

How to choose Blockchain over traditional systems??

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Course name: Blockchain Technology

According to you, What do you pay for when you use a blockchain?

- Do you buy a product, a service or a mix?
- What are the key elements to take into account to produce services?
- What is the client implication in the service production?
- How can value-chain models be characterized?
- How can a provider evaluate the value chain of its services?
- Is the value evaluation similar for a client?

According to you, What do you pay for when you use a blockchain?

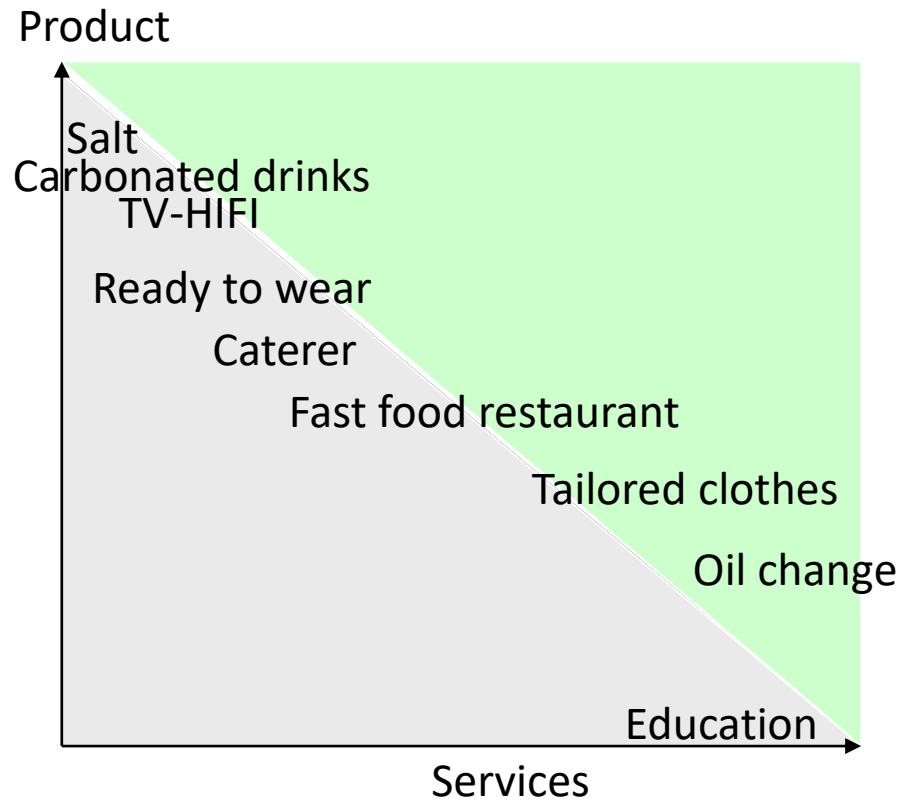
- In this part you will
 - Learn basic elements on product-service systems
 - Learn basic characteristics of service production system (named servuction)
 - Learn basic elements on value chain models
 - Learn how to integrate the service production process in the value analysis
 - Get information on the elements to integrate in a Blockchain service value chain

