The first blockchain-driven procurement network **based on trust**.

WHITEPAPER v 1.6

procurean

Abstract

International trade is integral to the world economy, but doing global business comes with significant costs and exposes all parties to numerous business risks without any real coverage. Procurean was designed to put trust back into business transactions and to drive new value and transform digital procurement in a way that was unprecedented before access to low-cost computing power, big data collection and digitalization combined with data strengthened by blockchain technology. By acquiring easy access to market information, knowledge and leverage against known or unknown business partners, businesses can unlock new levels of cost efficiency; benefit from significantly lower procurement transaction and friction costs; mitigate or completely remove business risks associated with international and crossborder trade; and transform procurement from a cost to a profit center.

Visit our website for more information.
procurean.network

Contents

We are creating radically new ways and approaches via which individuals and organizations or businesses can cooperate, engage, and collaborate.

1. Vision

The world is on the verge of the fourth industrial revolution. The adjustments we are facing are historical regarding size and are having a profound effect on production, logistics, and consumption systems. There is uncertainty surrounding these changes, in a sense that we just don't know how these changes, driven by the revolution, will affect our current behaviors and industries, or how these industries will be reshaped in the future. Changes are monumental due to their velocity—the speed with which they are implemented—as a result of a deeply interconnected world that can support more and more technological adaptations. They build on existing networks and transform industries, sectors, and society as a whole.

We are creating radically new ways and approaches via which individuals and organizations or businesses can cooperate, engage, and collaborate. One of the most significant discoveries of the past decade is that of the proof of work (POW) system protocol and its practical application in the creation of the blockchain, which creates distributed trustless consensus and solves the double-spend problem. In the future, it will serve as a registrar for various things, such as licenses, proofs of ownership, certificates, education degrees—virtually anything that can be expressed in programming code.

Online platforms have reduced transaction and friction costs that occur when executing various services and transactions and will do so even more dramatically in the future. They will essentially pave the way for costly transactions or inquiries to be incremented in minuscule fragments, shared among all participants on the network. This will have a profound effect in terms of reducing marginal costs of producing goods, services, or information close to zero.

With adaptations of such technologies and platforms, we are ever closer to the economic ideal of perfect information on a competitive market where there are close to zero frictions, and where all participants can participate equally, fairly, and with complete trust. Procurean will support building the future global B2B (business to business) market centered on these core values.

Digitalization will disrupt and fundamentally alter how both strategic and transactional procurement deliver value.

2. Opportunity

2.1. New procurement value proposition

Rapid progress in digital technology and information technology is remaking and delivering new purpose to supply chain management. Combining low-cost computing power, interconnected IoT (Internet of things), easy access to the cloud and data storage, digitalization will disrupt and fundamentally alter how both strategic and transactional procurement deliver value. Strategic sourcing will become more predictive, transactional sourcing will become more automated and optimized, and vendor relationship management will become more proactive, driven by sophisticated analysis of previously unavailable data. More efficient organizations will break through by utilizing emerging technologies to enhance or replace their legacy systems while transforming procurement from a cost center to a profit center.[1]

Procurean will transform procurement in a way that will enable businesses to:

1. lower their transaction costs by up to 90%
2. save up to 30% on (currently) non-optimized procurement
3. increase trust and lower business risks associated with business transactions
4. digitize and automate procurement with minimum time waste
5. get open market access and information
6. transfer knowledge and IT system capabilities from large enterprises to SMEs.

[1] https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-cons-digital-procurement.pdf

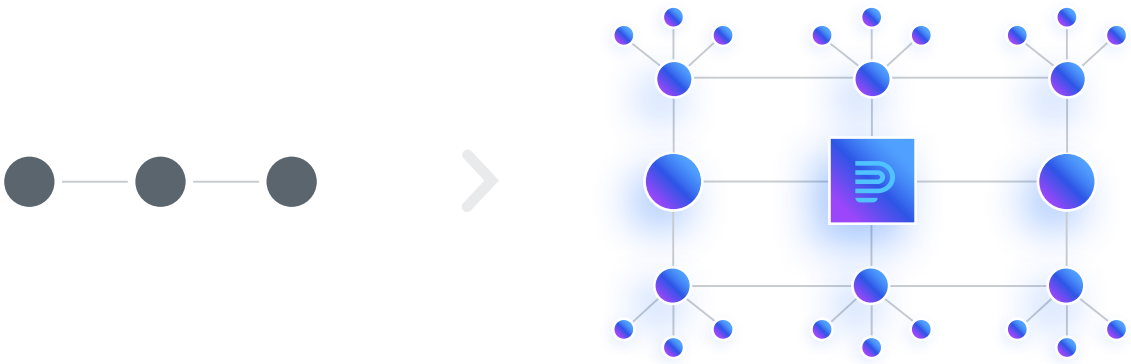
2.2. Transforming digital procurement

2.2.1. Supplier to consumer collaboration becomes predictive

Supplier to consumer business becomes transparent, predictive, and accessible, with visible prices and costs from suppliers all over the world, to enable and empower businesses to reach more trustful and beneficial agreements through smarter contracts with higher value suppliers.

BENEFITS:

- Manage and control costs in real time.
- Predict demand with backend.
- Receive alerts from all negotiated agreements (e.g., renewals, supplier relations) and reduce exposure to business risk caused by possible disruptions.
- Further optimize purchases with global access to and availability of trusted suppliers.

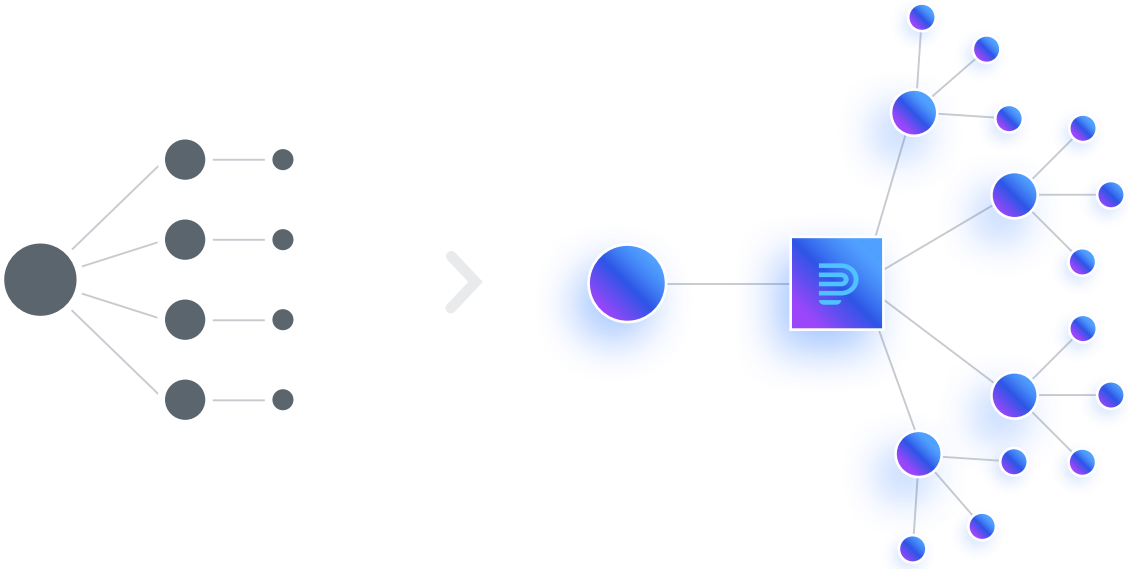


2.2.2. Procure-to-pay becomes optimized and automated

Procure-to-pay transactions and purchase indents that fall into the low sourcing priority brackets and would otherwise be exposed to temporary monopolies created through periodical contracts are entirely automated and routinized and require minimal to no intervention.

