

Understanding Smart Contracts & How They Work

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What is a 'smart contract'?

- ▲ programmatically-executed transaction (PET)
- ▲ computer code that, upon the occurrence of a specified condition or conditions, is capable of running automatically according to prespecified functions
- ▲ Use of distributed ledger technology

It's software...
what could possibly go wrong?

- ▲ A bit of history (1994)
- ▲ Smart contracts can be viewed as part of an evolution to automate processes with machines and self-executing code.

A 'smart contract':

- ▲ May incorporate the elements of a binding contract (offer, acceptance, and consideration), or may simply execute certain terms of a contract.
- ▲ Allows self-executing computer code to take actions at specified times and/or based on reference to the occurrence or non-occurrence of an action or event (delivery of an asset, weather conditions, or change in a reference rate).

- ▲ Existing smart contract use cases do not replace (the entirety of) natural language contracts with computer code, particularly in the case of high-stakes or complex transactions

What can they be used for?

Examples:

- ▲ iTunes
- ▲ e-scooter rental
- ▲ AXA flight insurance
- ▲ GuildOne

Operational vs. Non-Operational

Operational

- ▲ completed for successful performance of transaction
- ▲ steps that can be automated

Operational vs. Non-Operational

Non-Operational

- ▲ elements that cannot be automated
- ▲ boilerplate clauses
- ▲ example: governing law, dispute resolution, governance
- ▲ concepts such as “good faith,” “commercially reasonable,” “force majeure”, “gross negligence”, “mistake”, “lack of capacity”, or “duress”

Human Readable vs. Machine Readable

dated as of **16-Mar-2016**

```
{  
  "id": "Agreement Date",  
  "type": "Date",  
  "value": "16-Mar-2016"  
}
```

Human Readable vs. Machine Readable

(x) the amount of cash in such currency on that day; multiplied by
(y) the relevant Interest Rate in effect for that day; divided by
(z) 360 (or, in the case of pounds sterling, 365)

```
{  
  "id": "DailyInterestAmount",  
  "type": "Expression",  
  "value": "(CashAmount * InterestRate ) / (if Currency == 'GBP' then 365 else 360)"  
}
```

Challenges:

Technical Challenges

- ▲ Drafting 1:1 Coding
- ▲ Control over anything off-ledger or off-network

Legal Challenges:

- ▲ Enforceability
- ▲ Flexibility vs. predictability
- ▲ Modification
- ▲ Automated vs. non-automated elements

Enforceability

- ▲ Legal / dispute resolution
- ▲ binding / non-binding arbitration
- ▲ courts of law (which jurisdiction?)
exercising rights under control of the courts

Technical Enforcement

- ▲ "tamper-proof" technology / "unstoppable"
software agents
**fulfilling obligations, or exercising rights, that are
under control of the network**

Enforceability

Can a 'smart contract' be a binding legal contract?

▲ Potentially, but not necessarily.

Do legal frameworks apply to 'smart contracts'?

▲ Yes, smart contracts may be subject to a variety of legal frameworks depending on their application and the participants or parties who are involved.

Examples include:

- ▲ Commodity Exchange Act and CFTC regulations.
- ▲ Federal and state / provincial securities laws and regulations.
- ▲ Federal, state/provincial, and local tax laws and regulations.
- ▲ The Uniform Commercial Code (UCC), Uniform Electronic Transactions Act (UETA), and Electronic Signatures in Global and National Commerce Act (ESIGN Act).
- ▲ Bank Secrecy Act.
- ▲ USA Patriot Act.
- ▲ Other Anti-Money Laundering (AML) laws and regulations.
- ▲ State and federal money transmission laws.

Existing law and regulation apply equally regardless what form a contract takes.

Contracts or constituent parts of contracts that are written in code are subject to otherwise applicable law and regulation.

A word about intermediaries...