Tentative definition of a service

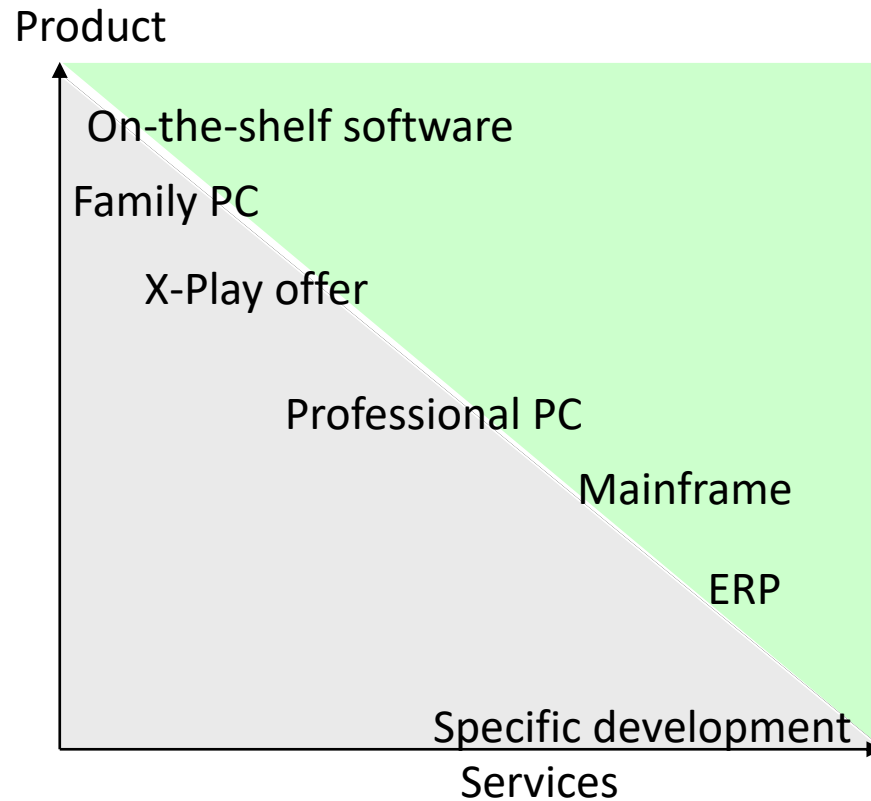
- Definition by opposition with
 - Tertiary sector
 - Do not belong to the primary sector: agriculture and fishing
 - Do not belong to the secondary sector: industry
 - Product vs service
 - Tangible vs intangible
- Software and information
 - Product: « tangible » goods : hard / soft / telecom
 - Services: intangible goods
 - Data
 - Specific studies

Product – service organization

- Shostack Matrix (1977)



- IT Product-service adaptation



Servuction: production of services

- Servuction = Production system to produce services
 - Integrates the role of the client
 - Separate front office
 - Contact with the client
 - Hardware and staff
 - Internal organization
 - Can be industrialized
 - Rational process organization
- Based on Eiglier and Langeard's model (in 1987)
 - Integrate the service concept in a production logic

Servuction in the IT context (1)

- Parameters to take into account
 - Client relation
 - Where is achieved the service
 - At the client's place
 - In the service company
 - Level of expertise of the service
 - Low
 - High: need headquarter support
 - Repeatable process?
 - Process standardization
 - Possible industrialization?

Servuction in the IT context (2)

- Front office / back office separation
 - Front office: interacts with the client
 - Studies
 - Application maintenance at the client's place
 - Development done at the client's place
 - Back office
 - Expertize center
 - Remote maintenance
 - Remote development
- Industrial rationalization of the back office
 - Outsourcing
 - Offshoring

Customer's implication (1)

- Service is defined as an interaction between the service company and its client
 - Commercial relation
 - Contractual dimension
 - Can be separated from the execution
 - “Services meeting” (defined by Czepeil in 1980)
 - During the production of a service
 - Interaction with the system of service (staff/equipment)

Customer's implication (2)

- Different types of relation
 - Dominant
 - Dominated
- Different types of participation
 - Active
 - Passive

Customer's role (1)

- Different roles
 - Definition of the service
 - Promotion
 - Innovation (demand of new services)
 - Control of the service provision
 - Realization (partial)
 - Consumption
- Benefits for the client
 - Match the needs
 - Cost
 - Appropriation?

Client's role (2)