BENEFITS:

- Automatically predict demand and request replenishment deliveries from suppliers.
- Eliminate repetitive processing and lower transaction costs by up to 90%.
- Exchange commodities through a trusted and verified decentralized ledger confirming every transaction.
- Optimize every purchase indent and deliver up to 30% cost-savings on non-optimized purchases.

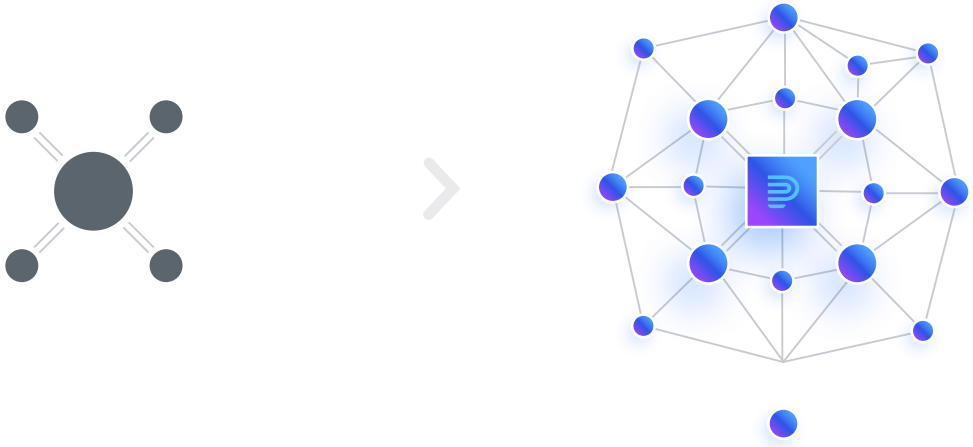


2.2.3. Supplier relationship management becomes continuous

Combining and leveraging data from procure-to-pay and S2C operations, SRM (supplier relationship management) becomes proactive and continuous while enabling human resources to be redistributed to focus on optimizing higher value processes. Processing data increases the accuracy of strategic choices and mitigates risk to support better and evidence-supported decision making.

BENEFITS:

- Enhance supplier audits through crowdsourcing.
- Monitor potential supplier risk through constant monitoring and data aggregation.
- Bring “know-how” and business practices relating to vendor and demand management enhanced by machine learning algorithms to SMEs.



2.2.4. ABC spend analysis

Pareto analysis in procurement—more commonly known as ABC spend analysis—is a formal technique used to identify priorities in business decisions, following the 80/20 rule. Pareto unequal distribution is based on the Pareto principle, which states that 20% of invested input is responsible for 80% of results obtained. A Pareto chart in procurement will include classification of the items that a business is procuring to minimize maladministration and to identify items with different management tactics and controls based on their projected value. The inventory is split into three categories,

A, B, and C, depending on the % of items and the % of the total spend affecting the business.

category	A	B	C
% of items	5%	15%	80%
% of total spend	80%	15%	5%

This fundamental strategic procurement analysis enables buyers to determine the 20% of high priority sourcing events to focus on for optimization, and the 80% of low priority sourcing events to be automated. Different tactics are applied for different sourcing events, with wholesome support on the network. B and C category purchases are rarely optimized due to lack of human resources, information, or knowledge as to how much optimization would affect revenues and profits.

According to historical data, just optimizing unstrategic, low sourcing priority purchases can increase value by up to 30% and decrease transaction costs associated with repetitive procurement by up to 90%.

2.2.5. Market sizing

2.2.5.1. SMEs

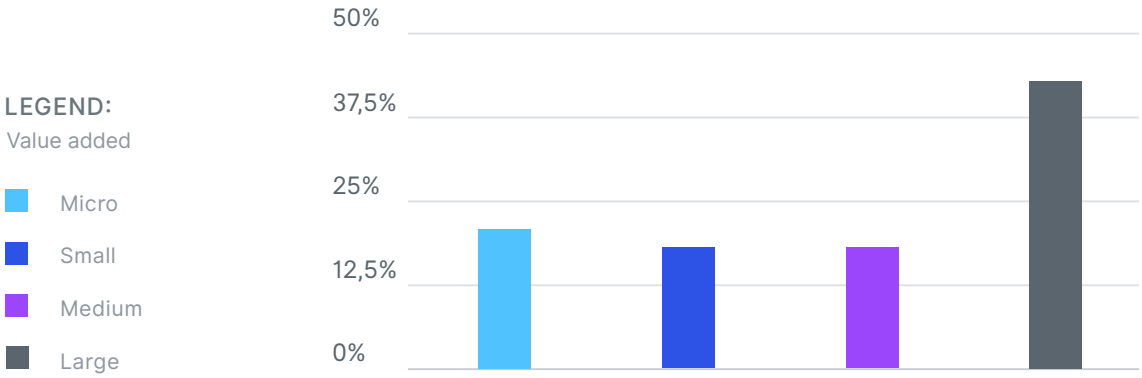
Trade represents more than 60% of global gross domestic product (GDP). However, doing business on a worldwide scale carries significant costs and leaves all parties concerned exposed to numerous risks. Searching for and vetting new business partners is expensive and time-consuming, and carries no real guarantees or assurances against tender corruption.

Recognizing our primary—but not exclusive—market, this is especially true for small and medium-sized enterprises (SMEs) which can't pay costs associated with international trade on a per use basis and which don't have easy access to global partners. As shown in the table below, SMEs are defined per EU recommendation 2003/361 on two deciding

factors: staff headcount and either turnover or balance sheet total. [2]

Enterprise category	Headcount	Turnover	Balance sheet total
Medium-sized	< 250	≤ € 50 m	≤ € 43 m
Small	< 50	≤ € 10 m	≤ € 10 m
Micro	< 10	≤ € 2 m	≤ € 2 m

These businesses represent roughly 98% of our target markets by number of registered enterprises and, as the chart below demonstrates, 60% by gross value added relative to total GDP; they are the powerhouse of the represented economies and other economies worldwide.[3]



SMEs are facing very specific challenges including:

- limited access to financing options
- poor or non-existent informational structure through a shared database
- low level investment into R&D, which slows down adoption of newer technologies and methodologies
- lack of best-in-class business solutions and know-how
- insufficient use of information technology
- lack of economies of scale and scope
- high transaction costs
- lack of skilled labor
- lack of market access and market information.

Considering the importance of SMEs in driving economic growth, Procurean will address these obstacles by tools enhanced with machine learning algorithms to ensure knowledge and experience transfer on the underlying market infrastructure.

[2] https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_sl.
[3] https://ec.europa.eu/jrc/sites/jrcsh/files/annual_report_-_eu_smes_2015-16.pdf.

