Building Blockchain Solutions

Provide Authenticity and Trust to all information you create, process and share.

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Digital Disruption Is Here

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The application of new digital technologies causes seismic upheavals in all markets: retail, services, healthcare, manufacturing and even public and non-profit organizations.

The exponential growth of technology inAI, mobility, wearables, video, cloud, analytics, and other digital technologies radically transforms the ways we live, work and play.

The Agile Enterprise

In order to survive -- and thrive -- the whole enterprise needs to embrace Agility in order to become capable of rapid response to change: to unexpected challenges, events, and opportunities. Agile IT encourages rapid and flexible response to change.

APIs are the tools for agile innovation

You can use APIs to share data and information and to enable transactions in legacy applications.

APIs enable you to leverage your internal data, or third-party data, or algorithms to create new products, services and business models.

Blockchain, the Big Disruptor

For the first time there is a technology that can add indisputable Proof of Authenticity to all the information we capture, store and share. And to all the transactions we process.

Shift of Trust

Blockchain is the Big Disruptor, because it will shift Trust from (centralized) authorities and 'trusted third parties' to infra-structures and eco-systems that use mathemetics and cryptology to guarantee trust in information.

This will lead to many new possibilities and business models.

> ***"We tend to overestimate the effect of a technology in the short run and to underestimate the effect in the long run."***
>
> ***— Amara's law***

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A single version of the Truth

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Not many people are connecting Blockchain (Bitcoin's underlying technology) and the way we organize trust, work and economy, today.

Most people tend to focus on the technology rather than the application of the technology. It is in people's nature to compare it to the things they know, things they're familiar with. With the risk that they miss the essence and the disruptive character of Blockchain.

A single version of the truth

Currently each participant in a transaction has his own separate, individual ledger and therefore his own version of the truth.
Which is why we need to rely on intermediaries to provide trust and consolidation, which is inefficient, error prone and fraud sensitive, and leads to disputes.

With Blockchain there is a single ledger, shared by each participant as the single version of the truth.
So, we now no longer need to rely on intermediaries, which is much more efficient, safer and cheaper.

Indisputable Proof of Authenticity

By combining mathemetics and cryptology together with consensus methods, Blockchain prevents tampering with the data it stores.
By using digital identities to digitally sign the data we write on a Blockchain, we can prove the author who wrote the data.
Blockchains automatically time-stamp every transaction it records.

Because of this, we inherently can trust the information on a Blockchain: *Who* did *What* and *When*.

For the first time ever we have a technology that can add indisputable Proof of Authenticity to all the information we create, store, process and share.

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Truth of Ownership

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Ownership of assets

With the internet we can easily share information. Copy it. Reuse it. Which is great! However, our society and economy are based on ownership of assets; Assets that have a value, whether they are physical or digital.

This is one of the main problems with the internet today: we don't want those assets to just be copied and reused — at least, not without any compensation or credit.
As with any transaction, we want to make sure that the sender is the rightful owner and receives compensation.

Fractual ownership of assets

Tokenization is a method to represent an asset as a digital entity. Like we did in the past when countries held gold and used money to represent it.

Tokenization offers an extra dimension to the ownership of assets. It enables you to split a single asset into multiple smaller parts, allowing and proving ownership of a single asset by multiple parties. And transfer of this ownership between parties.
Like we are used to with shares in companies.

An extra layer on top of the internet

We believe Blockchain should be seen as an extra layer on top of the internet.
There are important functions that Blockchain adds to the internet as it exist today. Blockchain enables you to prove that you are the owner of the asset. That only you can transfer ownership and can transfer it only once. And that this transfer of ownership will be done safely. These three principles can be programmed through a Blockchain protocol in such a way that they are tamper-proof, undeniable and can implicitly be trusted.

And these principles are not only applicable for assets in the Financial sector, but for all sectors of our society: Government, Healthcare, Supply Chain, Human Aid, Art, Education, Research, to name just a few.

Blockchain enables a fundamental change to the ownership of assets as we know this today.

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Blockchain, How does it work?

