TEAM
SATOSHI

PUBLIC PROCUREMENT & BLOCKCHAIN

SOURADEEP DAS

NEXT TECH LAB

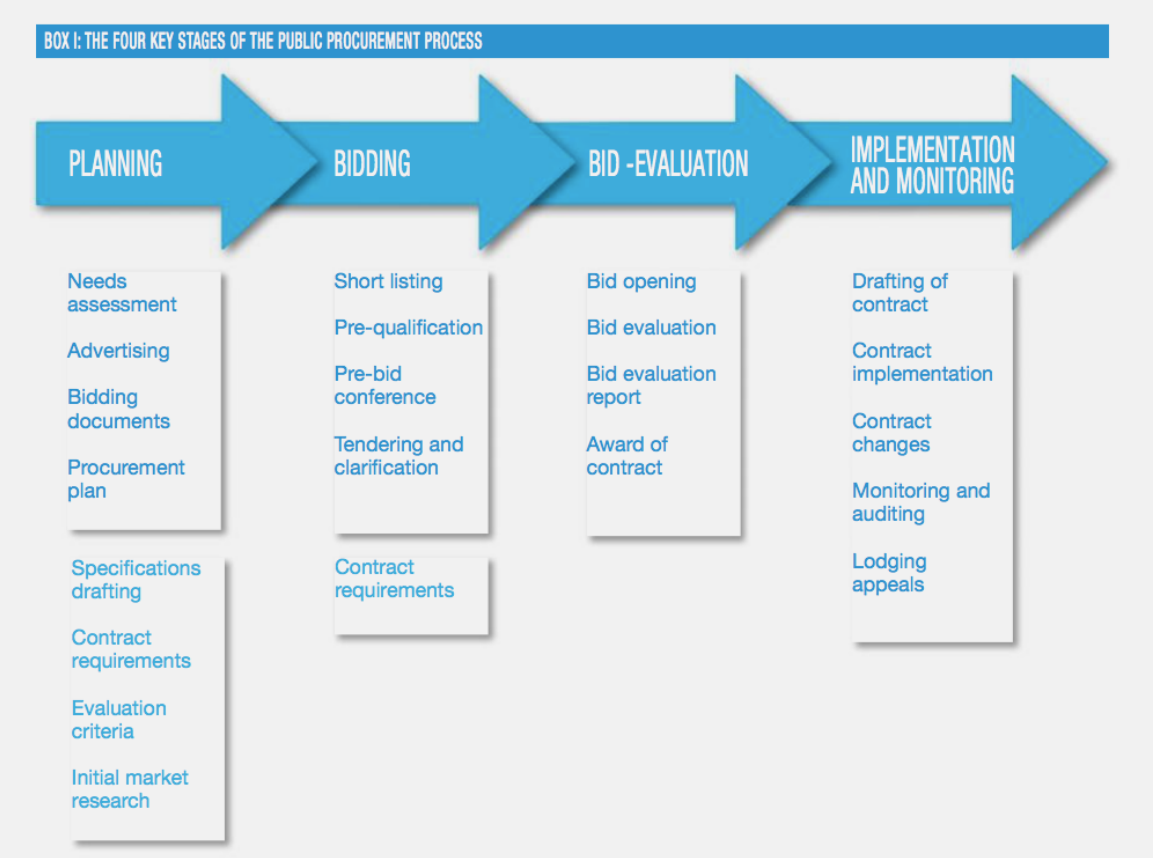
SOLVING CORRUPTION
IN DEMOCRATIC GOVERNMENTS

THE PROBLEM

1. Introduction
2. Importance
3. The Three Problems
4. Why Blockchains
5. Problem-Solution Fit

What is Public Procurement ?

Public procurement is the purchasing of goods, services, or constructions on behalf of a public authority, like the government. It is a fundamental building block of public-private sector partnerships, and is usually executed by requiring the procuring authority to issue tenders or auctions. By allowing the private sector to participate in nation-building, it creates an incentive for private companies to work in service of public good. A traditional procurement cycle is shown below.



"As large buyers, governments and the public sector are an important source of business for the private sector, which, in turn, is an important source of jobs for citizens. A fair and open government procurement process can be a vital stimulant for a well-functioning economy in which all stakeholders – governments, private enterprise and citizens – thrive,"

Augusto Lopez-Claros
Director of the World Bank's Global Indicators Group

Why does it matter?

Public Procurement is an outsourcing mechanism for governments, allowing it to interact and incentivise private companies to engage in public works.

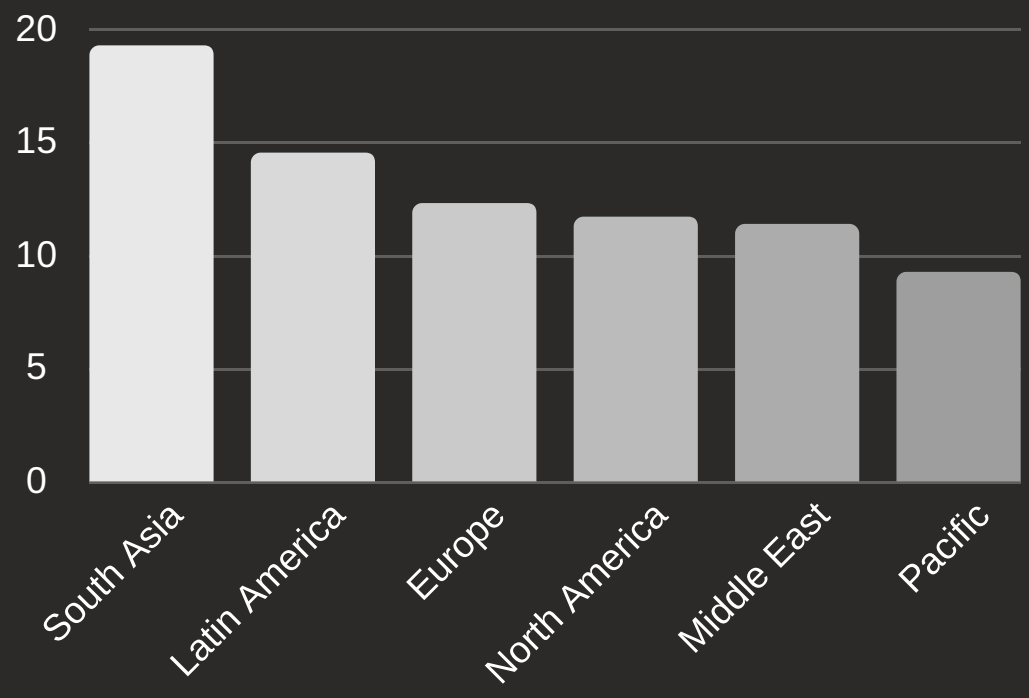
Most countries spend 15-20% of GDP on public procurement contracts.[1] Most of this capital is spent on procuring infrastrucutre- schools, hospital buildings, railways, and other citizen amenities.

USD 9.5 trillion each year

That's how big the worldwide public procurement market is.

The efficiency of a public procurement system directly affects the economic growth of a nation. This is because it powers schools, roads & energy supplies. It forms a substantial part of the global economy, and is an important metric for the health of an economy.

Procurement as a % of GDP



$15bn arms scandal

Presidential panel uncovers massive fraud in Army

• Oil baron held over N23bn bribery scam

Page 2

BRIBE

Size of deal: €560mn

€51mn

LOSS TO THE NATION

₹176000000000

A Raja deprived govt of this much money in 2G spectrum allocation: CAG report

K S Narayanan | ENS
New Delhi, November 10

THE sheer enormity of the figure, when one learnt about it, was perplexing than enabling to grasp its exact... the gravity of the offence, tho... on Wednesday as ... under

Alfred Nzo council yet to act on tender fraud claims

Battle rages over Sh400m fraud claim at Pipeline

₹750 cr in Tatra truck kickbacks

DNA Investigations Bureau
MUMBAI

Top officials of BEML Limited, a Bangalore-based company, and the defence ministry have siphoned off at least Rs750 crore in bribes and commissions over the past 14 years in the purchase of components for Tatra trucks, backbone of the army's artillery and transportation wings. The Indian Army uses Tatra all-terrain vehicles to mount guided missile launchers and haul

Digging the greedy truth out

For the past 14 years, top BEML officials have connived with officials from the ministry of defence and siphoned off at least Rs750 crore in the form of bribes and commissions while buying components for Tatra trucks. The

