



**PACIO**

**Semantic  
Blockchain for  
Business Data  
Competition**

14 August 2018

There is no fair way to compare other projects with Pacio since none have a similar array of features. Pacio is:

- An interoperable blockchain using the Pacio standardised semantic data protocol
- An application platform for third party apps using the Pacio API
- Enterprise logic to support triple entry accounting, business improvement, real time reporting, auditing, etc.

Most projects fit just one and a few might fit two of these categories.

MAIN PROJECTS * full list on page 11	PACIO	NEO	Request Network	Essentia	ConsenSys' Balanc3	Auditchain	PayPie	Ledgerium
Privately funded	✓	X	X	X	✓	✓	n/a	✓
ICO	X	✓	✓	✓	X	X	n/a	X
Protocol blockchain	Cosmos	Neo	Ethereum	Ethereum	Ethereum	Private BL	Ethereum	Ethereum
Token model (ST, UT, CT)	ST	UT	UT	UT	-	UT	CT	UT
MVP	2020	✓	✓	2018	?	2018	2018	2019
Team qualification / Whitepaper quality	4	5	4	2	?	3	2	3
Community (1-5)	1	5	4	3	?	2	2	2
<b>1</b> Semantic Blockchain / Data standardisat.	✓	X / ✓	X	X / ✓	X / ✓	X	X	X
Zero fee transactions for end users	✓	✓	X	?	?	X	✓	X
Enterprise data focus	✓	X	✓	X	✓	✓	✓	✓
<b>2</b> TARI®	✓	X	X	X	X	X	X	X
<b>3</b> Application platform	✓	✓	✓		X	X	X	X
Triple entry accounting	✓	X	✓	X	✓	X	✓	✓
Accounting for fiat/crypto	✓	X	✓	X	✓	X	✓	✓
Real-world business data reporting / audit	✓	X	X/✓	X	✓	✓	✓	✓
Scalability	✓	✓	X/ Plasma	X	X	?	X	X
Integrated governance	✓	✓	✓	X	X	X	?	X
Interoperable event driven business docs/interfaces	✓	✓	X	X	for cryptos?	X	?	✓
<b>4</b> Both public / private data	✓	✓	X	✓	X	✓	✓	✓
Identity management	✓	X	X	✓	X	X	X	✓
<b>Focus</b>	Semantic data	Blockchain framework	Enterprise payment	Data storage	Enterprise asset mgmt.	Audit	CRA on accounting	Accounting + audit

**1 Semantic Blockchain:** Own integrated taxonomies, Smart Data Objects, Support for multiple data/reporting protocols: XBRL, UBL, Open EDI, RDF, Ocean. **Data standardisation:** Data globally interoperable and comparable across entities, jurisdictions/ regions, languages, and accounting standards.

**2 Application platform:** Provided via an API, services, supporting utilities, and interfaces, to support multiple apps running anywhere. Services include authenticated accounting and other real world data feeds, Ricardian contracts, IoT interface, AI interface

**3 TARI® (Target Average Rate Index):** Real time management methodology allowing feedback to effect business improvement in real time, rather than only by analysis after the event.

**4 Interoperable actionable event driven business documents/interfaces:** This includes inter person, inter entity, and inter app transactions.

# 1 Introduction

Pacio competition can be considered in 3 categories:

- Pacio Blockchain Competition
- Pacio Services Competition
- Competition to apps which could be developed using Pacio

## 2 Pacio Blockchain Competition

The competitors to Pacio as a blockchain are:

- Bitcoin: Bitcoin is included because of its historical importance, and its store of value role, but it is not really a competitor for the Pacio type of zero transaction cost applications which will flourish on 3rd generation blockchains.
- The numerous Bitcoin sidechains or colour coin variations or derivations such as Litecoin, Monero, Dash, Zcash etc: These address some of the Bitcoin issues but fundamentally are limited in the Bitcoin manner.
- Ethereum and the many systems built on top of Ethereum
- Other 3rd generation blockchains whether Ælf (Aelf), Æternity (Aeternity), Aion, AlphaPoint, Apla, Blockstack, Cardano, Cosmos, Credits, EOS, Genaro, Hyperledger, Icon, Komodo, Metaverse, Multichain, Multiversum, NEO, Red Belly, SophiaTX, Tezos, Universa, Wanchain, or Zilliqa.

However, blockchains which run apps are more associates than competitors to Pacio, as their apps will be able to use the Pacio API and Pacio Services.