2.2.5.2. Revenue projections

We forward estimate that there are around 77,000,000 registered entities on our target markets, of which 42,000,000 are relevant business entities that represent the more procurement oriented sectors in the GDP, such as manufacturing, industry, and agriculture. These account for nearly 27,000,000,000,000 USD in revenue across all sizes estimated from their origin country's GDP, of which at least 8,000,000,000,000 USD account for procurement costs and represent the value of our projected market potential. To estimate procurement costs we use the lowest common denominator (in all sectors) of 0.3 to compare procurement costs against revenue—0.3 units of procurement costs produce 1 unit of revenue. By capturing 1% of this already reduced market potential in our target countries, we look towards nearly 800,000,000 USD in revenue.

$$\textit{Number of relevant entities} = \textit{Registered entities} * \frac{\textit{(Industry relevance ratio * Industry value added)}}{\textit{100}}$$

$$\textit{Avarage per business revenue} = \frac{\textit{GDP value added * GDP}}{\textit{Number of entities in sector}}$$

Country	Registered entities [4]	Relevant entities	Total inquiry value (USD)	Total revenue (USD)
Slovenia	134.727	83.559	8.318.577.519	820.420
Croatia	146.637	73.718	7.648.669.197	754.350
Austria	322.325	177.271	64.479.007.667	6.359.242
Italy	3.683.127	1.763.294	266.985.868.176	26.331.481
Hungary	536.610	330.250	23.229.692.981	2.291.028
Estonia	68.124	36.192	3.719.543.919	366.840
Latvia	109.642	49.859	3.761.553.578	370.983
Lithuania	186.468	108.997	7.494.727.705	739.168
Poland	1.606.559	940.625	82.793.831.366	8.165.542
Germany	2.408.352	1.445.502	626.216.087.726	61.760.562
Czech Republic	1.001.048	692.791	40.549.205.003	3.999.165
Slovak Republic	429.524	266.179	16.689.048.822	1.645.957
Romania	458.122	316.341	38.860.639.372	3.832.631
Bulgaria	326.219	170.193	8.332.459.624	821.789
Albania (e)	19.243	9.777	1.808.311.317	178.345
Montenegro (e)	7.095	2.609	482.587.712	47.595
Serbia (e)	62.123	38.684	7.154.842.575	705.646
Macedonia	54.738	27.400	1.636.801.134	161.430
Bosnia & Herzegovina	65.800	33.930	2.615.969.681	258.000
Kosovo (e)	10.786	5.463	1.010.479.020	99.658
Belgium	602.153	267.200	62.295.231.017	6.143.867
Cyprus	48.329	12.362	1.538.315.652	151.716
Denmark	210.726	95.329	41.650.899.140	4.107.820
Finland	229.096	120.839	37.740.363.028	3.722.143
France	2.908.814	1.163.990	295.972.559.558	29.190.294
Greece	789.975	286.011	20.929.188.259	2.064.141
Ireland	243.433	138.411	51.994.021.978	5.127.910
Luxembourg	31.926	8.497	4.681.430.330	461.706
Malta	26.059	9.572	1.212.026.460	119.536
Netherlands	1.092.243	454.003	96.918.974.291	9.558.634
Portugal	807.183	352.276	26.818.825.209	2.645.007
Spain	2.465.540	1.128.447	169.882.907.344	16.754.702
Sweden	686.433	349.846	78.659.600.354	7.757.803
United Kingdom	1.940.947	753.239	308.277.229.395	30.403.842
Canada (e)	2.481.307	1.178.740	218.012.981.007	21.501.530
USA (e)	30.209.330	12.621.623	2.334.422.103.221	230.232.380
China (e)	18.165.273	15.405.677	2.849.344.665.120	281.016.618
Russia (e)	2.081.320	1.120.570	207.254.070.151	20.440.433

[4] https://data.worldbank.org/

2.2.5.3. Competition

Whereas big data collection, real-time analytics, and rapid response to changes will drive procurement value in the future, it is clear that this data utilization won't be done by big enterprise resource planning (ERP) providers the likes of SAP, Microsoft Dynamics, NAV-X, or IBM Maximo. Rather, providers like Elementum, Kinaxis, and Synclab will offer smaller and more focused solutions to try to integrate data from all partners in given value chains. Procurean won't be competing directly with any of these providers; it will use already implemented solutions as a data source where available and provide integration packages with distributed apps and the Procurean application programming interface (API).

Businesses lack market access, information, knowledge and technological infrastructure to transform and drive value to procurement.

3. Challenges

3.1. To establish a global interconnected market

Every day, businesses are locked into existing relationships—mostly, not because of excellent conditions and performance, but due to lack of information and, consequently, choice. They are often exposed to extortionist rates or terms, simply because they lack the right amount of negotiable power to begin with. A competitive market is by definition a market in which a large enough number of producers are trying to optimally satisfy the needs of a large number of consumers, and no single entity can dictate how such a market turns or operates. As a buyer, suddenly having access to a global network of trusted sellers can get you much better prices or terms for your desired items than you're used to. The same goes for sellers, who can find new business partners among trusted buyers all over the world—without investing exorbitant amounts into sales or marketing. It is important that we provide businesses with tools and infrastructure that will enable them to transcend current limitations imposed on them due to high transaction costs, poor use of IT, and a general lack of access to both the market and information.

3.2. To ensure businesses trade with trust

Supply chains and international trade are an integral part of the world economy. They provide an essential stream that enables everyday commerce, but are rarely appreciated for their complexity until a disruption causes a shortage or becomes problematic. Forming these links and networks with businesses all over the world comes with enormous costs, and almost always carries all sorts of business risk, such as financial risk and reputational risk. For these risks to be mitigated, businesses have

to be thoroughly vetted and investigated. This is hard enough to do from a financial standpoint, where data is available, although usually not easily accessible, but almost impossible on the reputational side, where practically no data is available or collected. We propose a system where every business has free and open access to a global database of financial and reputational data gathered on behalf of every business in the network. Businesses can then judge on these indicators whether or not to pursue a business transaction. We want to combine this data with strict know-your-customer (KYC) registration procedures taken from bank and anti-money-laundering regulations, so that businesses can trade with trusted peers through a secure, transparent, and self-regulating network.

3.3. To provide powerful insights and technology

Even though businesses understand the benefits of adopting new technologies, there is a disproportionately big long tail of late adopters, especially due to SMEs' inability to cope with continuously changing technological environments and the scale of changes they require. Faced with higher spend limitations, SMEs can usually afford access and knowledge only at a fraction of the cost of the current available technologies. Slowed down by their small size and scattered distribution, they are implicitly slow to adopt and implement electronic processes, since their knowledge and experience are usually more tacit than digital. Today's businesses have to tackle data and infrastructural costs individually on an ad hoc basis, usually for every transaction—even repeating—resulting in a non-efficient and costly environment that leaves them exposed to lack of choice, which inhibits success.

Although constrained by manpower resources, SMEs can significantly improve their productivity by streamlining their processes while implementing best-in-class business intelligence and solutions, thus making their employees available to focus more on strategic decisions where they can further add value. We want to empower businesses of all sizes by providing a shared technological infrastructure that will increment costs and equip them with knowledge and experience that will enable them to drive and deliver better value to their organisations.

The trust rank is the biggest deciding factor for businesses on the Procurean network.

4. How does it work?

4.1. Trust rank

The trust rank is the biggest deciding factor for businesses on the Procurean network. It is, consequently, the most important leverage that businesses have to ensure trustful and fair behavior from their potential buyers or sellers.

The trust rank of a participant is calculated from two separate components: one financial and the other reputational. The business's resulting trust rank is a composite number calculated from a weighted sum—the weight being the trust rank of the evaluator, of quantitative evaluations ranging from 1 to 10 and their financial indicators.

4.1.1. Financial component

The data for the financial component is retrieved from publicly available financial data, smart data sources and data gathered by credit rating agencies. Most of this data is bought on the market from smart data providers. To judge a business's financial health, we rely on four key factors and their respective indicators.

4.1.1.1. Liquidity

A measure of how fast a business can use its easily convertible assets and cash to manage its short-term debt obligations. We look at the quick ratio, more commonly referred to as the acid-test ratio, to realistically judge the short-term liquidity of a business.

4.1.1.2. Solvency

A measure of how likely a business is going to be able to cover its debt obligations long term on an ongoing basis. We look at the debt-to-equity ratio, to see how much debt a business has against stockholders' equity. Since debt-to-equity varies from industry to industry, we try to see if there is a clear upwards or downwards trend visible over time.