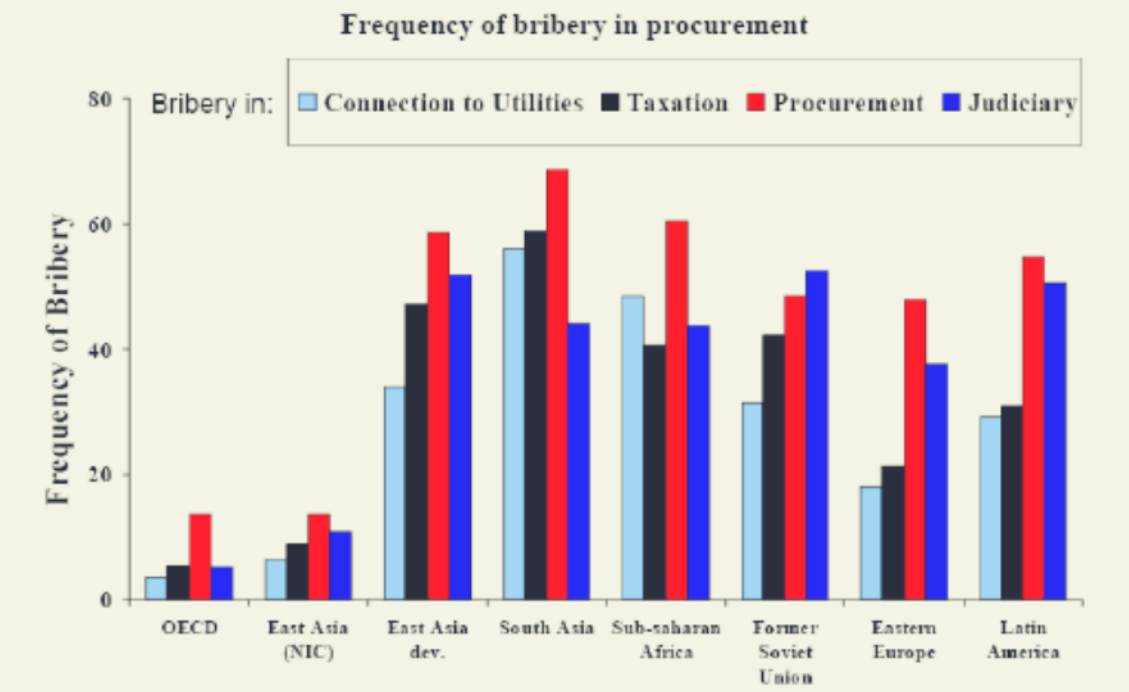
1. THE CORRUPTION PROBLEM

Public procurement is plagued by a corruption problem. According to the OECD, 2 trillion USD is lost every year to corruption in public procurement.

Globally, public procurement tops the charts in state-bribery and corruption. The OECD 2014 report on foreign bribery says 60% of all bribes to foreign officials were to obtain public procurement contracts.[3]

The problem is widespread an affects the millions of annual tenders globally. World Bank says that a public contract is on average 15% bribed before it's obtained.[2]

This large-scale corruption trust in the government eroding, private-public partnerships grow weaker and the economy suffers.



Source: Kaufmann, World Bank (2006), based on Executive Opinion Survey 2005 of the World Economic Forum covering 117 countries. Question posed to the firm was: In your industry, how commonly firms make undocumented extra payments or bribes connected with permits / utilities / taxation / awarding of public contracts / judiciary?

THE IMPORTANCE OF ANTI-CORRUPTION MEASURES

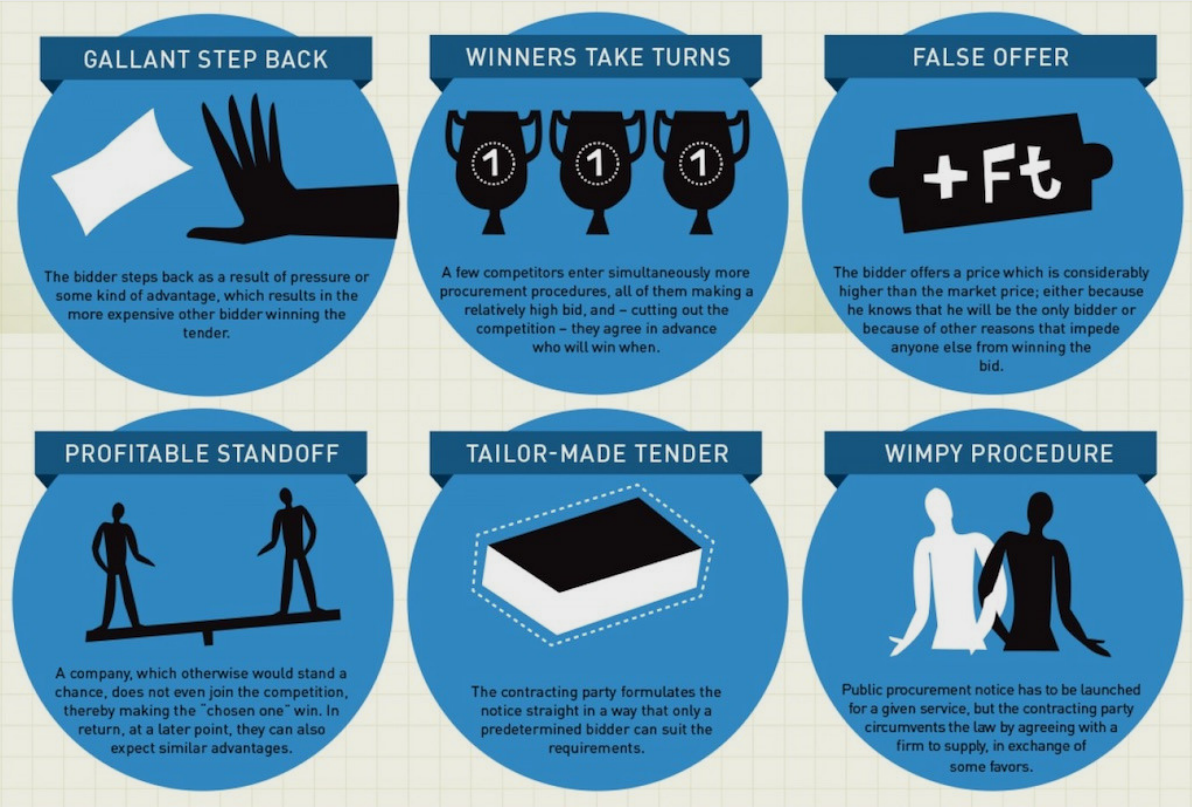
The losses are substantial. Developing countries spend an estimated $820 billion each year worth of citizens funds, about 50 percent or more of their total government expenditure, on procuring goods and services that range from food for welfare programs, to wiring for electrical grids that power homes and businesses.[4] When these developmental contracts are given to a corrupt party instead of the lowest bidder it weakens the economy, disincentives private sector to invest in public works, and burns an enormous amounts of citizen funds.

2. THE INCENTIVE PROBLEM

Corruption is difficult to solve because the underlying incentives are mis-aligned. The officials aren't incentivised to solve it because they're benefitting off it. Similarly, the bidders can engage in anti-trust activities like collusion as there's no officials enforcing the rules

Most notably, there is a strong incentive for bidders to form collusions to reduce both risk & competition in the auction process.

Another huge problem this causes is disadvantaging MSEs from participating in the procurement process. We often see forms which are biased against SME participation. Some ways this is done are listed below .



THE IMPORTANCE OF INCENTIVE RE-ALIGNMENT

These adversarial incentives exist because of two reasons:- the high stakes involved, and the multiple possible ways of biasing the tender process. We must redesign the process in a way that re-aligns the incentives to curb the behaviour, by punishing collusion and keeping the contract design process bias-free. Some economists have suggested this can be achieved using reputation systems, where the past performance of a bidder affects the their future chances of obtaining a contract. The United States have already implemented one, but still today most regions struggle to manage incentives without having a reputation system.