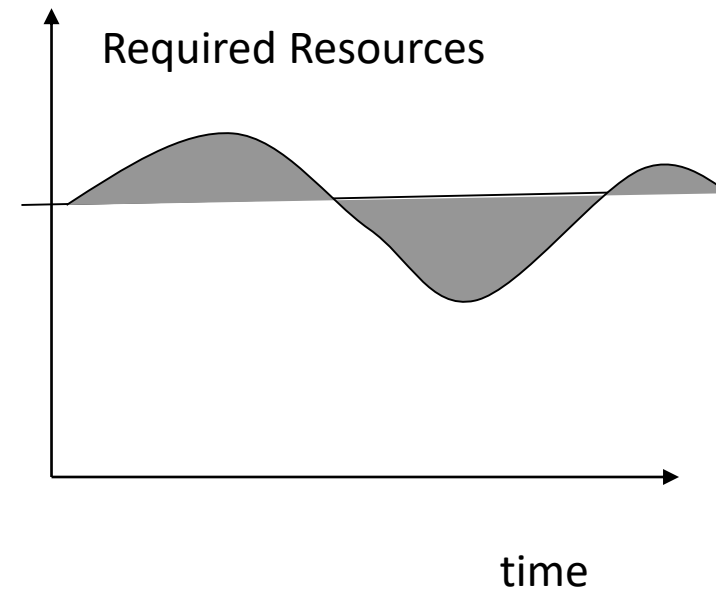
- Management of functions
 - 2 dimensions to take into account:
 - Co-production: Who achieve the work
 - Low co-production when the client or the provider achieve separately the (quasi) full work
 - Strong co-production when the client and the provider collaborate to produce the service
 - Co-steering: Who control the system
 - Low co-steering when the control is achieved only by the client or by the provider
 - Strong co-steering when the client and provider collaborate to control the system
 - Management of conflicts risks

Management of servuction

- Different problems
 - Back-office organization
 - Possible industrialization
 - Sub-contracting
 - “Balance” amongst the different missions
 - Front office Organization
 - Pressure from the client
 - Possible to standardize?
- Demand management
 - Just in time organization
 - Is it possible to organize some “client storage” ?