4.1.1.3. Operating efficiency

A measure of how efficiently the management can control costs and what their basic operating margin is after deducting variable costs from production and other operations. We use operating income, more commonly known as EBIT, to judge operating efficiency.

4.1.1.4. Profitability

The bottom line when assessing a business's financial health is its ability to generate and attain profits in the long term. We look at the net margin, to see how much each unit of revenue collected by the company translates to profit.

4.1.2. Reputational component

The reputational component is dependent on datasets collected from multilateral evaluations of participants done on the network. This data is generated through various buyer–seller interactions on the network using smart instruments and it is governed by smart contracts.
An evaluation is required at the end of every concluded phase in each transaction (such as bidding, delivery, payment) and this is visible to all transaction participants so that they can work towards any possible resolutions when needed. The reputational component dissolves over time to ensure relevancy.

4.1.2.1. Dispute settlement

In case of disagreements in the evaluation process, the disagreeing party can issue a dispute and provide evidence (the other party is also allowed to provide its arguments and evidence) and enough tokens to fuel the deployment and reward in a new dispute settlement smart contract. The tokens are locked into the smart contract for the duration of the dispute.

A dispute resolution algorithm selects the most appropriate businesses in the network to join the resolution process, for which they are reimbursed with tokens from the reward pool.

The appropriateness of resoluting partners is judged based on two criteria:

- sector relevancy (businesses who have previously bought or sold items in the same or similar classification)
- trust rank (only businesses in the 10th percentile are able to participate in the resolution process).

The resoluting businesses are invited to join the resolution process and can join on a first-come, first-served basis.

The resolution business selection process is followed by voting and is based on the “wisdom of the crowds” principle, where partners who joined the resolution process pool together to exercise their collective intelligence. The voting procedure is guided by the blind voting principle, where later voters can’t see previous votes to prevent them from being influenced by first voters, i.e. the bandwagon effect.

Once the dispute is settled with a qualified majority vote, the end result gets included in the trust rank. If majority is not attained, the voting stage repeats. This way, the Procurean network ensures the decentralization of business interactions, and gives businesses a credible and reliable mechanism of protecting their trust rank from potentially harmful actions.

4.1.2.2. Self-assessment

Each business on the Procurean network is periodically required to perform a self-assessment in which it can provide current trust data on its own behalf to enhance its trust rank. The selection algorithm is sporadic, but known upfront, and it asserts activeness of the partner in the Procurean network. The self-assessment is composed of a predetermined set of questions, and requires proof to be provided for all attained certifications and excellence milestones reached.

The aim is to provide an alternative set of reputational data properly positioning the partner in the Procurean network.

4.1.2.3. Guarantees

Businesses on the Procurean network can further enhance their trust rank by requesting and paying for a guarantee from one of their existing business partners that already participate on the Procurean network. The guaranteeing business gives a time-constrained guarantee to the asking business by staking its own trust rank. The given guarantee is fueled by tokens provided by the requesting party and issued on the Procurean network with a smart contract. All changes (positive or negative) to the trust rank of the requesting business are immediately reflected in the trust rank of the guaranteer for the remaining time, and the reward pool of tokens is redistributed to the guaranteer at the end of the guarantee period.

4.2. Smart instruments

To enable daily commerce and business transactions to take place where trust data can be collected, the Procurean network provides a set of smart instruments, each meant for a specific procurement role and each paid for with PAN tokens. These smart instruments are governed by a separate set of smart contracts that take care of token storage, disputes and behavior while the transaction is ongoing, and redistribution when the transaction is at its end.

Behavior for various inquiry scenarios is controlled by the predetermined criteria function. The parameters (trust rank, price, and specific item properties) in the criteria function can be either inclusive or exclusive:

- inclusive parameter (the value of the parameter is weighted by importance)
- exclusive parameter (the value of the parameter must be at least equal to or better than requested).

4.2.1. Blind reverse auction

Blind reverse auction is used by buyers who have successfully identified their item and estimated the price of the inquiry. The result is a business promise to the most competitive bidder and both parties are required to honor the agreement reached through the auction.

Sellers have to pay a fee relative to the estimated value of the inquiry for each bid they place. The estimated value of the inquiry equals the maximum price the buyer is willing to pay for the inquiry. The fee is paid with PAN tokens and sellers can put any number of bids towards the inquiry (the current winning bid can get beaten by another seller's more competitive bid). This promotes serious (researched and calculated) bids from sellers and gives them an incentive to place competitive bids from the start to avoid rebidding and extra costs.

In order to support different real-life situations, different scenarios will be supported:

- public auctions (any seller can join, if entry criteria defined by the criteria function are met)
- regulated auctions (only buyer-pre-selected and/or pre-approved sellers can actively join the bidding process, although other sellers can identify the inquiry and initiate the approving process)
- private auctions (only pre-approved vendors can identify or join the inquiry).

4.2.1.1. Example of a blind reverse auction

The buyer is buying ball bearings which represent a low priority sourcing event for the company and is currently not optimized. It sets up a blind reverse auction—public—and defines the criteria and the maximum price it is willing to pay for the ball bearings—10 USD per ball bearing. No bid can be accepted above this price. The Procurean network automatically discovers all the sellers that have the ball bearings in stock and match the required criteria. Sellers join the auction and place bids. Each bid is paid with PAN tokens and the tokens are locked into the smart contract until the end of the inquiry.

The lowest—winning—bid is 6.35 USD per ball bearing. The seller with the winning bid can now follow through with delivery and payment. The seller and the buyer exchange an evaluation at the end of the delivery and payment phase.

4.2.2. Multistep auction

Multistep auction is used for strategic purchases with strong supplier relationships. To support the supplier (seller) selection process, multistep auction is done in two parts.

The first part is a ranking auction in which the buyer defines the ranking process, guided by the criteria function. The buyer can choose to make as many tiers of the ranking auction as needed.

Sellers don't pay a fee to place bids in the ranking auction, but they can only place one bid per ranking auction tier. Sellers receive their ranking feedback at the end of each individual tier of bidding.

At the end of each tier, the vendors with the best bids are accepted into the next tier and finally to the second part of the auction, which is an instance of a blind reverse auction.

4.2.2.1. Example of a multistep auction

The buyer is buying aluminum, which represents a high priority sourcing event for the business and can therefore only be bought from pre-approved sellers. The buyer currently doesn't have enough sellers, so it chooses the multistep auction to gain and approve new sellers in the first step. The buyer decides to create a one tier ranking auction.

The Procurean network automatically discovers all sellers that have the aluminum in stock and invites them to the ranking auction. Sellers join the auction and place bids. The six best sellers have to be personally vetted and confirmed by the buyer before being moved to the second auction, where the winning seller is chosen through a blind reverse auction.

The buyer and all the best sellers from the ranking auction exchange an evaluation after the ranking auction is concluded. The winning seller and the buyer exchange an evaluation at the end of the delivery and payment phase of the blind reverse auction.

4.2.3. Market inquiry

Market inquiry is meant for buyers that can't fully define the item of purchase and want help identifying needs; that want to get an insight into the current market pricing; that just want to find out which sellers can supply the item.
The buyer has to provide a minimal reward pool of PAN tokens for *n* bids from different sellers. It is on the buyer to decide the appropriate reward per bid and the size of the reward pool. The higher the reward, the bigger the chance that sellers will place informative bids.

The appropriateness of sellers accepted to the market inquiry is judged based on two criteria:

- sector relevance (businesses who have previously bought or sold items in the same or similar classification)
- trust rank (only businesses in the 10th percentile are able to participate in the market inquiry).