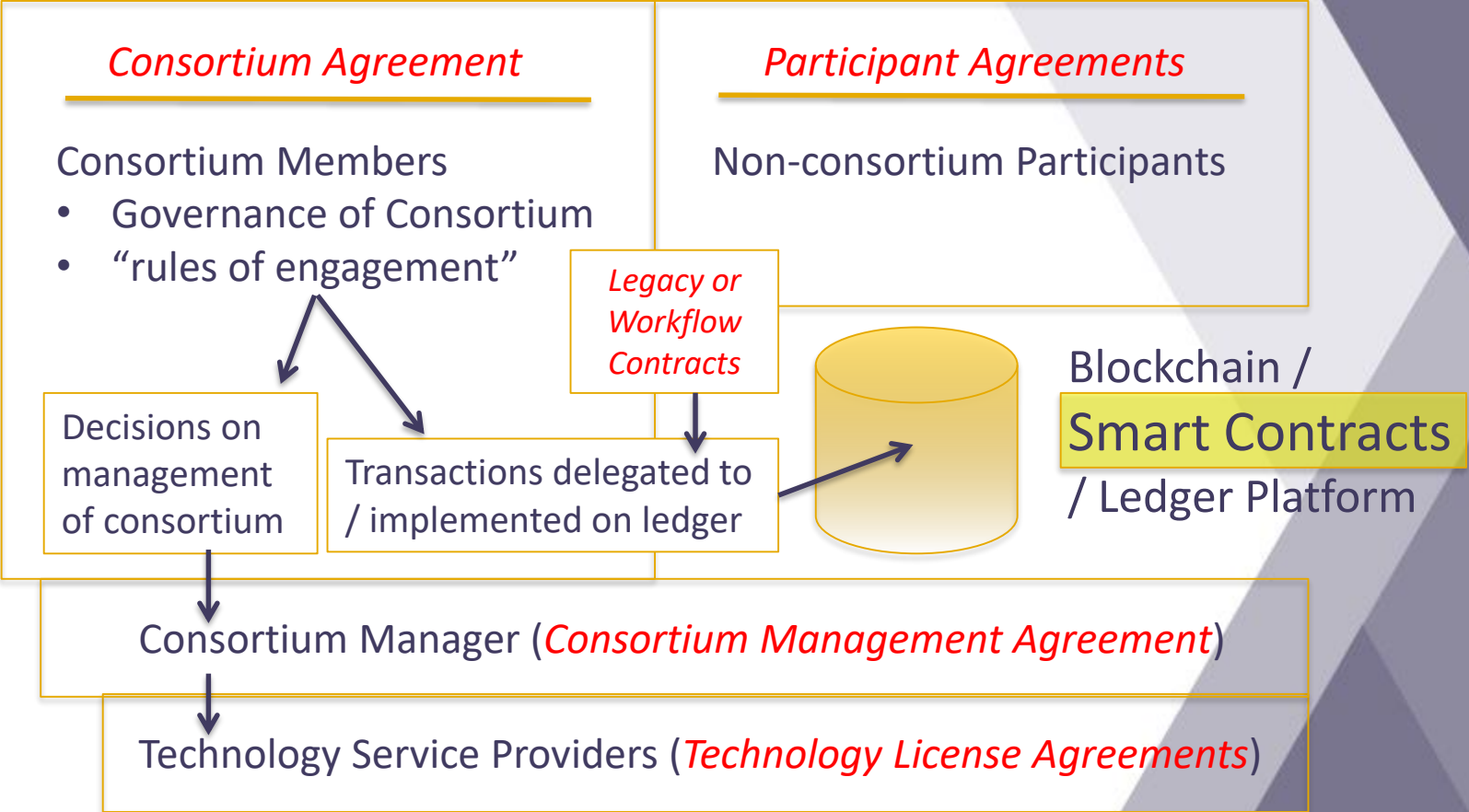
Governance

Governance of the Smart Contract Relationship

▲ Contractual Matrix

- Governance structure
- Layering of "traditional contracts" vs. "smart contracts"

GOVERNANCE ISSUES WITHIN PERMISSIONED SYSTEMS



AXA goes blockchain with fizzy



Your insurance works in 100% of cases.

