, called custodians, hold a secure device. Custodians with a secure device offer an offline backup process via a secure channel. The backup and restore are audited by the public and verifiable distributed ledger. These contents are answered by auditing services which are required during restore. Only some auditing services hold relevant data for a restore. The self-sovereignty of the user lies in the exclusive information which auditing services hold relevant data. AWARE is the first backup-and-restore mechanism that fully complies with the SSI model. We perform an in-depth security-risk analysis of AWARE, showing a risk rating which is comparable to the best risk rating of related non-SSI-compliant backup-and-restore mechanisms. We evaluate the AWARE protocol with cryptographic primitives providing a high security level of 256-bit. We show the implementation feasibility by providing a simulation of AWARE, and conclude with an estimated performance analysis on a microcontroller architecture based on our simulation and implementation results in the literature.	theoretical; application; recovery; restoration; backup; audit	trusted offline peers are used to backup data
100	Digital identities have been around for almost as long as computers and have evolved with the increased usage of online services. Digital identities have traditionally been used as a way of authenticating to the computer systems at work, or a personal online service, such as an email. Today, our physical existence has a digital counterpart that become an integral part of everyday life. Self-Sovereign Identity (SSI) is the next step in the evolution of the digital identity management systems. The blockchain technology and distributed ledgers have provided necessary building blocks and facilities that bring us closer to the realization of an ideal Self-Sovereign Identity. But what exactly is an ideal Self-Sovereign Identity? What are the characteristics? Trade-offs? Here, we propose the framework and methodology that can be used to evaluate, describe, and compare SSI systems. Based on our comparison criteria and the evaluation framework, we present a systematic analytical study of existing SSI systems: uPort, Sovrin, ShoCard, Civic, and Blockstack.	theoretical; requirement; comparison; evaluation; characteristics	Introduce "usability" as a requirement
104	As centralized identity management solutions amend identity data, they increasingly become attractive targets for cyber attacks, which entail consequences for users that range from service disruptions to exposure of sensitive user data. Self-sovereign identity (SSI) strives to return the control over identity data to the users by building on decentralized architectures. However, the adoption of SSI systems is currently hampered by a lack of qualified identity data that satisfies the services' requirements. Additionally, there is a gap w.r.t the user's privacy; intermediate components (e.g., importers or SSI network nodes) learn the user's sensitive attributes during the derivation of iD data. In this work, we present a decentralized iD derivation concept that preserves the user's privacy while maintaining the data's trustworthiness without revealing the plain data to any component outside the users' control. Our proposed system also enables users to selectively disclose only relevant parts of the imported identity assertion according to the service's requirements. We also implement and evaluate a proof-of-concept to demonstrate the feasibility and performance of our concept.	application; identity; identity creation; import identity; identity derivation; adoption; integration	Introduced an identity derivation concept to import identity from conventional providers to SSI
107	There are too few systematic architecture designs for blockchain-based self-sovereign identity (SSI) systems to support methodical development. We present an SSI platform that advances the notion of the design pattern as a service. We implement a prototype and evaluate it for feasibility and scalability.	design pattern; lifecycle;	introduced a series of design patterns considering the lifecycle of different components of a SSI system
109	More and more users are eager to obtain more comprehensive network services without revealing their private information. Traditionally, in order to access a network, a user is authorized with an identity and corresponding keys, which are generated and managed by the network operator. All users' personally identifying information are centralized stored by the network operator. However, this approach makes users lose the control of their personally identifying information. Users are concerned about who can access these sensitive data and whether they have been compromised. In this paper, we propose a blockchain-based identity management and authentication scheme for mobile networks, where users' identifying information are controlled by the users themselves. Our scheme lets users generate their self-sovereign identities (SSIs) and corresponding public keys and private keys. The private key used to authenticate the user's identifying information is only known to the user. We use blockchain to record SSIs and public keys of legitimate users, and information on the blockchain. The backup and restore are audited by the public and verifiable distributed ledger. Furthermore, other service providers which obtain the user's SSI and public key and authenticate users by querying the blockchain. Experimental results confirm that our scheme can greatly reduce the revocation overhead and communication overhead.	application; distributed ledger; revocation; revocation list; chameleon hash; revocable blockchain	use chameleon hash to update a distributed ledger and remove false claims/insertion of requiring users to maintain a traditional revocation list
110	An identity management including authentication and authorization in a network environment is a critical security factor. Various models for identity management have been developed continually, from the silo model to the federated model and to the recently introduced self-sovereign identity (SSI) model. In particular, SSI makes users manage their own information by themselves independently of any organizations. SSI utilizes the newly emerged blockchain technologies and many studies of it are in progress. However, SSI has not had wide public use because of its low compatibility with existing SSI systems. This paper involves an unfamiliar user experience and an immature process. To solve this problem, this paper proposes a new blockchain-based SSI model that complies with the popular and mature standard of OAuth 2.0. Using blockchain, the proposed model secures users' data sovereignty where users can use and control their own information in a decentralized manner, instead of depending on a specific monopolistic service-providers. Users and identity providers can easily accept the proposed model and apply it, which enables the scalability and usability of SSI. This paper also shows how the proposed model can be confirmed the feasibility of the proposed model by implementing it and a security analysis was performed. The proposed model is expected to contribute to the expansion of both blockchain technology and SSI.	application; compatibility; OAuth; authentication; distributed ledger	blockchain based SSI system with OAuth 2.0 compatibility for easy integration with current applications