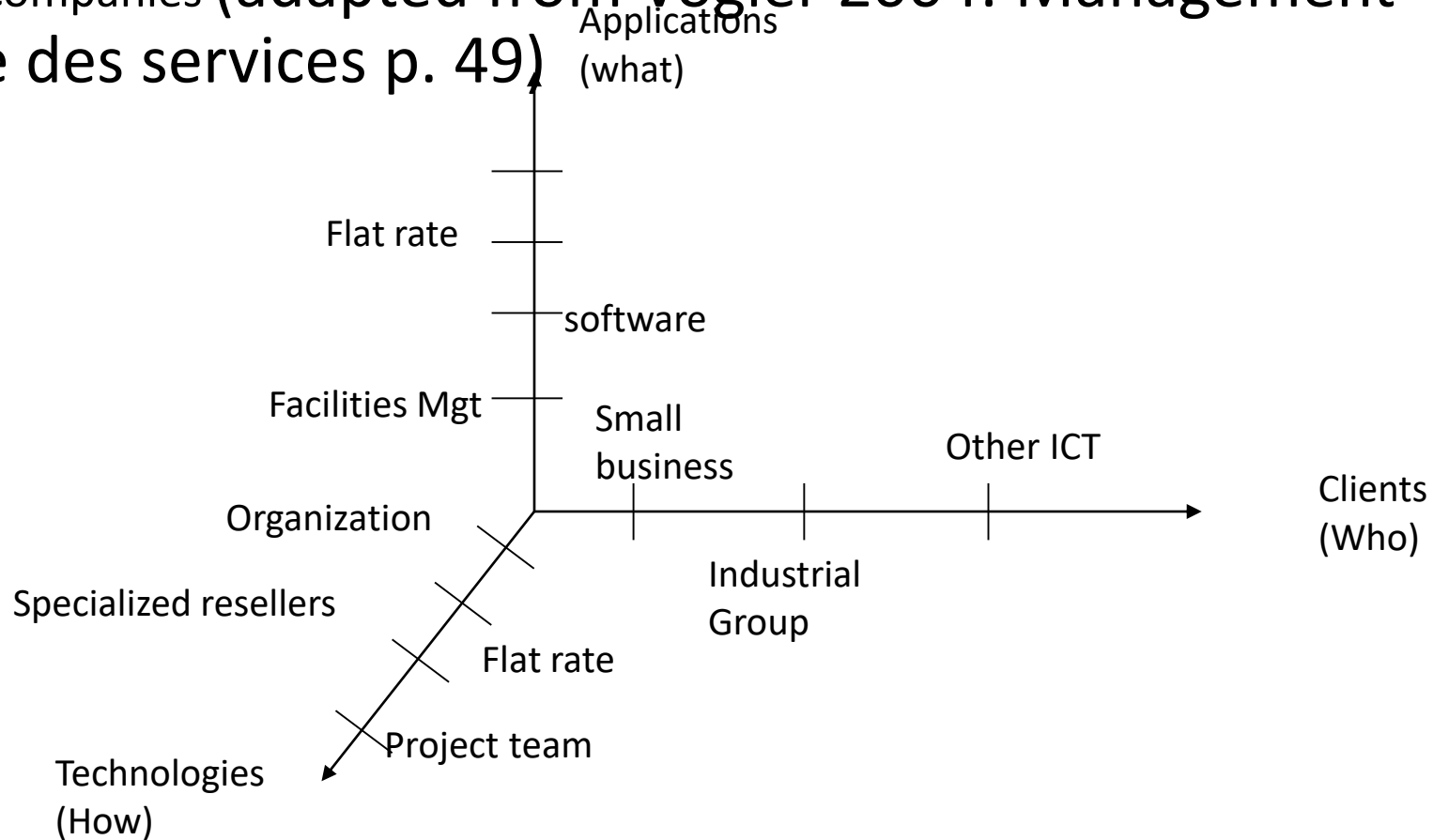
Production management logics

- Production management
 - Inventory based management: seasonal variation
 - Pushed flow management: know the demand
 - Just in time
- A service is ephemeral
 - Cannot be stored
 - Just in time logics
 - Resource management?
 - Act upon the demand
 - Yield management
 - Suppliers?
 - Staff
 - Competencies
 - Management of relations
 - outsourcing
 - Depend on contracts



Offer of Information Technology (IT) services

- Typology of IT companies (adapted from Vogler 2004: Management stratégique des services p. 49)



Blockchain servuction system

- Different problems
 - Back-office organization: Operation
 - Mining / transaction validation depending on the chosen blockchain technology
 - Optimization of resources to get the best mining process
 - Management of operation teams to support infrastructure operation
 - Front office organization
 - Wallet interface
 - API / connectors with legacy information system (for private blockchains)
 - Access to support
- Demand management
 - Blockchain customer must accept the intrinsic delay
 - Validation fees need to be adjusted depending on the demand

Public vs private blockchain servuction

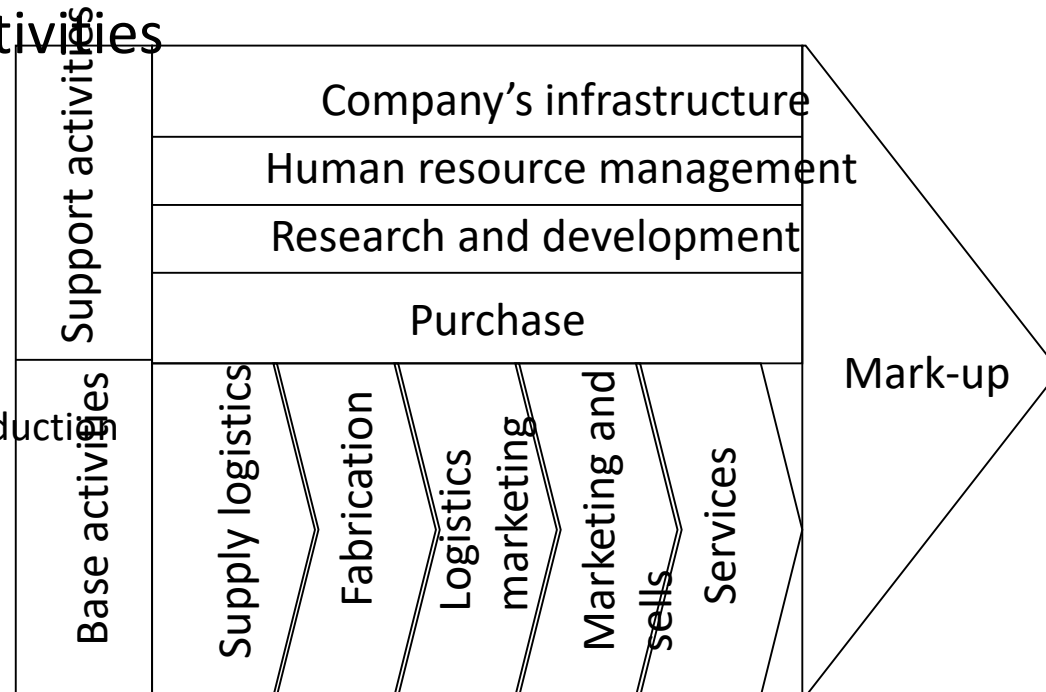
- System adjustment
 - ❖ Miners community development
 - ❖ Transaction fees
 - ❖ Shared computing resource
 - Front office
 - ❖ User experience
 - ❖ Reduced to wallets
 - Security
 - ❖ Managed by the consensus proof
- System adjustment
 - ❖ Well-known demand
 - ❖ Contractual relationships with mining and infrastructure services
 - Front office
 - ❖ Exended Information Systems connectors
 - ❖ Efficiency
 - Security
 - ❖ Core component
 - ❖ Development of access control methods