3. THE ENFORCEMENT PROBLEM

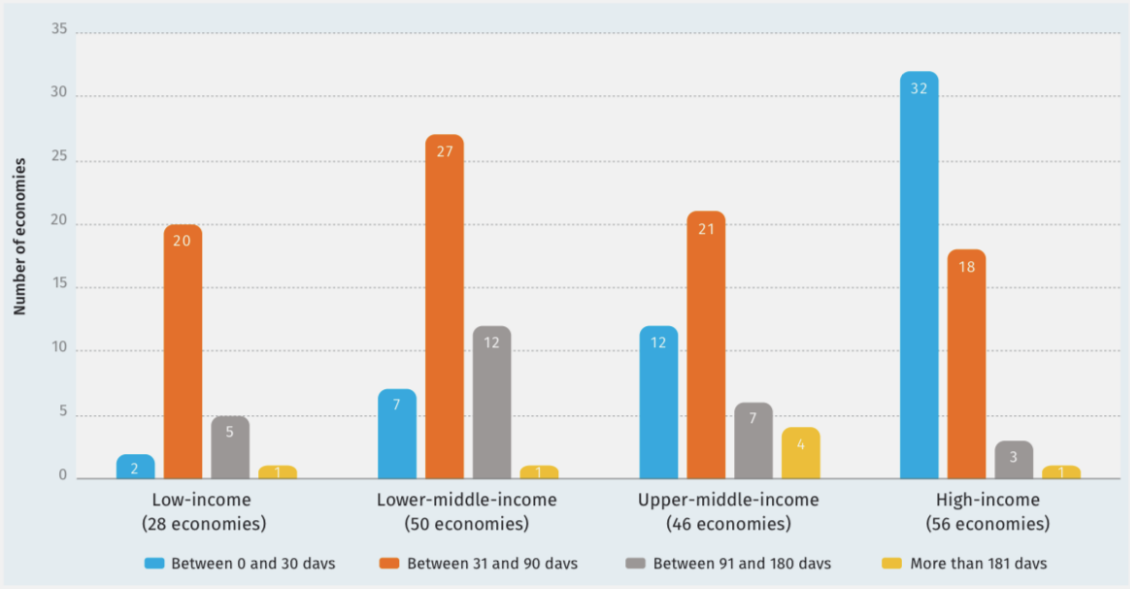
The public procurement process is slow, corrupt, and sometimes is directly controlled by organized crime, as discussed in a report by Jens Andvig.[5]

This is due to the powerlessness of officials in making sure bidders comply to regulations of a corrupt system.

Monetary [enalties are difficult to enforce when the winning bidders are sometimes found to be just shell companies.

We need automatic enforcement which is independent of location and time, and can be enforced without corrupt human supervision.

Figure 2.9 In a few economies, suppliers must wait more than 181 days to receive payment



Source: Benchmarking Public Procurement 2017 database.

THE IMPORTANCE OF INDEPENDENT ENFORCEMENT

Multiple reports and recommendations by the OECD over the past decade have concluded that an independent procurement unit must be set up to protect public procurement and keep it a level-playing field. The need for this body to be independent specifies the mistrust in government to stop and curb corruption. This sentiment is echoed by subsequent research by the World Bank which again concludes that an “independent and unbiased” body is needed to keep a check on anti-competitive behavior like collusion. and enforce penalties.

Why blockchain is the solution

Solving Corruption

Corruption is a trust problem. The bidders cannot trust the procuring body to create a level-playing field, and the procuring body cannot trust the bidders to not engage in collusion. We can resolve this catch-22 by making procurement bodies more transparent (via a public ledger) and making bidder collusion more prohibitive (discourage bad behaviour via reputation systems). Using an immutable public ledger as a rock-bed for all transactional evidence forces transparency onto officials and contractors, exponentially speeding up audits by third parties like journalists & government watchdog groups.

Solving Incentives

Bidders must be encouraged to bid in self-interest, but must not be allowed to form risk-reducing cartels. They must also be encouraged, once they've won a tender, to comply to the contract and not drop out after a few months of work. Procurement authorities count these as two of the key problems facing public procurement today. We address these using a reputation system. Each bid proposal is weighted by the reputation points of the bidder. Based on the performance of the bidder, the reputation increases or decreases. This way we can incentivise quality compliance for long-term contracts and disincentivise negative behaviour like bid-rigging and forming cartels. This system is implemented in an open smart contract to ensure fairness in the reputation system.

Solving Enforcement

Government procurement is heavily regulated, but the enforcement of that regulation takes time in courts, and money from the state. Wasting either is not in interest of the citizens. Using smart contracts, we can automate the monetary penalties and make enforcement of regulation instant and independent of the state. This also solves the problem of middlemen meddling into state affairs by lobbying or organised crime, since now the smart contract holds the payment and will automatically release the funds once the tender is proved to be complete.

A problem-solution fit

PAIN POINTS	OUR SOLUTION
Bid-rigging	Reputation system incentivises individual selfish behaviour over collusion
Impartial handing of tenders	Transparent auctions on private consortium network
Centralized bid-evaluation process	Automated and transparent bid-evaluation
Slow 2nd tier redressal process	Support network for redressal + assistance to procurement ombudsman (if exists)
Difficult to participate due to unintuitive system	Intuitive product design keeping in mind limitations of current systems
Complex contract design process	Templates for tenders + Interactive contract design interface
Low participation in bidding process, people wait till last moment to naively reduce risk	More points in reputation system for early bidders
Slow procurement process (months)	Proven faster process (S.Korea brought it's avg time from 30 days to 3)
Delayed contract payouts	Smart-contract regulated payouts
Publishing proprietary information on a public platform	Keeping data encrypted but auditable+transparent, using ZK-Proofs
Compliance to quality standards/contract	Reputation system incentives + Automated monetary penalties using smart contracts
Rigid contracting system, often with “one-time payment” schemes for year-long projects	Flexible, pay-as-you-go dashboard for managing funds going to contractors

MARKET RESEARCH

1. The Global Market
2. What Stakeholders Think
3. Choosing Entry Market
4. The Competition
5. Complexities & Nuances

GLOBAL TRENDS

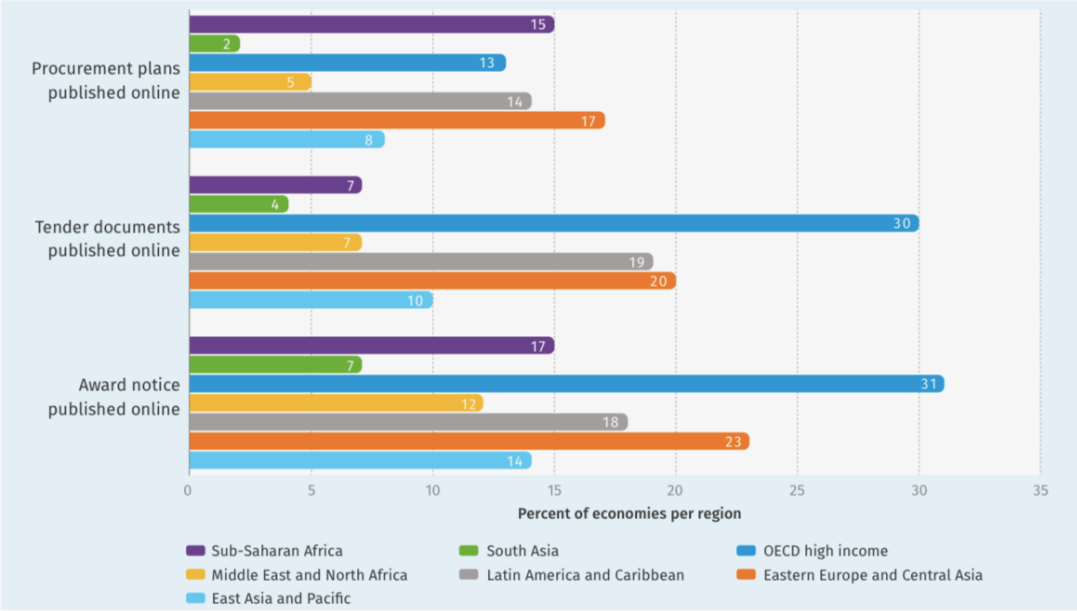
There is a global trend of countries going from traditional procurement systems to e-procurement portals. There are differences in the amount of transparency each country's system offer. Relevant demographics for 180 countries surveyed as part of World Bank's 2017 BPP report[6] is on this page.

The Mexican government has been internally working on a blockchain-based e-procurement system since early-2018.

Lithuania wants to develop a pre-commercial blockchain-based procurement model LBChain by 2019 and the project is being financed by European Commission.[7]

Russia's public procurement is plagued with money laundering, and since early-2018 the VEB (a major state-backed bank) and Roseltorg (an e-procurement platform) are collaborating to build on a blockchain-based procurement system to improve their platform. This past summer, VEB also inked a partnership agreement with the Ethereum Foundation to develop and implement a blockchain-based government application.

Figure 2.2 Availability of documents online varies across regions and depends on the type of information



Source: Benchmarking Public Procurement 2017 database.