Once the reward pool is depleted or the buyer marks the market inquiry as concluded, the smart contract executes the token redistribution. In case of an unsuccessful inquiry or partially used reward pool, the remaining tokens are returned to the buyer.
After the market inquiry has concluded and the buyer has received the required information and successfully identified the inquired-about item and price, the market inquiry is usually followed by a multistep or a blind reverse auction.

4.2.3.1. Example of a market inquiry

The buyer is starting to build a new item but is not exactly sure which components will be needed to produce it. It also doesn't know how much these components cost or what their availability is. It sets up a market inquiry and places PAN tokens in the smart contract to attract sellers that will place informative bids and provide the required information. The Procurean network will invite relevant and trusted partners to place their informative bids. At the end of the market inquiry (when the reward pool is emptied or the time has run out), the tokens are redistributed among the sellers who placed bids. As a result of the market inquiry, the buyer now has complete information and estimated pricing for the item.

4.2.4. Group purchase

Group purchase provides benefits from economies of scale to small and medium-sized buyers who otherwise wouldn't have access to aggregate prices.

When buyers are planning their successive periodical purchases, they can look for and form groups with other buyers who are buying the same products. This way, buyers are able to negotiate with sellers better prices and terms for their purchases.

A group purchase starts with a leading buyer defining the joining criteria function and other terms of the group inquiry (geographical limitations, auction date, trust ranking, delivery date, Incoterms). The leading buyer also defines a joining fee, which every following buyer has to pay in order to join the group purchase. This fee incentivizes the leading buyer to organize and administer the group purchase among all buyers. Lastly, the buyer defines the minimum and maximum quantity limitations.

The group purchase is shown as an open inquiry to which other buyers can apply in the predetermined time period. They are accepted to the buyer group if they meet the criteria function described by the buyer, and if they have paid the joining fee with PAN tokens.

Group forming is finished when the quantity limitation is reached, or when the date set for group formation has ended. If the group purchase fails to reach the minimum requested quantity, all joining fees are returned to the joining buyers and the group purchase is deemed unsuccessful.

After group formation, the group purchase is transformed to a blind reverse auction.

4.2.4.1. Example of a group purchase

The buyer is buying 1000 iron screws every month for the following year. The buyer sets up a group purchase which other buyers who are buying the same item can join. The inquiry is limited to either one month in time or when the total inquired amount reaches 20,000 iron screws. The minimum quantity limitation is set at 10,000 iron screws. The leading buyer requests all joining buyers to pay a fee of 100 PAN tokens when they join the group purchase.

After a month, more buyers have joined and are together inquiring after 15,000 iron screws. The inquiry is deemed successful and is transformed to a blind reverse auction, but with a 1500% increase in quantity, the buyers can collectively negotiate much better terms and prices from prospective sellers.

4.3. Market tools

Acknowledging SMEs as our principal market, we recognize that many lack the funds, infrastructure or knowledge to digitize their purchasing processes fully. Procurean will ensure knowledge and experience transfer from enterprise-sized businesses to SMEs by providing wholesome tools supported by backend statistics that will complement and provide better utilization and performance of smart instruments on the network.

4.3.1. Discovery

To establish a frictionless and informed market with appropriate information flow, we have to make sure that buyers have a way of finding sellers offering the items they are looking for and that sellers can find buyers for their items. This will be done in continuity along the network, comparing data collected from past transactions, vendor management tools and the network item catalog, to correctly identify the availability and projected capacity of items on the network by businesses with a sufficient trust ranking. As buyers and sellers use the instruments on the network, machine learning algorithms will learn to accurately identify potential business opportunities and considerably simplify or completely automate human work. Automated discovery tools also minimize exposure to business risk due to missed opportunities or misinformation.

4.3.2. Vendor management

Vendor management allows buyers to build tight, interconnected relationships with their sellers that strengthen both parties. Vendor management is not solely about negotiating the best prices or terms; rather, it is about committing to sharing information, mutual forecasting, contributing knowledge and coming together on value. Procurean makes available to partners a set of distributed apps that are missing from on-site ERP or SCM systems, to manage their vendor relationships in a fully digitalized environment using best practices, processes, and available technologies.

Implementing vendor management provides better-value control and assessment procedures while fully integrating these procedures with the Procurean network. Bringing together financial data, trust rankings, and other assessment results creates an environment with access to information otherwise not available to SMEs.

Access to this harmonized data and its continuous processing greatly lowers the effort and costs associated with managing vendor relationships. At the same time, it creates a more responsive, ever-improving, self-regulating partner network that is able to alert buyers about upcoming disruptions or improvements on the vendor side.

The end result is assured data quality for management decisions and lower risk for business performance. This data is also accessible using the Procurean API, allowing partners that use local ERP or SCM solutions access to data not otherwise available.

4.3.3. Demand management

Demand management is a method of planning, forecasting and managing the demand for products in producing businesses. It is used to address external factors of spending and purchasing so as to better arrange purchase orders and minimize wasteful spending.

Procurean supports these processes through a set of distributed apps, converging in an IT environment where forecasting, internal demand identification, approving and, actual procurement are digitalized and standardized.

Machine learning is then applied to further simplify system execution by forecasting demand, automating approvals, and suggesting appropriate procuring time frames and instruments.

4.4. Infrastructure tools

4.4.1. Escrow

The Procurean network offers escrow services by issuing a separate smart contract to complement the execution of business transactions done with other smart instruments.

Buyers can start an escrow toward which they put a predetermined amount of tokens, relative to the auction worth. The escrow is released when both participants involved in the transaction (buyer and seller) come to an agreement. If the participants don't come to an agreement, the seller can issue a dispute on the Procurean network.

4.4.2. Network item catalog

The Procurean network collects and stores data on all items generated from buyers and sellers to build a network item catalog, based on GS1 standards. This extensive directory of items is used by every participant on the network to identify products by a unique item trade number, and to streamline indent purchases to a machine-readable format which anyone can understand.

Powered by data collected from business transactions done with the instruments on the Procurean network, the network item catalog will help future development of new markets by providing streamlined and standardized item definitions and requirements. The network item catalog will provide specific item definitions (templates) for items of different type and/or classification to provide common definitions for buyers and sellers to categorize, describe, and identify their items.

By utilizing the network item catalog, the Procurean network will be able to match buyers and sellers in various inquiry scenarios (smart instruments).

4.4.3. Electronic documents

To help with recognizing established business practices internationally, the Procurean network implements electronic document creation, archiving, and exchange between participating parties.

In supporting procure-to-order and procure-to-pay processes, the Procurean network provides all needed (or required) documents to digitize business completely, overcoming the current status quo for businesses where mostly only electronic invoice documents are exchanged between parties (forgetting that business is done before invoices are sent).

Documents used in the Procurean network are generated and managed in compliance with established GS1 and MoReq standards. By using blockchain technology, long-term storage and the validity of the documents are ensured.

Electronic documents in the Procurean network provide effective and hassle-free entry into global trade for any business, regardless of its size or technical capabilities.

4.4.4. Integration API

The Procurean network is always accessed through the provided API. Any distributed application or existing ERP or SCM system can use the API to provide streamlined purchasing processes.

The API will be publicly accessible and will offer any company (a software vendor) the opportunity to use it in its products.

On top of the API, a Procurean adapter will also be provided to simplify the integration implementation. The adapter will use the Procurean API in addition to implementing required functionalities to manage access to actions on smart contracts (initiating a new contract, sending a signal to a contract, and so on) and provide management of private keys used in blockchain related functionalities.

Procurean is built on top of a decentralized network of nodes with blockchain as a court system.