113	Self-Sovereign Identity (SSI) is a new paradigm in digital identity systems that puts the end-user in control: no other actor manages, permits or revokes their digital existence. TrustChain is an academic peer-to-peer networking stack supporting SSI. It delivers passport-grade assurance by integrating with Dutch government. However, end-user control requires a programmed user agent with a human interface and protocols that enable the user to manage their own identity and verifiable identity data. This agent must be interoperable with a large number of existing digital identity systems. This paper describes the design, interface and protocols. This makes three main contributions. First, a theoretical framework is proposed for aligning notions of self-sovereignty across contexts, borders and cultures. It provides more detailed, focused and structured discourse than other work and helps consolidate design efforts. Second, a design project is done in collaboration with the Kamer van Koophandel (KvK). It focuses on 'authorisation by legal entities', a class of identity providers that is necessary to meet individual and collective goals. Such systems are social and behavioural. Modelling self-sovereign identity systems seeks to analyse, design for and evaluate digital self-sovereignty, design for and evaluate digital self-sovereignty. Third, a generic common 'semantic layer' or 'protocol', consisting of a smart contract and behavioural rules, is proposed. This protocol enables end-users to retrieve their data without leaving the app. The practical value of this prototype is evaluated at a construction site. The case study shows that the Kamer van Koophandel, like other government institutions, can be a valuable data provider. However, their current legal framework and business model may restrict them. Absence of such vital institutions invites commercial parties to close the gap, threatening privacy and independence of end-users. Finally, this work has three implications for TrustChain. First, attestation metadata must be considered confidential. Second, single-sided public revocation is required to ensure credential actuality without re-issuing. And, third, it determines on a policy enables the construction of chains of trusts if it enables individuals, not just organisations, to issue claims to others.	theoretical; new concepts; informal definition to SSI	build new concepts on top of Christopher Allen's ten principles of SSI and Kim Cameron's Seven Laws of Identity, proposes a new model to debate, analyse, design for and evaluate digital self-sovereignty
114	Self-sovereign identity promises to give users control of their own data, and has the potential to foster advancements in terms of personal data privacy. Self-sovereign concepts can also be applied to other entities, such as datasets and devices. Systems adopting this paradigm will be concerned with messages passing between multiple actors, both human and representing other entities, in order to issue and request credentials necessary to meet individual and collective goals. Such systems require social and technical interactions and behaviours. Modelling self-sovereign identity systems seeks to provide stakeholders and software architects with tools to enable them to communicate effectively, and lead to effective and well-regarded system designs and implementations. This paper draws upon research from Actor-based Modelling to guide a way forward in modelling self-sovereign systems, and reports early success in utilising the iStar 2.0 framework to provide a representation of a birth registration case study.	model; SSI modeling	introduce the problem of how to model actors, actors' goals, messages, credentials, interactions in SSI





<a href="#">104.1004</a>	<p>Attribute-based credential systems enable users to authenticate in a privacy-preserving manner. However, in such schemes verifying a user's credential requires knowledge of the issuer's public key, which by itself might already reveal private information about the user. In this paper, we tackle this problem by introducing the notion of issuer-hiding attribute-based credential systems. In such a system, the verifier can define a set of acceptable issuers in an ad-hoc manner, and the user can then prove that her credential was issued by one of the accepted issuers – without revealing which one. We then provide a generic construction, as well as a concrete instantiation based on Groth's structure preserving signature scheme (ASIACRYPT15) and simulation-sound extractable NIZK, for which we also provide concrete benchmarks in order to prove its practicability. The online complexity of all constructions is independent of the number of acceptable verifiers, which makes it also suitable for highly federated scenarios.</p>	<p>hide issuer, VP without revealing issuer, issuer hiding</p>	<p>creates a ZKP VP without revealing the issuer public key</p>
<a href="#">37.29.1036</a>	<p>Secrets such as passwords, encryption keys, and certificates are used to assist in protecting access to resources such as computing devices, customer data and other information. Unauthorised access to resources can cause significant disruption and/or disastrous consequences. Given the importance of protecting these secrets to the security and privacy of many software systems, many solutions have been proposed. These solutions take two main directions: either securely store the secret and implement an access control mechanism, or divide the secret into a set of shares and distribute them in different machines (such as the Shamir's secret sharing approach or multi-party computation MPC). However, apart from the MPC approach, they all share the same limitation: once the consumer receives the secret, it can be leaked and be used by any malicious actor. We believe that the secret management should not be centralised and that the secret should never be sent to the receiver. Therefore, in this paper we propose Secretation, a new approach for managing the secrets in a decentralised way by leveraging decentralised identity concepts such as verifiable credential technologies, password-authenticated key exchange protocols and multi-party computation. The result is a more scalable and secure solution that significantly reduces the risk of leaking the secrets.</p>	<p>agent; credential access;</p>	<p> Holders do not hold credentials/data. Instead, holders' data are stored somewhere else and secured with a two-party protocol between holder and storage service. Holders do not access their data directly. Instead, RP's agents make requests and the holder's agent asks the user for authorization.</p>