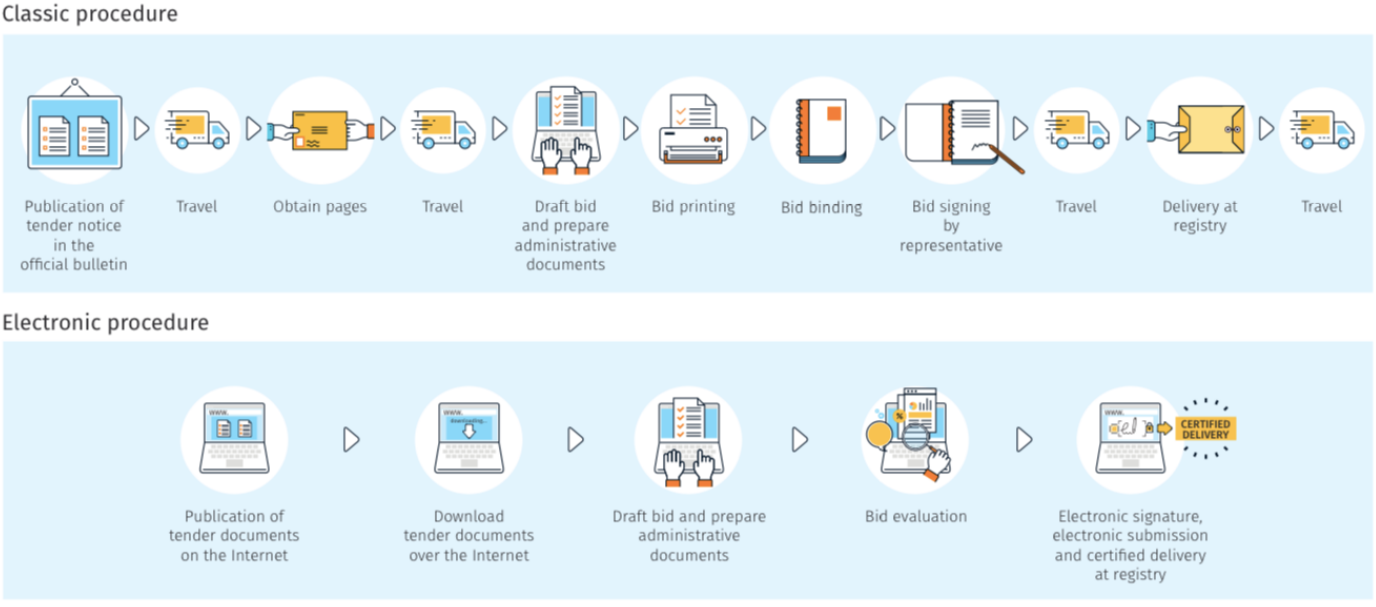
GLOBAL BENEFITS

SAVING TAX DOLLARS
Ukraine government, business and civil society already has a functioning e-procurement system, Prozorro, to redefine trust between citizen and local businesses. Having conducted over 26K tenders worth $240M, this open and fair system has helped save 13% on budget spending.[8]

SOLVING CORRUPTION
Slovakia government implemented a transparent procurement system; thereby exposing wasteful spending, fraud - resulting in significant increase in healthy tender competitions.

SAVING TIME
South Korea has implemented KONEPS, a transparent e-procurement system resulting in estimated US$1.4B savings in the public sector and around US$6.6B in the private sector. Figures say that bidding processes were timed down from 30 hours to just 2.[9]

Figure 2.1 E-procurement lowers transaction costs for bidders throughout the procurement process



WHAT STAKEHOLDERS THINK

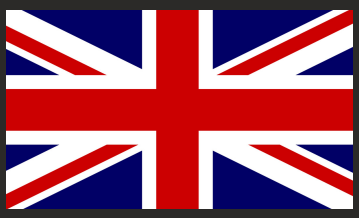
Stakeholders in the public procurement system are those who are associated with the process thereby creating internal stakeholders - individual / company / group who operate within the system's boundaries, here senior procurement management, working staff, contractors; and external stakeholders - the advisors, expert auditors (and even government directly, interest groups, media, local communities). External stakeholders might not directly participate in the tender, but always have legal, contractual, commercial dealings with the either side. For example, National Treasury is responsible for overseeing the process and asset disposal policy formulation; Public Procurement Regulatory Board will be responsible for enforcing the standards of the system, resolve conflicts within the system, protect rights and most importantly maintain the e-portal. Global stakeholders such as United Nations Commission on International Law and Committee on Industry, Innovation and the Entrepreneurship (CIEE) have recognized the challenge of including socio-economic and environmental considerations in public procurement process without jeopardizing the value of money. Also stakeholders from the private sector Business and Industry Advisory Committee to the OECD (BIAC) confirmed the emerging risks in the current procurement system. Lastly and most importantly, Economics Department of OECD, Asian Development Bank, Inter-American Development Bank - all acknowledged the need of monitoring the procurement performance.

With industries actively looking for efficient supply chains and business solutions, its estimated that blockchain implementations could save businesses at least $50B in B2B transactions by 2021 and predicts deployment of smart contracts in 25% of global organisations. For instance, last December saw EESL (Energy Efficient Services Limited) coming under a cloud for alleged misconduct of tender processes.

WHY EUROPE IS OUR BEST MARKET

Highest geographical concentration of high-capital corruption in public procurement

According to the European Commission's 2014 Anti-Corruption Report[10], corruption costs EU society around €120 billion per year. With public procurement accounting for 14-19% of EU GDP, it is considered the leading contributor to corruption in the region.



Economic instability due to Brexit & EuroZone crisis

The Euro region is looking to inspire trust in its economies after multiple crisis over the last decade. With the proven cost benefits of a transparent procurement system, saving billions of tax dollars from corruption aligns with the region's incentives.

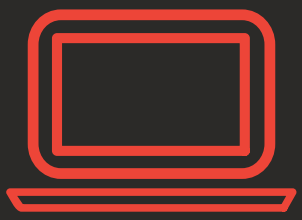
Highest frequency of geographically-concentrated international procurement

Europe is the one of the rare regions with high amount of international procurement between neighbouring countries. This exposes many national economies to our product even before they have adopted it themselves. This brings down our cost of customer acquisition.

Pan-European pressure to move to better procurement [2014 directives]

Organisations like European Commission (EC) have long been pushing for implementing a Union-wide procurement system. In 2014, they passed three directives which made e-procurement mandatory in all member states. A 2011 report[11] by the Commission estimated that an EU-wide procurement system could save €920 million in corruption costs annually. Further, EC's vision is to create a domestic market out of 28 member countries. Our product goes a long way in creating exactly that.

THE COMPETITION



Product-Form

1. Mexico working on blockchain-based procurement system since early-2018.

2. Lithuania wants to develop LBChain by 2020 and the project is being financed by the European Commission.

Product-Category

1. e-SENS project funded by the EC to bridge European markets into one domestic one. It's scope included more than just online procurement.

2. open e-PRIOR, an e-procurement portal with pan-EU ambitions

Generic

1. Procurement outsourcing services

2. Policy-oriented projects that aim to become a data standard for upcoming procurement solutions. Eg: PEPPOL

What are their weaknesses?

1. Project is in it's early stages, considered an experimental pilot.

2. LBChain plans to only track procurement bids and does not have a end-to-end public procurement solution like ours.

1. e-SENS went four years before being replaced with policy-oriented projects. Due to it's scope, it wasn't able to focus on public procurement & was dispersed b/w lots of issues.

2. e-PRIOR has stayed in beta for a long time now.

1. Exclusively target private sector & not considered a reliable alternative for long-term procurement by Governments.

2. No implementation they can market, but valuable partners for us.

Why are we better?

In the European market, we can uniquely position ourselves as a corruption-eradicating solution whose unique value proposition is bringing down the cost of the procurement process by 20-30%. e-procurement solutions cannot reach these numbers because they aim to only handle the bidding and not streamlining the entire process (financial auditing, contract design, overseeing compliance) which our product can handle.

COMPLEXITIES AND NUANCES

- URGENT PURCHASES
  Urgent purchases made at the end of a fiscal year often involve corrupt elements, most likely due to the fact that transactions in this period are less strictly controlled. In many government agencies the unspent portions of the public budget cannot be carried over into the next fiscal year.

- NATURAL DISASTERS
  Procurement in cases of natural disaster or other emergencies is particularly at risk from corruption because of the large sums of money usually involved, particularly for the provision of basic needs such as food, shelter, water and sanitation.

- BIDS BY OFFICIALS
  The participation of bidders owned fully or partly by government officials is highly problematic because of the potential confict of interest or chance of undue in uence on decision-making.

- SECTOR VULNERABILITY
  There are some sectors of the economy that are more prone to corruption. According to Transparency International's Bribe Payers Index, construction and public works rank as the industry sector most prone to corruption. The extractive industries of oil, gas and mining follow close behind.