Blockchain sizing

- Intrinsic delay
- Take the needs into account
 - Average
 - Consumption peaks
- Saturation points
 - Increasingly powerful processors but...
 - Bottlenecks
- Stakes
 - Charge balancing
 - Optimized management of resources
 - Optimized management of transactions fees/ transaction pricing

Traditional value chain description

- Porter's model (defined in 1985)
- Company's static organization through the value chain
 - A combination of 9 generic activities
 - Bring value to the client
 - Complete process analysis
 - Demand
 - Well identified
 - Stable
 - Looking for efficiency => Cost reduction
- Problems
 - Agility?
 - Other efficiency criteria?
 - Price adjustment?



Towards a networked value model

- Introduced by Allee in 2002
- Competition based upon:
 - Performance (cost/ speed...)
 - Quality
- Business process driven by the value perceived by the client
 - Centered on client and not on the production process
 - Principal flow from the client towards the supplier
 - More « volatile » demand
- Give great importance to knowledge as a source of value
- Tangible and intangible value creation

Key differences with Porter's model

- Human centered model
 - The process is controlled by the user
 - Importance of the knowledge
- Encourage innovation
 - Does not require a fixed and optimized process
 - Favors agility and reactivity
- Transparent and partnership-oriented
 - Take exchanges into account
 - Not one-way exchanges
- Global optimization

Value analysis: from cost to value

- Traditional approach
 - Cost analysis
 - Add a margin
- Centered on the clients
 - For what are they ready to pay?
 - Impact on their « process »
 - Exact answer to their needs
 - Assessment covering all the actors
 - Evaluate necessary customization
 - Niche market
 - Product with different variants

Value analysis according to lean strategy

- General analysis of different value chains
 - Assessment according to the process
 - Logics based on flows
 - Analysis of waste points
 - Analysis of flows convergence and synchronization
 - Flow pulled from the client to the raw material
 - Analyze the size of lots
- Identify the waste points
 - Continuous improvement
 - Re-synchronize the process, the size of lots, ...

Organization of the servuction process

- Organization step carried out after the analysis of the value chain
 - Identification of the objective
 - Organization of the flow including design, order, and the product itself
 - Globally rethink the process
 - Avoid the sources of wastes
 - Deploy quality function by function
 - Integrate support processes
- Organize the process
 - Continuous flow
 - Management of task complexity
 - Smoothed schedule

According to you, How can you describe the blockchain ecosystem?

- Is there one or different models of blockchain ecosystem?
- How value is regulated in a blockchain ecosystem?
- Who are the main actors? How do they interact with their environment?

According to you, How can you describe the blockchain ecosystem?

- In this part you will
 - Learn key elements to characterise a blockchain ecosystem
 - Learn how internal regulation mechanisms are set
 - Identify key actors
 - Identify how the ecosystem interact with its environment

Blockchain typology

- Different blockchain technologies
 - Blockchain 1.0
 - Crypto-currency
 - Public blockchain
 - Validation paid by tokens
 - Blockchain 2.0
 - Include smart contract
 - Miners and developers are paid using tokens
 - Permissioned or permissionless systems
 - Blockchain 3.0
 - Blockchain middleware
 - XaaS model

Blockchain targeted usage context (1)

- Usage perimeter
 - Who will use the system
 - Permissioned
 - Users are well identified
 - Permissionless
 - For public blockchain
 - Identify potential users to identify the associated market
 - Community development strategy
 - For private blockchain
 - Who will participate
 - Cooptation mechanism
 - Costs sharing strategy

Blockchain targeted usage context (2)