Transaction Information ⏪ ⏩

Tools & Utilities ▾

TxHash: 0x9961922aca19ac8337c3a728036a00e3341da55b5761e7c56b8ed35d5812fda4

TxReceipt Status: **Success**

Block Height: 7169730 (35840 Block Confirmations)

TimeStamp: 7 days 10 hrs ago (Feb-03-2019 07:07:32 PM +UTC)

From: 0x50e00de2c5cc4e456cf234fcb1a0efa367ed016e

To: Contract 0xe083515d1541f2a9fd0ca03f189f5d321c73b872 ✓

Value: 0 Ether (\$0.00)

Gas Limit: 132061

Gas Used By Transaction: 120055 (90.91%)

Gas Price: 0.000000014 Ether (1.4 Gwei)

Actual Tx Cost/Fee: 0.000168077 Ether (\$0.02)

Nonce & {Position}: 19719 | {109}

Input Data:

#	Name	Type	Data
0	flightId	bytes32	4c482e363031312e313534393735363830303030300000000000000000000000
1	limitArrivalTime	uint256	15497907000000
2	premium	uint32	5
3	indemnity	uint32	150
4	productId	bytes32	6661622835333437396231373432636538366331326362353561326636396262

2019-09-09 *Decoded input inspired by Canoe Solidity*

#	Name	Type	Data
0	<u>flightId</u>	bytes32	4c482e363931312e3135
1	<u>limitArrivalTime</u>	uint256	<u>1549790700000</u>
2	<u>premium</u>	uint32	5
3	<u>indemnity</u>	uint32	150
4	productId	bytes32	66616233353334373962

AXA FIZZY

CONDITIONS GENERALES DU CONTRAT FIZZY VALANT NOTICE D'INFORMATION

Article 1. DÉFINITION

Dans ces *Conditions Générales* et dans vos *Conditions Particulières*, les mots ou expressions en italique, qu'ils soient au singulier ou au pluriel, au masculin ou au féminin, ont la signification qui suit :

<p>« <i>assuré</i> » ou « <i>souscripteur</i> » ou « <i>vous</i> » :</p>	<p>Désigne toute personne qui souscrit un <i>Contrat FIZZY</i> pour couvrir tout ou partie du <i>dommage</i> qu'elle est susceptible de subir (en qualité d'assuré) du seul fait d'un <i>retard</i> du <i>vol</i> pour lequel elle dispose d'un <i>Billet</i> à son nom.</p>	<p>« <i>Contrat FIZZY</i> » : ou « <i>Contrat</i> » : ou « <i>FIZZY</i> » :</p>	<p>Désigne le contrat d'assurance dont l'objet est défini dans l'0 des présentes <i>Conditions Générales</i> et qui est formalisé dans votre police d'assurance constituée de ces <i>Conditions Générales</i> et de vos <i>Conditions Particulières</i> émises à l'issue du processus de souscription.</p>
<p>« <i>assureur</i> » ou « <i>nous</i> » :</p>	<p>Désigne l'assureur du <i>Contrat FIZZY</i> : INTER PARTNER ASSISTANCE (« IPA »), SA de droit belge au capital de 31 702 613 €, agréée par la Banque Nationale de Belgique sous le numéro 0487, BCE 0414 591 055 - siège social : Avenue Louise, 166, 1050 Bruxelles – Belgique, par l'intermédiaire de sa succursale irlandaise dédiée au monde du voyage - CRO 906 006 - C47746 - située 10/11 Mary Street –1 – Dublin – Ireland.</p> <p>L'<i>assureur</i> ayant délégué la souscription et la gestion des <i>Contrats</i> et des <i>sinistres</i> à AXA Global Parametric (« AGP »), nom sous</p>	<p>« <i>dommage</i> » :</p>	<p>Désigne la perte de temps qui résulte de la réalisation d'un <i>sinistre</i> et sa traduction en terme pécuniaire en raison de la perte, du manque à gagner et/ou du gain manqué directement associés à cette perte de temps.</p>
		<p>« <i>éléments d'identité</i> » :</p>	<p>Désigne les données personnelles <i>vous</i> concernant. Il s'agit de votre Adresse email, de votre Prénom, de votre Nom, de votre adresse, de votre pays de résidence et, uniquement depuis votre <i>espace personnel</i>, de votre numéro de téléphone mobile.</p>

Regulatory Environment:

▲ Legislation –

- UK Law Commission / UK Law Society
- Ohio, Tennessee, Arizona, Wyoming, Delaware

▲ Case Law –



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