- EXCEPTIONAL PROCEDURES
  A negotiated procedure is an exceptional procedure which allows contracting authorities to negotiate the terms of the contract with a bidder and award a contract without a sealed bid. This happens outside the system.

- SYSTEMIC CORRUPTION
  In case of systemic corruption, it's difficult to disrupt corrupt practices. The optimal way to approach such a market is by approaching an auditor or inspectors general outside the system.

BUSINESS STRATEGY

1. Business Model Canvas
2. Customer Personas
3. Partnerships
4. Revenue Model
5. Goto Market Strategy
6. Scaling Plan
7. Product Vision

Business Model Canvas

Project name: Solving Corruption in Public Procurement with Decentralization — **Team Name: Team Satoshi**

Key Partners

Economics department of OECD

Transparency International

Regional Development Banks (ERDB, IADB, ADB, others)

Key Activities

Auctioning tenders on decentralized e-procurement portal

Key Resources

IPFS

Ethereum Alliance's Private Consortium

Internet Access

Key Propositions

Cost savings in billions of tax-payer dollars

Eliminating bid-rigging

Saving a months of time with faster procurement

Automated bid-evaluation

Easier contract design process

Post-bid monitoring

Checkpoint-driven payouts

Open-data API for auditing

Customer Relations

Technical support

Annual conference on decentralized-procurement

Channels

Website

Tech Support Helpline

Customer Segments

Chief Procurement Officers

Auditors & Inspectors General

Legislature & Lawmakers

Cost Structure

Server and storage costs

Gas costs

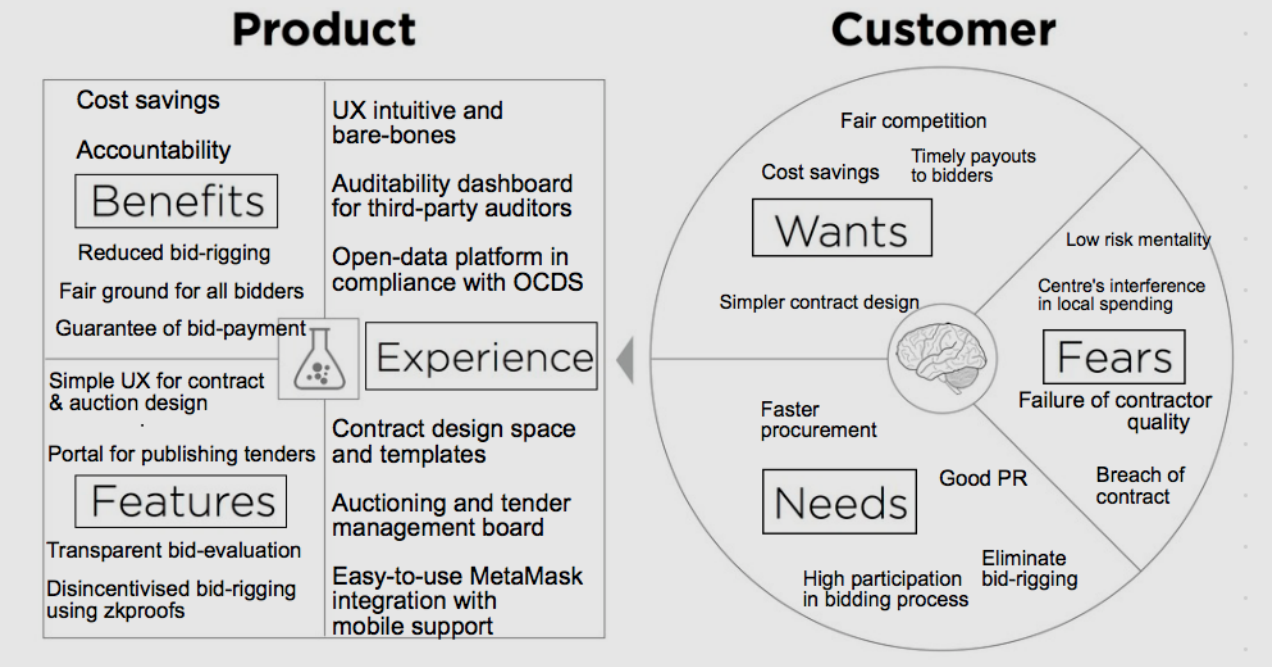
Estimated costs for 1st fiscal year (assuming EU operations): ~500,000 USD

Revenue Streams

e-Portal product purchases
(price decided as % of procurement sales volume of customer)

Per tender % payments for subsequent service

Target earnings for 1st fiscal year (assuming EU operations): ~5mil USD



CUSTOMER PERSONAS

The Procurer

AGE - 45+

1. Supervises entire process
2 Keeps bidding competitive, improves visibility
3. Rallies against corruption & enforces penalties
4. Procurement automation

The Auditor

AGE - 30 to 45

1. Maintains and verifies procurement records
2. Audits financial records of contractor
3. Oversees audit of the procurement process

The Policymaker

AGE - 30+

1. Creates formats for the tenders
2. Evaluates the bids
3. Oversees compliance of contractors

What are their pain points?

1. Time-taken from pre-bid to post-bid is too high
2. Enforcement of penalties against fraudulent parties is difficult as often they turn out to be shell companies
4. Cost of procurement process itself is high

1. Records are tamperable by anyone who might crack access.
2. Auditing is a slow and time-consuming process
3. Difficult to investigate contractors when they outsource tenders to sub-contractors.

1. Contract design process is difficult
2. Bid-evaluation is time-consuming, has high risk of corruption
3. Ensuring compliance is one of the hardest problems for the entire procurement sector.

How are we relieving them?

1. Streamlined process, from pre-bid to post-bid with easy comm channels
2. Smart-contract enabled automatic enforcement of monetary penalties
4. Near-zero cost of procurement to procuring party

1. Access-specified blockchain nodes from the ground up
2. Auditing is extremely easy with an on-chain records (merkle trees, fractional reserve auditing)
3. All records on-chain and viewable by only those with specified access on the node

1. Contract design dashboard
2. Consensus-based bid-evaluation removes corruption & makes process faster
3. Blockchain-based fair reputation system provably helps compliance.

Revenue Model

Our Model

Customers license our platform, and can pay a retainer fee for technical support. We have specialised offerings on our platform for each customer segment.

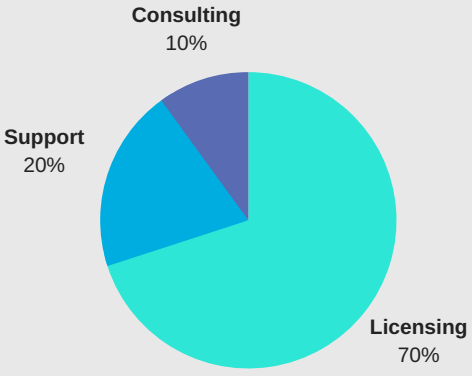
Revenue Streams

1. Licensing
2. Support
3. Consulting

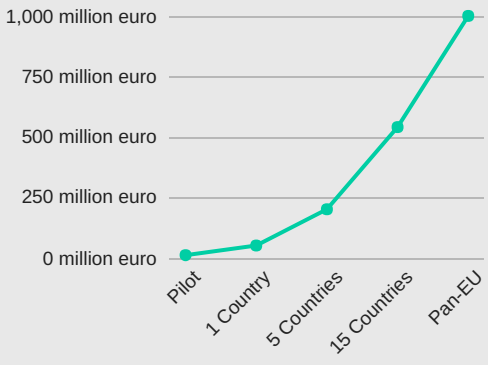
Is this financially sustainable?

Our model is primarily driven by research done by OECD and the EC in the the last 5 years.. There are strong indications that the procurement of the entire European market will be shifted online in the next 4-5 years. The 2014 directives regarding procurement mandate this. Based on this and other reports from the EC, we have concluded that there is a real need in the market for solutions like ours, and the net profit from our revenue streams will exceed our minimal costs.