## 3 Pacio Services Competition

Competition to the Pacio Services would be systems which provide a business/ accounting application building “operating system” or platform or environment similar to that which Pacio Services, or some of them, will provide.

The “blockchain for business” field will be highly competitive, including the current leader, Ethereum, but Pacio will have strengths that will position it strongly. To our knowledge there is no system available or planned which does or will do all of what Pacio plans.

### 3.1 NEO

Perhaps the broadest potential competitor is NEO, the Chinese blockchain, with help from Onchain and DNA, as described in The company behind NEO: Onchain and its ultimate plan—DNA. “Our vision is to make Onchain a truly universal Blockchain framework,” said Da Hongfei.

NEO/Onchain will lack many Pacio strengths however:

- Semantic Blockchain via the Standardised Semantic Information Model (SSIM), Business Improvement via TARI, and probably Single Entry Accounting done right! (SEA) and Ricardian Contracts (Internet of Agreements™) at the core

- The breadth and scope of Pacio's real time and real world data
  - The flexibility of Pacio with its services
  - The cross-blockchain transaction ability of Pacio
- Still NEO/Onchain will need to be watched closely.

## 3.2 OracleChain

OracleChain is described in their white paper as “the world's first application built on an EOS ecosphere” which aims to “meet the demands of the Oracle (oracle machine) ecosystem by efficiently linking blockchain technology services with various real-life scenarios, thereby delving in to this immense multibillion dollar valuation market.”

The Pacio Authenticated Accounting and Real Time Feed for Oracles or Apps service has some similar objectives to OracleChain, but goes beyond them in terms of breadth, scale, the better semantic organisation provided by SSIM, and the real time management information including that provided by TARI.

It would be good to establish linkages with OracleChain, however, and to explore possible ways of co-operating at technical and market or organisational levels.

## 3.3 Request Network

Their site describes Request Network as “A decentralized network for payment requests”, but that appears to understate their full plans. The Request Network is more than just PayPal 2.0—It could revolutionize the finance world article clarifies things, by saying “Request is a platform that could enable a whole new decentralized accounting system”. In that sense, Request could be a serious competitor to several aspects of Pacio.

However, Request Network has decided to build their system using a core Ethereum smart contract plus a mixture of synchronous and asynchronous (oracle) interfaces. That decision, unless changed, will severely limit how far Request can go. (Their white paper acknowledges the scalability problems they will face as a result of choosing to use Ethereum.)

Request is developing a vibrant community, however, and has made some interesting architectural decisions e.g. to work with “bricks” as they call them, as follows:

- First Brick: 0x Protocol, token-trading. Cross-Currency Settlement
- Second Brick: Civic, an identity provider. Secure and Protect Identities
- Third Brick: Aragon, a governance protocol. Unstoppable Organizations

Pacio's broader focus and far greater capacity will provide much better “platform” support for app developers than the Request approach, but nevertheless, Request will be a competitor to watch, especially if they switch to a more capable blockchain than Ethereum.

Further, Request will be a venture to keep in mind as a potential partner, or as a prospect to be converted to using Pacio as the “operating system” for their eCommerce goals.

## 3.4 Essentia

Essentia is an interesting but complicated project, which at first glance appears to be competitive with Pacio, but is actually more complementary.

Essentia approaches things from an identity perspective, plus it links to or is integrated with many subsystems.

Differences from Pacio:

- does not attempt to standardise data to make it useful across DB schema, entity, jurisdictional, and accounting standard boundaries - no equivalent of SSIM
- does not seek to make data semantic - no equivalent of that part of SSIM
- no taxonomies - no equivalent of that part of SSIM
- no smart object data processing - no equivalent of that part of SSIM
- not accounting or management oriented - no equivalent of SEA/TEA or TARI®
- not db centric as Pacio is. Yes Essentia is about decentralised data, but not in the searchable cross entity sense of Pacio's DB
- no possibility for opt in cross entity analysis as for Pacio
- not app focussed - Essentia is not an app platform in the way that Pacio is
- includes hardware components which are not planned for Pacio, or not currently anyway

But Essentia is strong on identity and privacy and integration with other services.

Their code is open source, as we plan ours to be too.

The Business Plan gives expense projections but no revenue projections. (They talk of revenue but not in the normal accounting sense of operational sales, just token sales.)

Their projected development costs are similar to ours, though different in detail: "We estimate the total cost for Essentia Platform development to be about USD 40.8m over the next four years. This amount will be covered by the proceeds from the Distribution of ESSs and the income from the retained ESS tokens."