5. Technical description

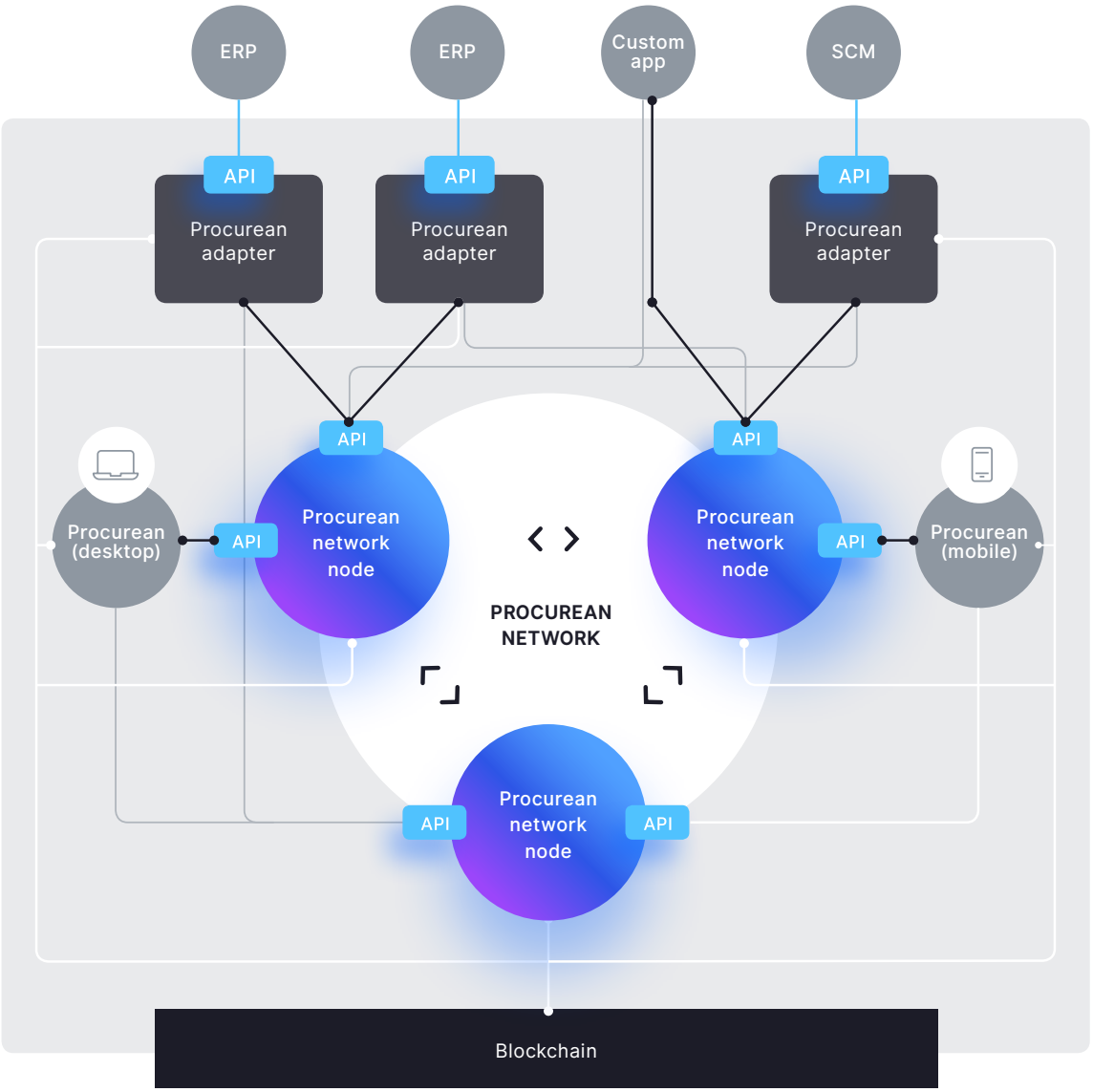
5.1. Procurean ecosystem

The Procurean ecosystem consists of three main components (see the figure below):

- **Procurean network**—provides implementation for all smart instruments and tools. Built using Procurean nodes which act as a self-organizing system to provide the functionalities, the decentralized network uses the public blockchain to ensure data immutability.

- **Procurean API**—provides the entry point to the services offered by the Procurean network. It defines the rules and protocols for the external system to enable it to integrate with the network. In order to speed up the integration, the default implementation will be provided in the shape of a Procurean adapter.

- **Procurean dApps**—a set of multi-channel applications providing functionalities of the Procurean network to users who do not integrate their systems via the Procurean API or in situations where existing systems lack certain functionally used/needed by the purchasing processes.



5.2. Procurean network

5.2.1. Network topology

The Procurean network is built on top of a decentralized network of nodes providing all the functionalities of the network and storing data.

Each of the nodes uses blockchain to provide support for decentralized process execution—with smart contracts—and to provide data immutability for individual

transactions and documents created on the network. The Procurean network uses the swarm protocol to enable data distribution[5] and ensure a functioning real-world environment, where communication is not always stable or secure, effectively dealing with situations where some nodes are not available or are experiencing performance issues.

Both the network of nodes—providing near real-time transactional speed—and the blockchain—providing security—are tightly integrated to enable implementation of smart instruments and tools.

The data is always replicated to multiple nodes in the network, ensuring data availability even in the case of partial network outage. The minimum number of nodes to which data has to be replicated is dynamic, following the node replication rule of $2n + 1$ nodes, where n are the areas where the majority of transactions are performed within a single market cell (geographical area). Replication is also done in an outsider node, beyond the initial market cell, to further extend security and prevent loss.

Every time data is created, its immutability is ensured by using blockchain to permanently store the data signature, effectively providing immediate detection if and when data changes. In addition to this, data stored in the network is governed by the majority rule of the consensus building algorithm to be regarded as valid. This means that nodes are always required to agree on the data they store before that data can be used in the Procurean network.

The blockchain is necessary for the Procurean network to be safe and fair.

5.2.2. Blockchain

Ethereum blockchain is Procurean network's first choice due to its widespread acceptance, decentralized nature resulting in great freedom, and ability to execute computer code by utilizing smart contracts native to the Ethereum ecosystem.

The Procurean network is built to be blockchain agnostic and will not be tied to the Ethereum platform—if a better or more economical option becomes viable, Procurean will change the underlying blockchain.

[5] https://www.gitbook.com/book/gritzko/swarm-the-protocol/details.

5.2.3. Synergies

When businesses participating on the Procurean network want to be included in larger supply chain ecosystems, the network provides implementation of systemic integrations. The first implementation provided will be the OriginTrail protocol, where Procurean nodes act as data nodes in the OriginTrail network, providing data on executed order transactions to the supply chain network(s) of choice.[6] The same can be done by introducing logistics systems to the Procurean network (e.g., CargoX, Instafreight), providing instant digitized paths of metadata between ecosystems.

5.3. Interfaces

5.3.1. APIs

A set of APIs providing connectivity services to partners is available, predominately for integrating ERP and SCM systems directly with the Procurean network. The APIs follow well-established REST API guidelines and are published and available to the partner ecosystem. Furthermore, a Procurean adapter implementation is provided for the partners to use in integration projects.