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Blockchain is best described as a distributed and replicated database.

Typically, a traditional database is stored in a central location, somewhere on a networked server.
The database is managed by one or more database administrators.
Users must be authorized to use the database. User transactions store, change and read data in the central database.

By contrast Blockchain is a decentralized database that is replicated on thousands of computers globally through the use of a peer-to-peer network.

A user-transaction added to the Blockchain database is replicated to all nodes in the network. The network uses a mathematical consensus mechanism to validate and approve each transaction.
Only after validation and consensus the transaction is committed to the database.

This database can typically be accessed by anyone (public blockchain) or anyone with a permission to access the database (permissioned blockchain).

Key concepts of Blockchain

Distributed ledger
A ledger is shared over many nodes in a peer-to-peer network. Transactions are hashed and then replicated in all the shared ledgers.

Hashing
Any generic data set (a value, a file, a database, the status of a transaction, etc.) can be hashed to produce a short unique identifier, an electronic fingerprint, called a hash.

Consensus
All transactions are validated through a consensus mechanism before they are committed. Different Blockchain systems can have different consensus mechanisms.

Public, Private or Permissioned Blockchain
A *Public* ledger can be used by anyone. By contrast a *Private* ledger is maintained and accessed by a single organization.
A *Permissioned* ledger is distributed, shared and used by multiple but specifically authorized users.

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Blockchain:
What can I do with it?

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Certify and authenticate content

You can create a unique electronic fingerprint (hash) for any document, object or data and store this on a Blockchain.

Anyone that has access tot this object can now verify the authenticity by simply recreating the hash and verify it on the Blockchain.

When the object is unchanged, the hash will still be the same and is found on the Blockchain, including the timestamp of registration.

Create independently verifiable audit trails

The same method can be used to register steps in a workflow process on a Blockchain.

Each registration is linked to a specific case, document version, associated data and action, creating a chain of transactions.

An auditable trail that can then be verified by (autho-rized) third parties, providing Transparency, Compliance and -- most importantly -- Trust.

Interact with Smart Contracts

The Sphereon Blockchain API can also interact with so-called Smart Contract applications.

This allows you to provide input required to execute a Smart Contract directly from within your applications.

Create a better Electronic Signature solution

Use Blockchain to sign *any* digital object, not just PDFs, with a legally binding Digital Signature.

Without the need for a central Certificate Authority or central Time-stamping server.

The Digital Signature also lives independent of the object which enables parallel signing and independent verification, with or without the object itself.

Sign and certify IOT data

We offer a microprocessor and software that will create a digital identity for an indivual IOT-device, as well as a private/public keypair. It will use these keys to sign the hashes of all data originating on the IOT-device, certifying which device created what data when. And prove the data has not been tampered with.

Tokenization of processes and eco-systems

Tokens can represent any asset. This enables you to replace goods, services, valuables with a token as a ‘store of value’.

Blockchain enables you to transfer ownership of an asset. It prevents ‘double spend’ and prove ownership of an asset in an easy and independent way.

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Sphereon, an API-driven cloud platform

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Sphereon offers an innovative platform that allows your organization to use APIs for Information Management, Document Processing and Blockchain.

Easy integration

We provide standard integration plug-ins for Alfresco, MS SharePoint and Office 365, making it very easy to integrate Sphereon, without the need of low level programming.

A broad range of intelligent APIs

Sphereon offers many smart APIs to extend and enhance the applications and solutions that you build for your business and for your customers.
We offer APIs that unlock information stored in legacy ECM systems, Enterprise File Shares and Document Stores.

Also APIs that capture and extract data from objects, such as emails, photos, images, and documents.

Several of these APIs use Artificial Intelligence, for example to analyze or classify data objects, photos and documents.

Sphereon Blockchain APIs

Or use our Blockchain APIs to digitally sign emails, objects and documents.
Or to log transactions, data or objects as immutable and independent verifiable records.

- **Blockchain Proof API**
  A high-level API to prove, or disprove, the existence of any digital content at a certain point in time.