- Transaction validation strategy
 - Proof of Work
 - Opened miners community
 - Mining ecosystem
 - Hardware resource development
 - Hosting infrastructure
 - Proof of Stake
 - Validators are known
 - Token investment to become a validator
 - Proof of Authority
 - Well known validators
 - Closed environment

Blockchain targeted usage context (3)

- Blockchain software economic model
 - Heavy development associated to the blockchain support components
 - Open-source and freeware model
 - Favour community development
 - Evolutions can be improved using co-development
 - Core developers get initial tokens
 - Licensed
 - Only few systems
 - Sometimes only few components easing the blockchain project integration are licensed
 - “Product owner” can be responsible
 - Controlled evolutions

Blockchain ecosystem: context

- Blockchain community
 - Different parties
 - Each party contribute to the global value
 - Blockchain is a value source or each party
 - Share the “internal token currency”
- Service system
 - Importance of the “client experience”
 - Requires some investment
 - Development
 - Infrastructure
- Fair balance regarding investment / Return On Investment

Ecosystem organization (1)

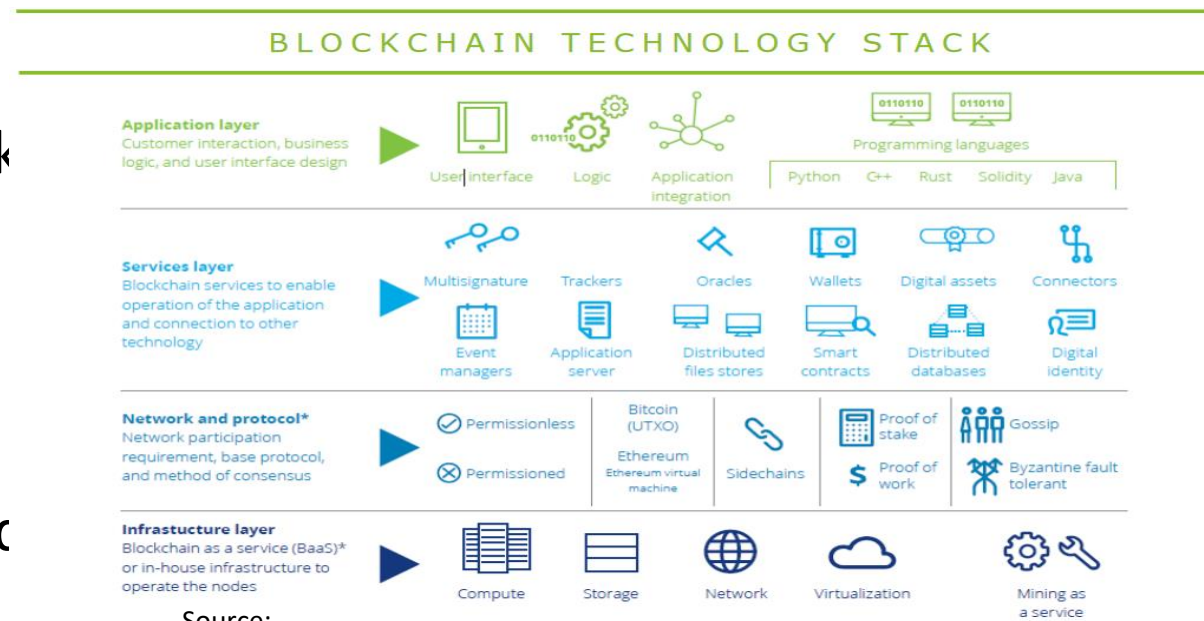
- Co-operation or competition?
 - Transaction validation
 - Competition between validators
 - Resource sharing strategy can be used to support co-operation
 - Transactions shows co-operation between parties
- Internal regulation mechanisms
 - Consensus management rule
 - Speculation on token value
- External incentives
 - Initial Coin Offer
 - Legal status of blockchain transactions, smart contracts...
 - Energy subvention to support data-centers / “sovereign blockchain” enactment

Ecosystem regulation (2)

- **Permissioned blockchain**
 - Well-known ecosystem
 - Agreements between partners
 - Support common shared collaborative processes
- **Permissionless blockchain**
 - **Core contributors**
 - Developers
 - Initial investments
 - Determine governance and regulation rules
 - **Users**
 - Core blockchain regulation rules
 - Market regulation empowering (or not) users (depending on the community)