Their documentation is well presented - better than ours - but English errors and excessive jargon render it less credible than it might otherwise be.

Essentia does have some very good ideas, but in our view will struggle in the market as the project is currently presented, because it is too convoluted, and goes too much head to head with the big guys. e.g. up against Amazon and Apple in terms of identity/interface boxes.

Not that we aren't taking on a huge task also!

Collaboration would be good, though.

Identity is a big part of Pacio too. Perhaps we could work with Essentia on this.

It would be appropriate to talk with Essentia as Pacio development proceeds.

## 3.5 Others

3rd generation blockchain or distributed ledger systems in progress including Ælf, Æternity, Aion, AlphaPoint, Apla, Blockstack, Cardano, Cosmos, Credits, EOS, Genaro, Hyperledger, Icon, Komodo, Metaverse, Multichain, Multiversum, NEO, Red Belly, SophiaTX, Tezos, Universa, Wanchain, and Zilliqa attempt to overcome current blockchain

limitations, but apart from Universa and SophiaTX do not directly offer accounting or real-time management facilities.

Universa and SophiaTX, do focus on business/accounting, but lack the Pacio strengths listed above re NEO. Universa is too centralised in our opinion, whereas SophiaTX focusses on a narrower market segment, the businesses running SAP software.

IOTA is specifically Internet of Things focused so is competitive to the planned Artificial Intelligence Interface service but lacks the breadth and flexibility of Pacio.

## 4 Competition to apps which could be developed using Pacio

### 4.1 Business Improvement Systems

Business improvement apps could be developed readily with the help of the “real time management and business improvement system embodying TARI” service of Pacio.

There is no direct equivalent of such an app, but numerous management systems exist.

While activity measurement has been incorporated in all management accounting and costing systems when attempting to determine product or service costing, these systems work from the bottom up towards a cost and then a price. TARI® works with activity measurement at the point of business output – the sale or invoice. We are unaware of any other system measuring activity as units sold.

TARI® does not claim to be a costing system but rather a value added maximiser driving directly to the bottom line without the complications of allocating costs between products but determining which product contributes the best return per unit of activity. Eg if the same production staff are manufacturing tables of types A and B, which product provides the greatest contribution to overheads and profit. TARI® can answer that question in seconds, costing systems generally cannot. TARI® goes further when the marketing supports Table A in greater volume than Table B by taking into account the relative selling prices and marketing.

Conclusion: Pacio TARI® for app development use does not have current competition.

### 4.2 Accounting Systems

#### 4.2.1 Balanc3

The first blockchain competitor to apps which could be developed using the accounting aspects of Pacio was a ConsenSys attempt with an Ethereum based accounting system incorporating TEA named Balanc3. That project started in 2015 and is described in this 2016 video: [Balanc3 - Triple Entry Accounting](#).

However, Balanc3 today is no longer a general accounting system but has morphed

into “An open platform to manage your digital assets, crypto currencies, and tokens. “ A possible reason why Balanc3 has changed so much from its original intent, is that the original Balanc3 goals of 2015 were too ambitious.

The original goal of being a general-purpose accounting system incorporating Triple Entry Accounting, built on the Ethereum blockchain, meant that Balanc3 had the difficult task of trying to cope with the plethora of differing tax and regulatory requirements which afflict business and accounting systems around the world.

But an even more fundamental problem was that the Ethereum blockchain lacked the transaction processing ability to cope. That Ethereum buckled under ICO and CryptoKitties (a cat game) processing loads in 2017 shows that. Ethereum can only handle about 13 transactions per second which is far too few if a general accounting system were to start to be put to real use by multiple companies. This issue is discussed in detail in *Scaling Ethereum to Billions of Users*. This is part of why Pacio will use a 3rd generation blockchain which does have the transaction processing ability needed.

Pacio will not be a “broad based accounting” application directly either, but it will allow others to create them, or to including accounting in their apps, dapps, and chatbots, tailored to their market, jurisdiction, tax, or regulatory environments.

## 4.2.2 Auditchain

Auditchain is a reporting and disclosure framework which claims to be the “world’s first decentralized accounting, audit and real time reporting ecosystem for enterprise and token statistics.” It focuses on auditing, and token compliance reporting for ICOs.

Auditchain will use a “distributed ledger smart contract network” which sounds like a private blockchain.