- **Easy Blockchain API**
  Provides a blockchain agnostic solution to create and manage interlinking Blockchain data structures.

- **Crypto Keys API**
  To create, import, and manage Secrets, Keys and Certificates. The API includes integration with MS Azure KeyVault.

Online Developer Documentation on all our Blockchain APIs can be found on the Sphereon.com website

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Using Blockchain to Sign and Verify Documents

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Use our Blockchain Proof API to 'sign' an object.
Our Blockchain Proof API creates a unique electronic fingerprint (a hash), using a standard hashing algorithm as the identifier of your object. Or generate your own hash and pass it to our API.
Using our Crypto Keys API we sign each transaction using a cryptographic key to guarantee the authenticity of the party that performed the transaction.

The transaction then gets registered into the Blockchain ledger. The transaction is automatically time-stamped.

It is important to know that the object itself will *not* be stored in a Blockchain, just the hash.

Verification
Using a secure and trusted verification site, or our Blockchain Proof API, an object can now be verified.

The unique electronic fingerprint is created again and verified against the Blockchain.

If there is a match (there should be a match), the API returns a valid match as well as the original time-stamp. If not, the document is not identical: it has been changed and should not be trusted implicitly.

Blockchain Agnostic
Our Blockchain APIs are not linked to one specific Blockchain infrastructure, through an abstraction layer they are Blockchain Agnostic.

We support multiple public and permissioned Blockchains with a set of generic APIs.
For example, we support Factom, Ethereum, Hyperledger, Multichain and others.

We offer a generic API around these different Blockchains, hiding the complexities of their low-level APIs and things like wallets and coins.

This provides easy access to these often very complex technologies, as well as flexibility to switch, link or adopt new blockchain technologies as they become available.

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A better Electronic Signature using Blockchain

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Electronic Signatures

There are several Electronic Signature solutions available on the market today. These solutions allow you to add legally binding signatures to documents. They also offer the functionality to enable external parties to sign documents.

Disadvantages of traditional solutions

Firstly, these traditional signatures can only be added to PDF or Microsoft Word documents. Only these files offers support for storing the signed certificates.

Secondly, you need to get an expensive certificate from a limited group of Adobe approved *central* Certification Authorities (CA).
Besides this dependency on a central CA, you are also dependent on a central Time-stamping server.

Another drawback is that the digital signature is stored *inside* the document. This means that whoever needs to check if a document is signed, will have full read access to all the content in the document.

Also, because the document changes with each signature, signing documents in parallel is not possible: everybody needs to sign the document sequentially.

Create better Electronic Signature solutions

Our Blockchain solution offers the same functionality and the same legal basis, plus we add important functionalities to create much better solutions.

Sign any digital object

First of all, we support Digital Signatures for *any type of digital object,* not just PDF and office documents, but also drawings, pictures, videos, audio, or just data.

Additional information on Blockchain

We also enable you to add additional information to the transaction on Blockchain, for example who signed or a status or a geo-location or any other value.

Independent verification

With the registration on a Blockchain, the Digital Signature also lives independently of the object, which enables independent verification, with or without the necessity of having access to the object itself.

Parallel signing of documents

Since the object is not changed by the signature, it also enables you to sign documents in parallel and implement business rules based on mandates, 4-eyes, majority vote, seniority, etc.

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Using Blockchain for Compliance and Risk, Transparency and Trust

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Compliance and Risk solutions

For most businesses specific rules and regulations exist that must be adhered to: internal as well as external rules dictated by governments and regulatory bodies.

Create independently verifiable audit trails

Using our Blockchain API you can register each step in a process on a Blockchain.

Each registration is linked to a specific case, object, version and action, creating a chain of transactions: an independently verifiable audit trail.

Create Trust

As this audit trail can then be verified by (authorized) third parties, this provides a high level of transparency.

Internal- and external controllers, stakeholders and regulatory bodies can easily verify Compliance, which — most importantly — results in Trust.

Regulators and Auditors

Regulators and auditors already require you to keep audit-logs for all your transaction systems.