Actor identification strategy

- Based on competencies
 - What are the technical skills
 - Computing development
 - System management
 - Not discriminant
- Based on IT market
 - Inspired by the Cloud and communication stack
 - Identification of the blockchain stack
 - infrastructure
 - Core platform based services
 - Application oriented services



Source:

<https://www2.deloitte.com/content/dam/Deloitte/in/Documents/industries/in-convergence-blockchain-tech-stack-noexp.pdf>

Typology of the main actors

- “Core blockchain”
 - Developpers
 - Miners
- Interaction with infrastructure
 - Cloud providers
 - Hardware development
 - Distributed system management
- Interaction with the usage
 - Developpers
 - End-user
- Investors

Infrastructure layer

- Computing and mining resources => Implement blockchain protocols and core developments
- Requirements
 - Hardware development
 - Hardware hosting
 - Parallel computation
 - Distributed storage
 - Scalable resource management
- Traditional Cloud and hardware actors
- Development of Mining as a Service
 - Federate resources
 - Transaction coordination => action on front office part

Distributed ledger management

- Core development of the blockchain
- Consistent Storage capabilities
 - Development of secured architecture
 - Consensus protocols are used to maintain the global consistency / replication process
- Access control
 - Consensus protocols used to protect the ledger
 - Reduced access to the ledger for permissioned blockchain
 - Require interaction with identity management / cryptographic protocols
- Token management
 - Attribution strategy (often seen as a payment mean)
 - “Fees” management control the transaction registration priority

Service layer

- Focused on the blockchain usability
 - For end-users
 - Wallets
 - Identity management
 - For applications
 - Identity management
 - Key management (also related to wallets), signature management
 - Smart contract management
 - Connectors with other components of the legacy system
- Different actors:
 - For end-users/ dedicated applications / business area
 - May be specific depending on the target project

Blockchain community interaction (1)

- Intrinsic delays
 - Difficult to get a scalable system
 - Need more computing resources
 - Need different validation strategy
- Cooperation
 - Fair
 - Shared computing resources fitting “earn more” strategy: increased resources means increased survival rate or increased transaction successfully validated
 - Reduced environmental impact: avoid wasting computing resources
 - Unfair
 - Malicious block publishing
 - Internal hack

Blockchain community interaction (2)

- Economic governance
 - Internal crypto-currency
 - Market regulation?
- Token value
 - Transaction fees
 - “Economic regulation” with users
 - Estimate the current workload?
 - Speculation caused by
 - Initial investors / core developers/ miners
 - New securities players?

Interaction with socio-economic regulators (1)

- Identifying requirements due to technology
 - P2P transaction support
 - Solve and prove the double-spending problem
 - Previous interchange contracts manages logs on each system
 - Blockchain integrate the double spending process as its core service
 - Immutability management and trackable processes must be deployed
 - Distributed architecture
 - Identifying / proving responsibilities limits
 - Token exchanges are trackable but not the way blocks are validated (means involved)
 - Threats can focus on different entry points
 - Cryptography
 - Used to “sign transactions”
 - Has different regulations depending on the countries

Interaction with socio-economic regulators (2)

- Identifying requirements due to economic environment
 - Token economy
 - Token status:
 - transnational and unregulated crypto-currencies
 - Technical value
 - Different legal constraints depending on the countries
 - Environmental impact
 - Authorizations to set data centers
 - Require estimating the energy consumption
 - Complexity of blockchain governance
 - Different blockchains used for different purpose
 - No transfer between blockchains

Legal regulations (1)

- Different strategies for each country
 - It also may evolves!
- Economic incentives
 - Data center hosting
 - Activity development
 - Taxes on energy can be used to regulate these deployments
 - Target “sovereign blockchains”
 - Based on the computing/storage infrastructure
 - Be sure that only one legal context is applicable
 - Does not fit the public blockchain openness target
- Cryptographic regulation
 - Related to perceived risks against the state protection

Legal regulations (2)

- Smart contract status
 - Automated transaction vs legal contract?
 - Contracting involves
 - Identified parties
 - How to connect “True identity” with Blockchain pseudo?
 - Mistaken party may involve (or not) contract nullity
 - Contracting capacity
 - How can you prove that the pseudo-identified party is allowed to contract?
 - For example only major people can sign a contract. What about minors?
 - Connect a “real world contract” to its automated transaction support

Legal regulation (3)

- Token status
 - Usage value
 - Necessary to perform a task / use the system
 - Transaction fee is a toll
 - Security value
 - Payment mean
 - Money investment
 - Howey test (US) to identify securities
 - Money investment in a “common” enterprise
 - Expected profit
 - No possibility to change the enterprise governance

According to you, How can you define the blockchain value?