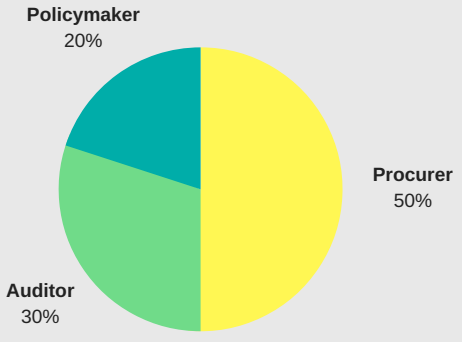
Projections based on EC & OECD reports



Expected distribution of income from revenue streams



Annual cost savings in for customers as we expand (money saved from corruption)



Expected distribution of sales between customer segments

Partnerships

ConsenSys

In February 2018, European Commission (EC) partnered with Consensys to launch a two year project called the EU Blockchain Blockchain Observatory and Forum. The focus of the partnership is to mobilize the blockchain for the single European Market benefit. Partnering with ConsenSys will help ConsenSys progress their European Observatory with an innovative product for the EC that combats immediate problems, while simultaneously helping us leverage their network of connections to find investors and pilot-testers in the European Commission.

PEPPOL

PEPPOL is a non-profit launched in 2008 with the goal of developing a single data-standard for cross-border e-procurement in the European Union. PEPPOL is currently adopted by 16 EU countries, and 3 non-European ones. Our platform is designed to be compliant to PEPPOL standards from the very beginning. Partnering with us will give the PEPPOL group a working implementation of their standard that shares the same values as them, while simultaneously we can leverage the PEPPOL partnership to scale our product to multiple markets rapidly.

SEPA

SEPA is a payment-integration project launched by the EC to simplify and streamline payment processes in the EU, especially cross-border payments. Their goal, much like PEPPOL's, is to turn the fragmented national markets for euro payments into a single domestic one. Partnering with SEPA to design our e-invoicing and payments tracking will allow us to further integrate into existing European infrastructure around procurement, reducing cost of adoption for new customers, and cost of customer acquisition for us.

GO-TO MARKET STRATEGY

TODAY

Phase I

3 months

Phase II

6 months

Phase III

9 months

Phase IV

12 months

Phase V

24 months

Phase I - Partners

We gather a network of partners from the European procurement market

Phase II - Targeted Marketing

Partner with European Development Bank, European Commision, other pan-Europe bodies to become a standard procurement platform for EU.

Phase III - Pilot

Romania is a highly corrupt country in EU, acc to RAND 2017, losing 992 mil euros in PP. Constanta municipality is competing with capital Bucharest and will be the ideal pilot launch opportunity.Croatia was reported to be having the highest rate of corruption among public procurement corruption by RAND Europe and can be another option for the pilot launch.

Phase IV - Launch

Official launch at ProcureCon 2019.

Phase V - Customer Acquisition

Bootstrapping on the results of the pilot, we will conduct the world's first conference for decentralized procurement systems (an emerging global market that Russia, Mexico, and some EU countries like Lithuania are already testing). Start expanding pan-Europe.

Scaling Plan

Scaling is easy in the EU

One of the major challenges to scaling public procurement solutions is the heavily context-dependent regulation of independent nations. But in the European Union, this problem is mitigated by the presence of multiple specifications and standards to ease cross-border procurement like PEPPOL and ISA. They're each partnered with multiple member states and have local access points. This makes scaling easier as the pipelines are already in place.

In Jan 2015, the European Parliament launched three directives to make e-procurement mandatory in the EU. These mandated that by July 2018, all members must have shifted their processes online. The presence of these directives mean that most member states are in the process of moving from a manual procurement process to an online one, which is great for us because we'll be entering a market which will be ready to try new things and experiment. This also reduces our customers' cost of adoption, as they'll have basic online processes in place that facilitate procurement. Our product can simply bootstrap on them to scale pan-EU.

Support from the Administration

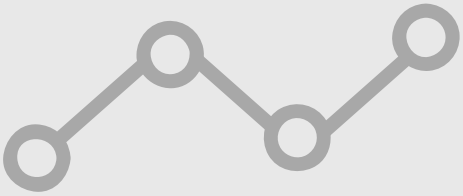
"Among the many technologies that are driving digital innovation, blockchain has the potential to be truly transformative for financial services and markets. The Blockchain Observatory and Forum will monitor developments and also inform our policymaking."

~ Valdis Dombrovskis, Vice-president of European Commission

Product Vision

Tagline

Healthier procurement leads to healthier economies.



Mission Statement

Weeding corruption out of democratic governments, one procurement at a time.

Long Term-Goal

Become the world's largest e-procurement platform with end-to-end services, while remaining accessible, accountable, and transparent.

TALKING BUSINESS

Validation Plan

How do we make money from each customer segment?

The Procurer

We are working with a municipality in Tamil Nadu, a southern state in India, to take their procurement process on the blockchain. Feedback from this pilot run has given us validation for our MVP design.

The Auditor

We've been reaching out to both bidding parties and procurement officials in public and private sectors. Hearing complaints from bid-participants first-hand led us to come up with the procurement idea in the first place.

The Policymaker

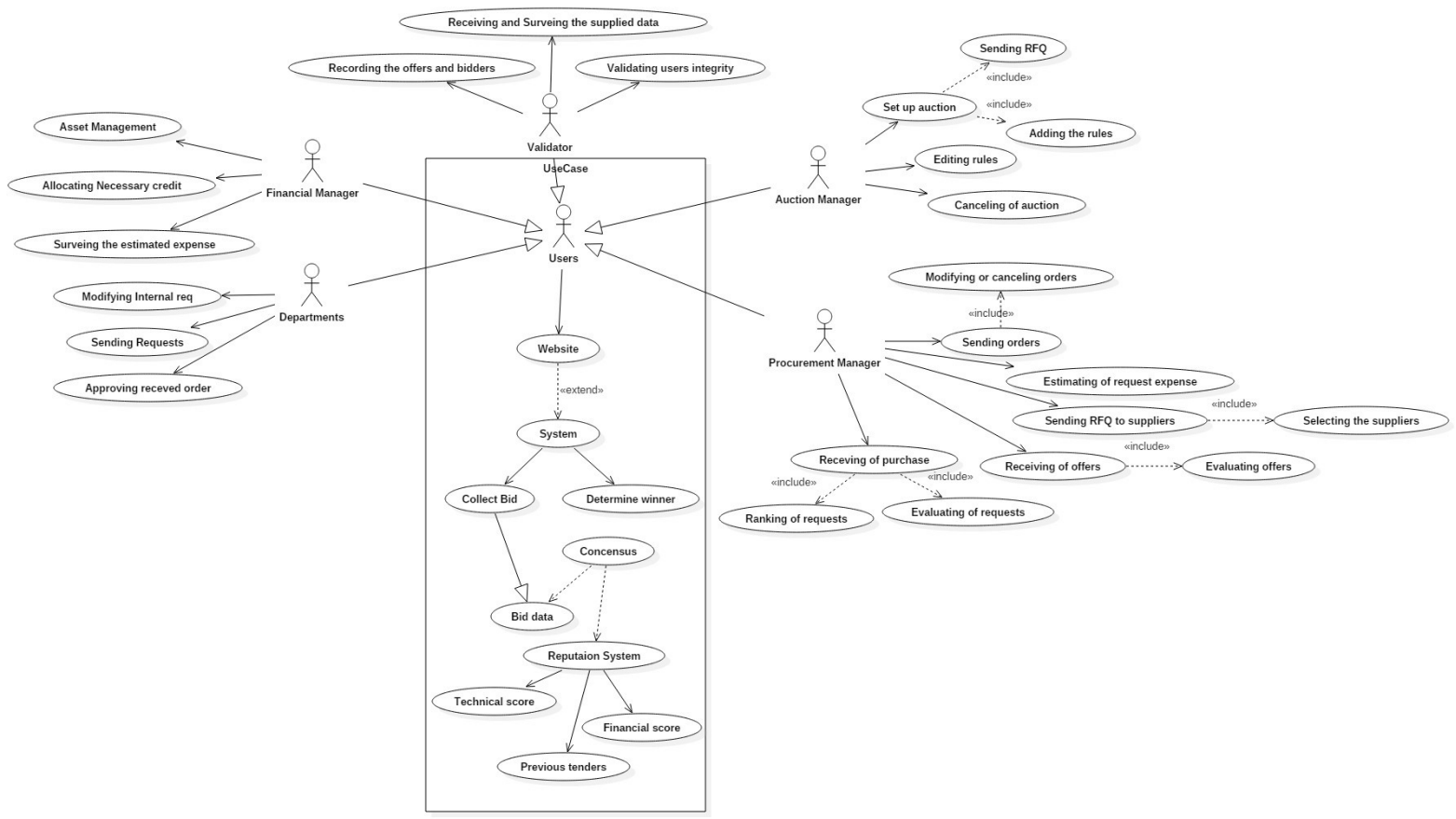
We have reached out to experts on the World Bank collaboration forum and are receiving key insights into the economics side of the product. More info on this in the product testing section.