As such, why would you accept anything else than *immutable* audit-logs!?

Integration with existing Business IT systems

Sphereon is coming from an enterprise software background, with a focus on Business Process Management and Document Processing,

We know that organizations are heavily vested in existing Business IT systems and that implementing new technologies can only be successful if they can easily be integrated in the existing IT landscape.

Sphereon has standard plug-ins and integrations for existing systems, such as Alfresco, Kofax, Microsoft SharePoint, Office 365 and Azure.

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Using Blockchain for Smart Contracts

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Smart Contracts are *self-verifying* and *self-executing*, computerized transaction protocols, stored on a Blockchain, that perform the terms of a contract.
Put very simply, Smart Contracts are a piece of program-code on a Blockchain.

What makes Smart Contracts special is that they are uniquely tamper proof.

When they are executed, these Smart Contracts run on node networks, which nobody controls, nobody can tamper with, and therefore everyone can trust.
This assures all participants that the contract will be executed as it was written.
Unchangeable. Impossible to influence.

You can create these kinds of applications yourself using public tools, such as DAML or Solidity.

DAML Smart Contracts

DAML is such a leading open-source smart contract language for building multi-party workflow applications on a safe, privacy-aware runtime.

DAML enables you to run business processes where several parties in an eco-system or chain particpate and keep a verifiable, transparent audit-trail for all stakeholders.

Key concepts in Smart Contracts

Oracles
Are pre-defined data sources, often from trusted and independent parties.

Self-verifying
Means that a Smart Contract performs its own evaluation and keeps a provable recording that a contractual performance has occurred: it records the performance of various pre-defined data feeds as defined in the Smart Contract.

Self-executing
This means that the Smart Contract is executed once the preset conditions have been met.

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Signed at Source[TM] Certification of IoT data

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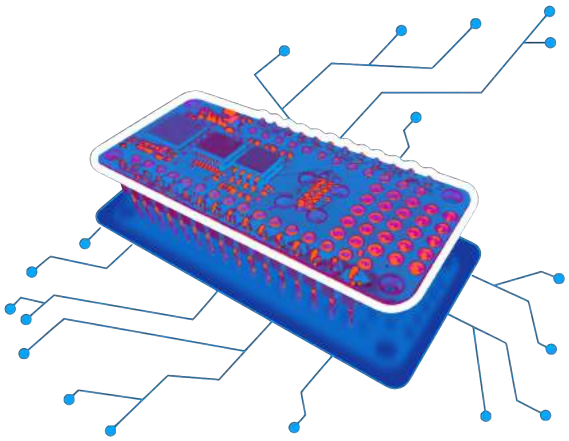
Secure your data, as close as physically possible to its source, using a IOT-SAS cryptographic signing chip. This micro-controller also gives you an accelerated cryptography solution, yet with low power consumption, in a small package.



Tamper-Proof Data

Hacking and spoofing attempts are impossible by cryptographically signing data within the device itself. Any doubts about data veracity during or after transport are removed as integrity is maintained from its source.

Immutable Data

IOT-SAS leverages blockchain technology to store either a hash or the raw data itself.
A key property of this technology is immutability and unchangeability, allowing absolute and irrefutable proofs about the data to exist.

Never doubt the integrity of your IoT data again.

Seriously ... Never!

Third-Party Auditable

Blockchain allows for a shared and completely trusted record of data.
This can be achieved through a public blockchain or a permissioned, private architecture.

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Tokenization of assets, processes and eco-systems

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Tokenization and Blockchain

Tokens can represent any asset. This enables you to replace goods, services, valuables with a token. Using tokens with Blockchain enables you to transfer ownership of an asset. Blockchain prevents the 'double spend' of tokens and prove the ownership of an asset in an easy and independent way.

Tokenization of Social Benefits

An good example is the use case where we tokenize Social Benefits programs for municipalities.

Citizens that are entitled to extra benefits will receive tokens with a specific value and rules. For example, to buy warm clothes for the winter, to visit a theater or for their childeren to join a sportsclub.