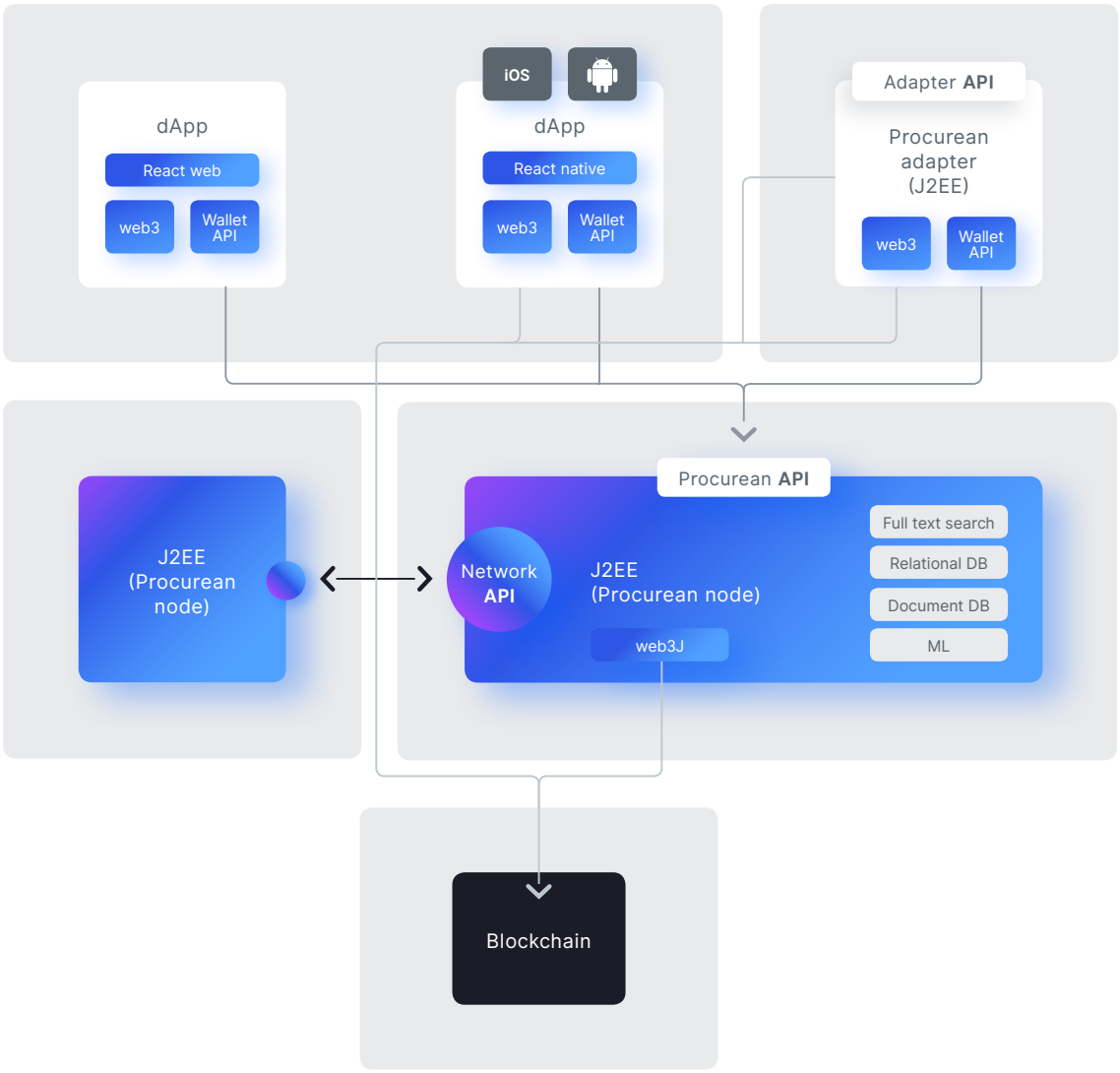
5.3.2. Distributed applications

The web and mobile Procurean dApps offer support for end-users to participate in the Procurean network in their business operations without (or in parallel with) their existing IT systems. This way, SMEs get direct access to IT features not commonly accessible to smaller companies, as well as infrastructural data collected from the network.

[6] https://origintrail.io/storage/documents/OriginTrail-White-Paper.pdf

5.3.3. Technology stack

The APIs and dApps are built using proven and reliable technologies such as React and Node.js managing the application front-end, combined with Java EE managing the Procurean network, the Procurean adapter and the REST-based Procurean API (see the figure below).



Blockchain is accessed with the web3.js library and we use external wallet-service-provided APIs to access and ensure wallet functionalities. Native database drivers are used to access individual data repository types—JDBC for relational databases and a native search engine for full text search or document database.

5.3.4. Storage

The data is stored via two systems:

- The blockchain provides permanent immutable storage for all smart contract results and transaction/document signatures.
- The decentralized network of nodes provides storage for all data related to Procurean network operations.

The Procurean network implements a scalable and distributed data storage approach, ensuring fast and reliable storage of data and documents. Each node has to provide effective means to access the required data:

- To store transactional and structured data, nodes use relational databases with ACID (Atomicity, Consistency, Isolation, Durability) properties.
- To store documents, nodes use document-oriented databases.
- To provide data access functionality, nodes use appropriate text-based search engines.

When nodes handle sensitive data, the Procurean network implements zero-knowledge proof to safeguard data and protect businesses from revealing their trade secrets to the Procurean network or third parties. In these situations, the data is encrypted by the owner (using a private key) and is accessible only to the intended receiver (using a public key).

The PAN tokens will be launched with a smart contract deployed on the Ethereum platform.

6. PAN token

6.1. PAN token utility

6.1.1. Bidding

Businesses use PAN tokens to place bids on inquiries in various scenarios enabled by smart instruments. The price-per-bid covered in PAN is relative to the estimated inquiry value. This means that sellers pay PAN to win new business (blind reverse auction, multistep auction) and buyers pay PAN to gain new information (market inquiry, group purchase).

6.1.2. Disputing

In order to reward businesses invited to the resolution processes, the businesses opening a dispute on the network have to provide enough PAN tokens to fuel the dispute. The amount of required tokens is summarized from a fixed amount and an amount relative to the estimated inquiry value. These tokens will incentivize potential resolutioning businesses to join the resolution process.

6.1.3. Guarantees

Businesses use PAN tokens to pay for a guarantee requested from other trusted businesses on the network. This will incentivize businesses with a strong trust rank to help less-established businesses conduct their first transactions. The amount of required tokens is summarized from a fixed amount and, additionally, whatever the guaranteer and the requesting business agree to.

6.1.4. Escrow

To further enhance trust, buyers can use PAN tokens to lock them in a smart contract which acts as a contractual agreement in which a third party receives or disburses the tokens dependent on conditions agreed to by the transacting parties. The amount of tokens locked in the escrow smart contract is relative to the estimated inquiry value and is decided by the buyer.

6.2. Token distribution

PAN tokens will be launched with a smart contract deployed on the Ethereum platform. The tokens will be ERC-20 compliant, which is a standard broadly enforced by the Ethereum community. ERC-20 compliant tokens can be stored in almost all wallets that already support the Ether currency.

Tokens will be created at the end of the crowd sale. No tokens will be created before that time. Instead, an agreement will be made with early buyers regarding PAN tokens. PAN tokens can be exchanged only for ETH, which buyers will be able to do by transferring ETH from their wallet to the official Procurean wallet address posted on the procurean. network website before the pre-sale starts. Detailed instructions for participants will be published before the token sale. Procurean will transfer the tokens to the buyer's wallet address after the crowd sale event is done.