- Can the Porter model be applied to the Blockchain to analyse value sources?
- How can you characterize the value sources of a blockchain project
- How can you characterize the token value?

According to you, How can you describe the blockchain ecosystem?

- In this part you will
 - Learn how you can use the Porter value model to set a blockchain value analysis
 - Learn how the value of different private blockchain can be assessed
 - Learn how the networked value model of a blockchain can be set
 - Identify how the token value can be described

Identifying Porter's value model key components

- Blockchain system is a service system
 - Its production can be described
 - Identify what is produced
 - Ledger
 - Validated transactions
 - How client are managed
 - Community based
 - What is necessary for the core production
 - R&D
 - Hosting functions
 - How the service is delivered
 - Refer to usage related components

Value associated to support functions (1)

- Infrastructure hosting
 - Data-center services
 - Value refer to physical security, energy, cooling...
 - Computing services
 - Refer to IaaS value model
 - Identify consumption
 - Integrate QoS requirements
 - Management services
 - Availability
 - May be less constrained than for a classical Cloud system

Value associated to support functions (2)

- R&D
 - Core blockchain development
 - Transaction validation process
 - Consensus management
 - Token management
 - Token creation
 - Reward mechanisms
 - Mostly open source
 - Value is picked from initial token and reward mechanisms
 - Blockchain community (related to its usability) is a key performance indicator
 - Few licensed system (Hashgraph...)
 - Classical IT system value model

Value associated to production function

- Production means transaction validation
 - Costs due to the brute force computation used for the PoW strategy
 - Investment (price paid) for the block validation for the PoS strategy
 - Benefits = tokens received when succeeding in validating a block
 - Transactions fees
 - Prioritize “best” transactions to integrate in a block
- Other value sources
 - Validation software optimization
 - Optimizing the computing resources using cooperation (federating different miners resources)

Value associated to marketing function

- Blockchain community development
 - Increased users increases the number of transactions
 - Global benefits due to transaction fees
 - Price/transaction may be increased to make the transaction be selected
 - Increased miners
 - More competition => more costly for each miner (risk of useless work)
 - “Natural regulation” for transaction fees
 - More opportunities to use the blockchain
 - Token liquidity is increased
 - Speculative risks

Value associated to delivery functions

- Wallet management
 - Pseudo “identity” management: associate cryptographic keys to pseudo
 - Different kinds of wallet
 - Hardware wallet: from paper wallet to safe hardware devices
 - Crypto-currency safe storage usage with strong authentication mechanisms
 - Hot wallet
 - Associated to the device they are installed on. Provide keys storage and payment facilities
 - Online wallet
 - Keys are stored on a trusted server
 - Different value models
 - Product purchase model for the hardware wallet or licensed hot wallets
 - Usage-based payment
 - Transactions are necessary to transfer tokens from one wallet to another

Value associated to service functions

- Associated to components related to the blockchain usage / integration with other IT components
 - Identity management: value associated to the authentication of the association “real identity” to the pseudo
 - Authentication management:
 - Multi-signatures extend the P2P transaction to collaborative exchanges
 - Smart contract management
 - Extra services to set these contracts
 - Event manager and oracles: control the execution
 - Components used to connect the contract with other IT components
 - Transaction management
 - Basic transaction storage
 - Transaction backtracking

Value model: to conclude

- Rather similar to other IT systems
 - Licensed products
 - Wallet
 - Some blockchain core component
 - XaaS model
 - Payment
 - Transaction
 - Freemium
 - Free components
 - Used a incentives to use the blockchain / a particular service
- Also different
 - Token crypto-currency
 - Token value considered as a security?

Reference and source

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