Is our revenue model financially sustainable?

TECHNICAL ARCHITECTURE

1. UML Diagrams
2. Tech Stack
3. MVP Testing
4. Product Dev Timeline

USE-CASE DIAGRAM



The Diagram

The above diagram describes the relationship of users to our product, and their individual roles and functions. The box symbolises product-user interaction and encapsulates all the functionalities present in the current MVP.

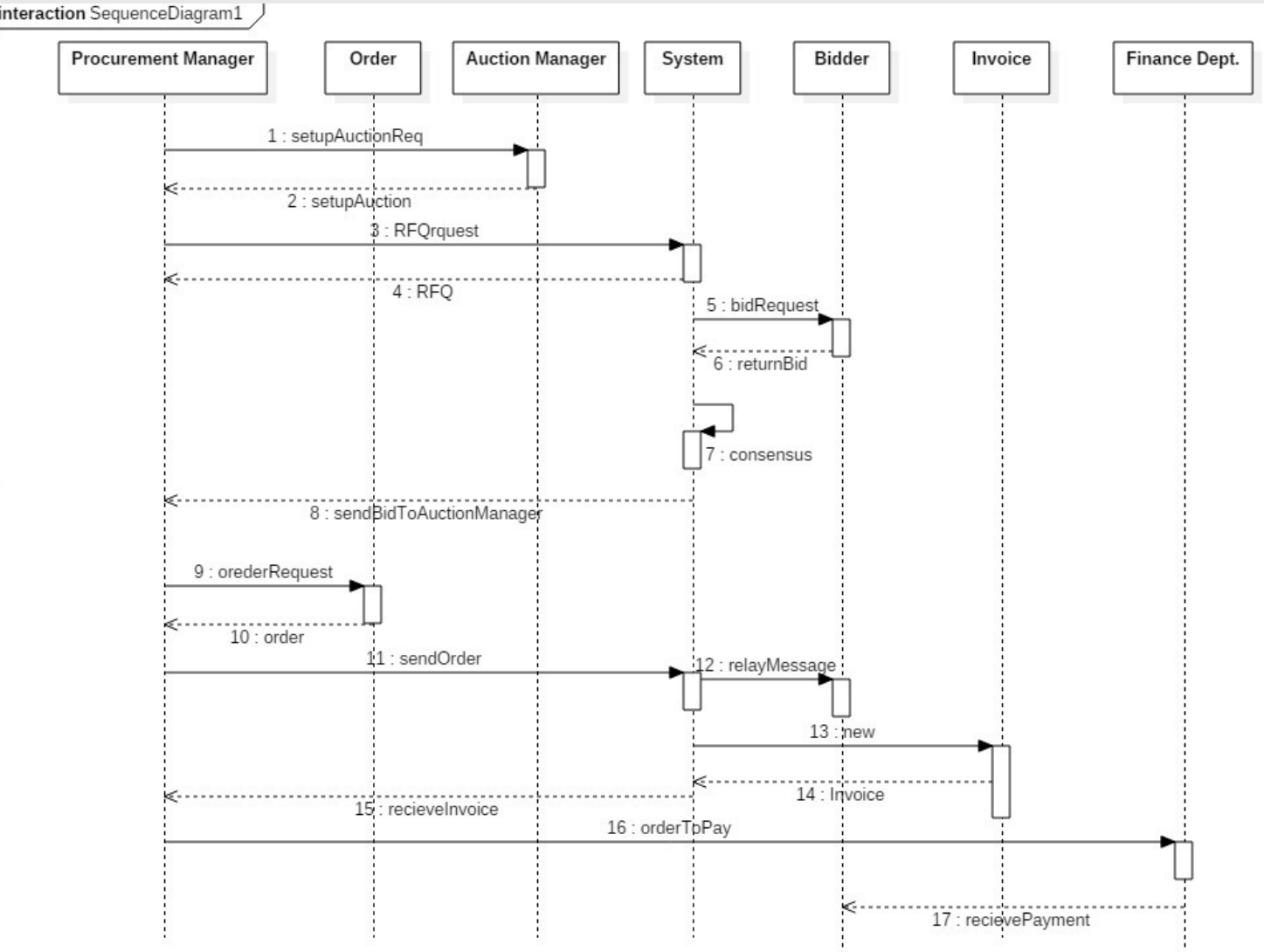
Actors

The five actors represented above are the key stakeholders in all procurement processes. In the private sector, these roles are often outsourced to "procurement specialists" but that is uncommon in the public sector. Our product targets the needs of each of the actors with customised dashboards that simplifies individual workflows.

Actions

The roles the actors perform as individual agents can be integrated into a more streamlined system where data interoperability makes auditing easier, reduces cost of procurement, and increases transparency. Inside the box representing our product, we can also see how the consensus mechanism decides the winning bid. This means there can only be preferential bidding if 66% of the system is corrupt (systemic corruption).

SEQUENCE DIAGRAM



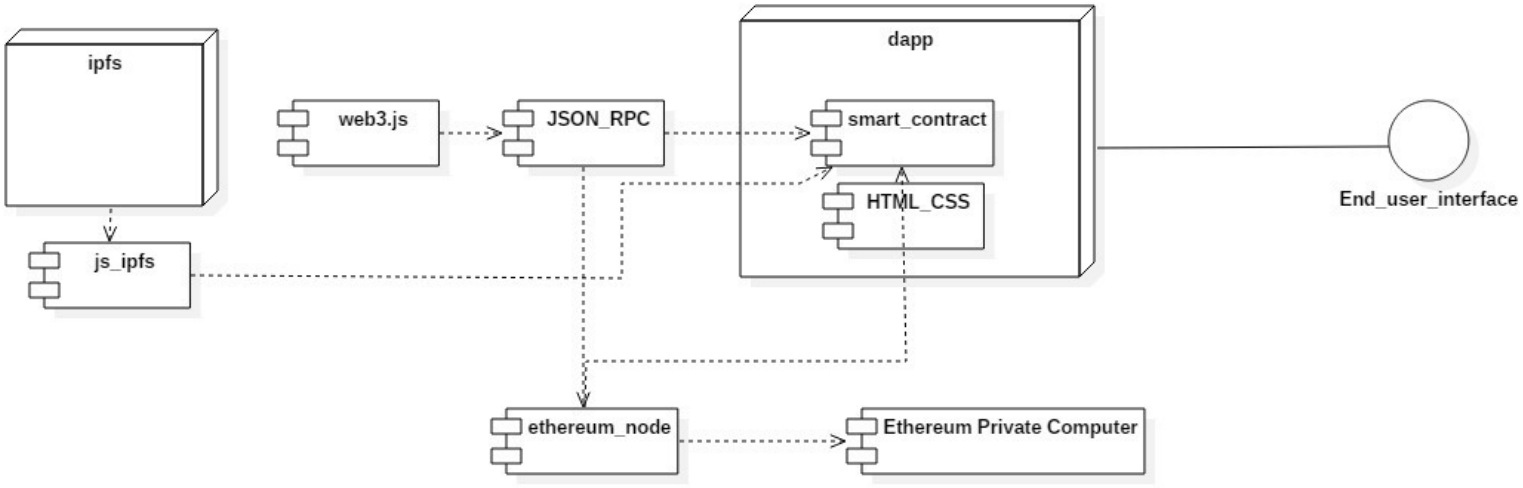
The Diagram

The sequence diagram describes the interaction between stakeholders and our product by visualising the sequence of steps the procurement process takes on our product. From setting up a auction request to doing auditing at the end of the process, our product handles these processes in a transparent and auditable manner.

Consensus

Often times during bid-evaluation, the sub-optimal bid gets selected because of corruption and partiality. As we've seen with Hungary's public procurement, this is a key entry-point for corruption in the system. We overcomes this by using a consensus-in-a-smart-contract approach (similar to Ethereum's Casper) where multiple validators vote on the winning bid and the bid with 66% positive votes or more wins. This ensures that as long as the corruption is not systemic (>65% validators are honest), the best bid will win the tender.