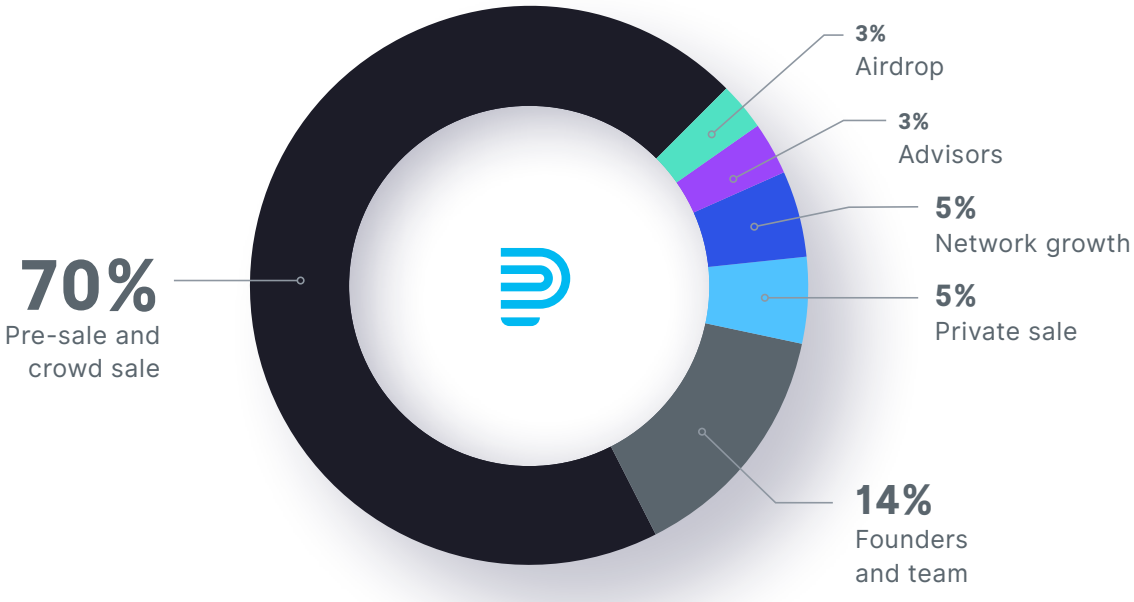
A finite amount of up to 150,000,000 Procurean tokens (PAN) will be released at the time of the PAN crowd sale event. The soft cap target for the combined tokens sold to private sale investors and in the pre-sale and crowd sale events is set to 6 million USD Ether equivalent. The hard cap is set at 21 million USD in total. The initial value of a single PAN token is set at ~ 0.22 USD.

Type	Usage
Total supply	150,000,000
Public distribution	105,000,000
Currency code / Ticker	PAN
Initial value	~ 0.22 USD
Blockchain technology	Ethereum

The ETH/USD exchange rate will be locked based on the market exchange rate one day before the crowd sale. It will remain unchanged for the remainder of the crowd sale. The crowd sale will be open for a maximum of 30 days in total, with the intention to close sooner.

A large enough share of tokens (14%) will be reserved and shared among the founders and team, to promote and incentivize PAN token valuation as one of the team's priorities. The reserved tokens will be vested for a three-year period with a one-year cliff, meaning that we will release one-third of the tokens to the founders and team each year until the three-year vision and promises are fulfilled, to protect the development of the network and to avoid an inflated supply of PAN tokens followed by a devaluation.

Of the 45,000,000 PAN tokens that will not be available at the public pre-sale and crowd sale events: 21,000,000 will be distributed among the founders and team; 7,500,000 will be sold to private sale investors; 7,500,000 will be reserved to promote network growth on the Procurean network—these tokens won't be directly withdrawable; 4,500,000 will be available to advisors; and 4,500,000 will be available as rewards in our airdrop program.



6.2.1. Private sale

The tokens sold to private sale investors will be offered at special individually-agreed-upon terms to Procurean strategic and long-term partners and businesses that will vouch to use the Procurean network in the future, and to very-high-net-worth individuals. If there are any tokens left unsold before the start of the pre-sale event, they are going to be transferred and sold in the pre-sale.

- Available tokens for distribution: **7,500,000.**

6.2.2. Pre-sale

The public pre-sale is targeted at our community to provide each member with a fair discount and an opportunity to invest in the project before the final marketing and sales push in the crowd sale. If there are any tokens left unsold in the pre-sale event, they are going to be transferred and sold in the crowd sale.

- Phase duration: **TBA**.
- Available tokens for distribution: **52,500,000.**
- Minimum contribution: **1 ETH.**
- Bonus: **20% discount.**

6.2.3. Crowd sale

The public crowd sale is targeted toward the general public, high-net-worth individuals and businesses that will join as participants on the Procurean network. Unsold tokens in all tiers will be offered in the next tier up until the final tier.

- Phase duration: **TBA**

Tier A	Available tokens for distribution: 10,500,000 Minimum contribution: 0.2 ETH
Tier B	Available tokens for distribution: 10,500,000 Minimum contribution: 0.2 ETH
Tier C	Available tokens for distribution: 10,500,000 Minimum contribution: 0.2 ETH
Tier D	Available tokens for distribution: 10,500,000 Minimum contribution: 0.2 ETH
Tier E	Available tokens for distribution: 10,500,000 Minimum contribution: 0.2 ETH

We understand procurement and the effort and decision making process to fundamentally change established business practices in legacy functions.

7. Roadmap

Procurean is based on Gepom, a market-proven e-procurement platform that helps buyers and sellers achieve cost-savings by automating purchases of non-strategic and low sourcing priority items. Gepom has more than 1000 registered partners, with yearly over 50,000 successful tenders and over 100,000 bids. Gepom has helped businesses to lower their purchasing costs by up to 30% on initially non-optimized purchases and has opened a new way of practicing procurement to small and large businesses alike. Some of the biggest Slovenian enterprises, such as Gorenje, Unior, Slovenijales, Inpos, and Omco Metals Slovenia, as well as many more smaller businesses, are already active partners on the portal.

The team behind Procurean is dedicated and has years of experience providing IT and process improvements to corporate clients. We understand procurement, required effort, and the decision-making processes needed to fundamentally change established business practices in legacy functions.

The implementation plan for a fully functional global market supported by Procurean is centered on four scaling waves, all relative to the initial coin offering (ICO), each with specific target markets, platform implementation processes, and goals in mind.

Year	Activity	Goal	Platform progress	Market expansion
2013 (Mar)	founded Gepom			
2013 (Dec)	100 registered partners			
2015	300 registered partners			
2016	strategic partnership with Unior d.d. reached			
2017	strategic partnernship with Gorenje d.d. agreed 1200 active partners development of the Procurean network starts			

Year	Activity	Goal	Platform progress	Market expansion
2018 (Q3)	Procurean network ICO			
2018 (ICO + 4M)	Procurean network platform launches and replaces Gepom	1 central office 1 ERP partner 3 strategic partners	new UI and UX design new business model blind reverse auction market inquiry trust ranking discovery tool document automation tool integration API financial data pooling wallet token	Slovenia Italy Hungary Croatia Austria
2018 (ICO + 1Y)	Procurean network expands to other CEE countries and implements missing tools	3 regional offices 25 ERP partners 25 strategic partners	multistep auction discovery vendor management tool demand management tool	Estonia Latvia Lithuania Poland Germany Czech Republic Slovak Republic Romania Bulgaria Albania Montenegro Serbia Macedonia Bosnia & Herzegovina Kosovo
2018 (ICO + 2Y)	Procurean network starts crunching data to power machine learning backed tools	8 regional offices 50 ERP partners 50 strategic partners	group purchase vendor management tool demand management tool network indent catalog	Belgium Cyprus Denmark Finland France Greece Ireland Luxembourg Malta Netherlands Portugal Spain Sweden United Kingdom
2018 (ICO + 3Y)	Procurean network reaches maturity and supports a decentralized market based on trust used by businesses worldwide.	11 regional offices		Canada USA China Russia

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