These tokens can be exchanged for these goods or services (and only for these goods or services) at participating providers.

The municipality automatically settles the tokens received by the provider, because all transactions are signed and logged on a blockchain.

This saves all parties a lot of work because they can trust in the process.

About tokens

Think of a banknote as a token: a banknote has a specific aspects and rules. For example: Euro and 20, you can use it in exchange for goods or services in Germany, The Netherlands, France, but not in the United Kingdom or Unites States.

Fungible tokens

Just like Euros, Bitcoins are fungible, meaning that every Bitcoin is equal to, and can be exchanged for, another Bitcoin without any loss of utility or change in its perceived value.

Non-fungible tokens (NFT)

These tokens have specific characteristics attached to it, making the token unique, one of a kind. Like with art, you cannot exchange one old master painting for another: they are unique.

You can divide a token in multiple smaller tokens to co-own an asset and sell or buy parts of it. Like we're used to with shares in companies.

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Co-creation in a Partner Ecosystem

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Change is not a constant, change is exponential

We live in a time of exponential growth of technology as described by Moravec, Vinge, Kurzweil and others.

Organizations will need to participate in ecosystems of networked vendors, partners, contract workers, as well as customers, that work together in order to thrive in today's fast-moving, hyper-connected world. We need to work together and co-create new products, services and business models faster and smarter.

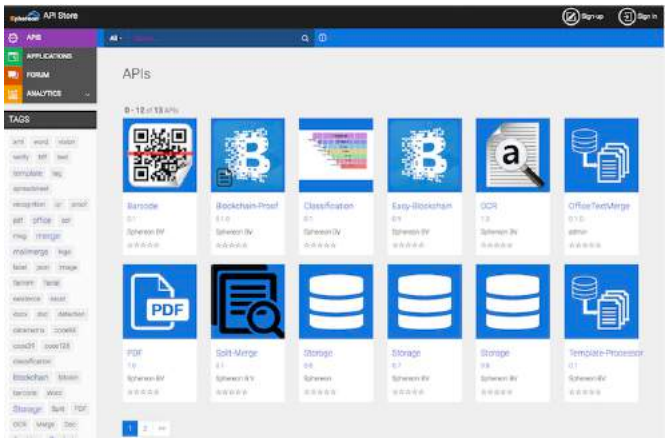
We need to create real partnerships

The best partners have a deep, industry-specific, expertise across technologies and markets, creating the crucial ability to provide not only IT solutions and services, but also business knowledge.
Each partner will benefit from the "network effect" of the other organizations' knowledge, experience and efforts.

Sphereon is actively looking for such partnerships to co-create solutions for tomorrow today. It is, in fact, our business model.

store.sphereon.com

Our APIs are public and published in our API Store.



All our APIs are accompanied by extensive online documentation, live-try-outs, sample-code and SDKs for all modern programming languages like Java, C#, PHP, Phyton, and many more.

Online Developer Documentation on all our Blockchain APIs can be found on the Sphereon.com website

APIs are essential to Blockchain. They are the building blocks for all Blockchain solutions.

Provide Authenticity and Trust to all information you create, process, store and distribute.

About Sphereon

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Sphereon is an innovative software company, often ahead of the curve, based in The Netherlands.

Sphereon was founded in 2015 by experienced industry veterans and a young CEO, with a mission to develop the Sphereon platform.

Sphereon provides an API-driven cloud platform for Document Processing and Blockchain.

The Sphereon platform is built using modern Micro-services technologies, while the functionality is based on our industry experience and the input and feedback from our partners and customers.

APIs are a crucial building-block in today's API economy. Where it is all about agility and co-creation is the name of the game. Adapt or Die.

This API-first, Cloud-first, approach allows us to offer our customers a very close integration with their projects and quickly adapt to their ever-changing needs.

It is our mission to help you quickly build powerful and flexible solutions that are relevant to your business.
Adopt, Adapt, Improve.

Our success is a result of the solutions that we build together with you, our customers. We provide the software platform and you have the knowledge and experience in your market domains.

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