TECH STACK

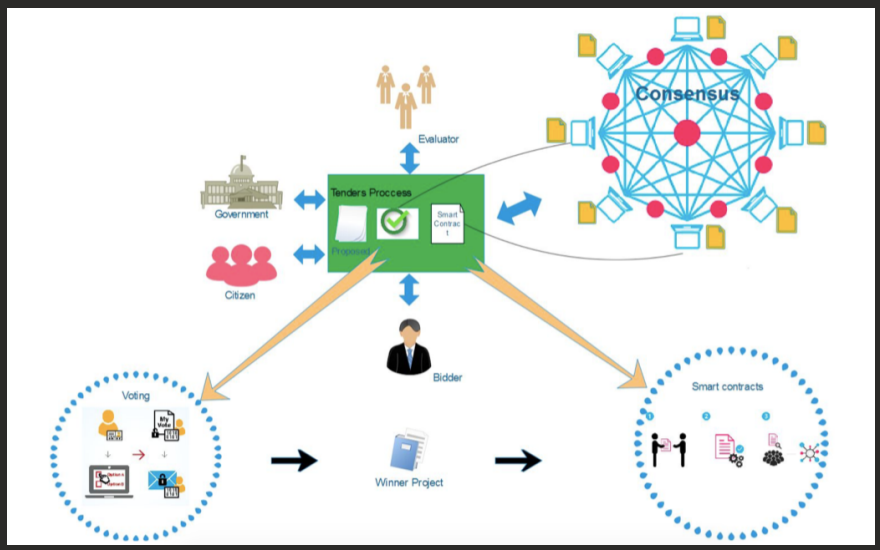


Tech Stack

Our tech stack is the standard followed by most end-to-end DApps built on Ethereum, as can be seen above. What we're doing different is using IPFS to store the contract bids and hosting a private ethereum consortium network on locally-stationed ethereum nodes. This makes the deployed nodes and IPFS our major technical dependencies.

Deployment

The deployment location of the nodes is an important part of our technical solution. These nodes need to be accessible to the public so they can access the raw data directly, improving citizen engagement and enabling journalistic audits of the entire system. Our plan is to deploy these nodes in publicly accessible location like university libraries, civil service departments, among others so the information is kept open to the public.



MVP TESTING

Testing Strategy

Currently, we have a landing page which details our core value proposition, an interactive MVP, and an explainer video. They're all available here: http://tinyurl.com/teamsatoshi. We're conducting one-on-one product tests over Skype with public procurement officials. We record their screenshare & reactions, compile their suggestions into a doc, and implement the improvements we think will improve our landing page's 3 key metrics, namely conversion rate, and average session duration, and clarity.

The steps followed in a single testing session are:
1. Show explainer video
2. Give user the link to landing page
3. Record screenshare & user reactions as they interact with it
4. Give them the link to the demo
5. Record screenshare & user reactions as they interact with it

Metrics

1. Clarity: How many users visiting the landing page understood precisely what we are trying to do? Since this is a qualitative metric, we measure this only during individual product testing.
2. Conversion Rate: How many users visiting the landing page requested a demo?
3. Average Session Duration: How long does an average user browse the landing page and demo for?

Reaching our Testers

1. Online forums are a high-signal-low-noise path to reaching our target audience. Most of these international govt procurement forums are fairly active and are maintained by macroeconomic institutions like the World Bank. One of the more notable ones can be found here: https://collaboration.worldbank.org/groups/e-procurement.

2. Advertising directly to decision-makers like elected representatives is an effective marketing channel because they are often the officals overseeing the entire procurement process. Creating brand awareness in that segment through direct talks or targeted advertising will be highly valuable down the road.

3. We have found there exists a network of technology advocates in the procurement sector, who are collaboratively advocating and lobbying for technologically-forward procurement. Finding them through their websites has convinced us that they are great partners for our testing process.

PRODUCT DEV TIMELINE

TODAY

Phase I

3 months

Phase II

6 months

Phase III

9 months

Phase IV

12 months

Phase V

24 months

Phase I - PEPPOL-compliance

With our first prototype already live, we are currently in the process of working on becoming compliant to the PEPPOL standard. This will greatly ease our entry into the European market.

Phase II - Beta-testing

Hold controlled tests with procurement officials from the European Union. We already have the necessary channels ready for getting in touch with them. In this stage, we monitor customer satisfaction on three key components: contract design interface, pre-bid interface, post-bid interface. By the end of this stage, we'd have tested product tailored for real world procurement officials.

Phase III - Pilot

When the product is in pilot, among other things, we are focussing on testing our updation strategy. We determine which product update strategy works best for active development in the public procurement space, how we'll be deploying updates, and how to gauge customer feedback for the same.

Phase IV - Launch

Official launch at ProcureCon 2019.

To prepare for customer acquisition, we set up up interactive FAQs and multilingual chatbots, something our technical team has previous experience with. The aim is to leverage the incoming exposure to our product and capture value.

Phase V - Updates

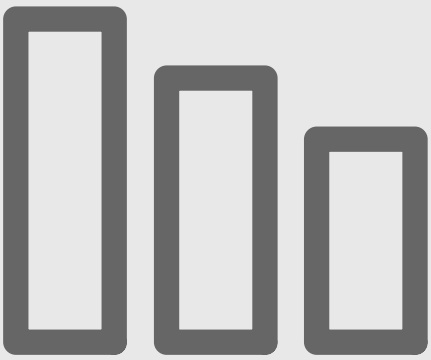
Depending on what we learnt in the pilot, we'd initiate our updation strategy to fix any existing bugs & iterate on customer feedback.

IMPACT MEASUREMENT

1. Impact Goals
2. Key Performance Indicators
3. Measuring Impact on Corruption
4. Collecting Data

IMPACT GOALS

Curb corruption and thus bring down cost of public procurement by 20-30%, saving more money for development of schools, hospitals, and other citizen needs. For the entire EU region, this means saving approximately **€920 million in citizen funds[11].**



Improved rankings of our client countries on macroeconomic performance indexes, especially on World Bank's World Public Procurement report in 2020. We expect an increased growth in GDP too, as improved public procurement has proven to be a **highly positive stimulus for SMEs.**

Unlocking measurable performance improvement of contractors due to the reputation system. Research has shown, most notably the work of Francesco Decaroli, that reputation systems increase compliance by a considerable margin. More on this aspect: **https://goo.gl/bEvaEv**

KEY PERFORMANCE INDICATORS

KPIs FOR CORRUPTION:

1. Corruption rate calculated in anti-corruption risk assessment complying with ISO 37001 Anti-Bribery Management Systems Standard.

2. The number of corrective actions to prevent corruption.

3. Corruption Perceptions Index(transparency.org).

KPIs for INCENTIVE-ALIGNMENT:

1. Average reputation score of bidders

2. The total number of bidders complying with our standards.

3. Customer Satisfaction indicators

KPIs for ENFORCEMENT:

1. The total number of registrations.

2. The total number of client referrals.

3. Client retention percentage.

MEASURING OUR IMPACT ON CORRUPTION

Our indicators for measuring our impact on corruption have been developed guided by the research that Daniel Kaufmann[12] has done in the space since 2006. Below is an overview of the approaches we use for measuring our impact in the area it matters most.

Corruption Measurement Technique	Description of Method	Level of Analysis	Tools/Resources used	Time to Execute
SURVEYS				
Reportage & Journalism	Inventory of socio-economic reports linked to corruption	Macro	• Perceived corruption reports • Transparency studies and statistics • Socio-economic data • Access to EC archives • Newspaper archives	4-6 months
Public expenditure surveys & Budget reviews	Identify leakages and flows of public funds from government to contractor	Macro	• Public expenditure tracking surveys • Perpetual inventory method	6-12 months
A/B testing	Analysis of the cost of a public contract on our system, then contrast it with manual execution cost of similar contract	Micro	• Two or more similar procurement contracts • Having contractor reputation metrics in place	Duration of chosen contracts
AUDITS				
Cost Analysis	Identify gaps in primary and secondary data that suggest corrupt practices	Micro	• Compare to standard unit price • Cost overrun analysis	1-2 years
Procurement Data Analysis	Case-level analysis of procurement data	Micro	• Procurement portals • Government Websites • Newspapers	3 months
Performance Monitoring	Interventions and checks to determine performance of procurement party as well as suppliers	Micro	• Ex-ante, ex-post, interim evaluations • Post-bid performance monitoring • Reputation system scores	6-12 months

COLLECTING DATA

WHAT DATA POINTS TO COLLECT

1. Customer reviews/ratings
2. Total customer volume
3. Corruption perception index
4. Client refferals

HOW TO COLLECT THOSE DATA POINTS

1. Surveys and feedback form
2. Corruption index from transperancy.org
3. Client data

POTENTIAL ISSUES

1. Miscalculation (i.e., KPI improvements did not sufficiently offset failure to execute in other areas).
2. Gaming (i.e., employees learning how to achieve the KPIs but without respect to the profit goals).
3. Sandbagging (i.e., employees barely reaching KPIs while determining to carry-over performance into the next period).
4. Misalignment (i.e., forcing employees into behavior that moves them outside their skill sets and abilities).

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