The project could be implemented as an app using Pacio, but why? Yes, the project seems strange to us. Blockchain technology can greatly reduce auditing requirements when implemented fully as Pacio will do, so why build a complex system to automate old auditing methods?

## 4.2.3 bBiller

bBiller is an Australian company whose site describes their plans as “When released, bBiller will be the democratization of payments using the ISO/IEC 19845 standard UBL XML as the supply-chain document interface. Using bBiller, one will be able to order and pay for goods and services using a single payment to an Ethereum blockchain. All parties, such as suppliers and shippers, fulfill the order and instantly receive their payment in a decentralized and secure fashion. This produces an immutable transparent supply-chain document trail of all of the steps. Without any central organization, membership fees or central server, this pay-as-you-go commerce system will be globally available 24/7 on the blockchain. It will be available to any and all parties wishing to participate in the bBiller community with their specific supply-chain-oriented contribution. Having based the interface on an open standard, bBiller will be attractive to e-commerce service organizations offering their constituencies a formally-documented supply-chain commerce solution.”

Their use of UBL is interesting as that is one of the languages which Pacio will need to support for its Semantic Blockchain aspects.

The difficulties bBiller face in our opinion are gaining sufficient scale (size of the network of users) for their triple entry accounting and supplier/customer linkages to be viable or useful, and then the issues of Ethereum scaling if that success should occur.

The “any app” and more flexible approach of Pacio should help to overcome the network size issue, while the far greater performance capabilities of the Pacio infrastructure will avoid the Ethereum scaling problems. Thus, apps developed using Pacio which compete with bBiller should have strong competitive advantages.

Update by way of comments on the Pacio Competition blog:

Stephen Rowilson of bBiller on 4 June 4 2018

BBILLER is building on Hyperledger and has identified 100,000 customers via PEPPOL. BBILLER should fit nicely underneath Pacio and will accept Pacio tokens to drive supply chain events.

David Hartley’s response:

Great thank you Stephen. We look forward to cooperating.

#### 4.2.4 Fizcal

Fizcal is a Belize based entity, whose system is described on their website as “the next generation of accounting software which integrates crypto currencies onto the balance sheet, uses blockchain technology to implement triple entry accounting, can be operated from a website, smart phone or tablet and uses AI, optical and voice recognition to offer investment advice and to automate the manual repetitive tasks which plague current accounting software. We also aim to be the first to market in developing a fully decentralised triple entry framework for bookkeeping and accounting, a concept first developed by Yuji Ijiri in 1989.”

We see Fizcal as confirmation that the time for accounting via the blockchain has arrived. In our view of the market, Fizcal is attempting an “all things for all men” approach, like Balanc3 did originally, and so will have a hard road to travel. Fizcal is a good example of an application that would be able to take good advantage of the Pacio transaction capacity and the PIM, SEA, and TARI® features of the Pacio API, in regional or vertical market variations, and so be better able to meet the general accounting system need. We wish them well, and look forward to their adopting Pacio in due course.

#### 4.2.5 PayPie

PayPie is about “Credit Risk Assessment on Business Accounting. The PayPie platform brings ultimate trust and transparency to the financial markets by introducing the world’s first risk score algorithm based on business accounting.”

A better equivalent of PayPie could be developed as an app which uses Pacio. PayPie says that their risk algorithm will use TEA (SEA) transactions. A problem with that is developing critical mass, as TEA transactions are only possible when both parties to



a counterparty deal are using the same or compatible systems. Pacio will make that easier/more likely, though SEA being used by multiple apps.

Also, PayPie is Ethereum based, so cannot scale unless Ethereum's scalability problems are fixed. In contract Pacio apps will high throughput capability from the start.

#### 4.2.6 Verady

Verady "provides cryptocurrency accounting and audit services for companies in the blockchain industry"

Their site states "Cryptocurrency is redefining the financial landscape. Audit and Accounting Standards haven't caught up." And "Over \$10 Billion of Cryptocurrency changes hands each day, with no framework for proper tracking, reconciliation, or reporting."

We agree with those statements, but propose that the Pacio Services will provide the "framework" in a better way via the Pacio Services for use by any app needing accounting and crypto tracking or reporting. Further, Pacio, through the planned Pacio Foundation will contribute to helping set the accounting standards so that they do catch up.

#### 4.2.7 Libra

Libra supplies "Real-time enterprise applications that automate and optimize reporting, compliance, and control processes."

Their "About us" says "Libra is a US-based, NY, NY, headquartered Blockchain/Crypto-focused software company. Libra's solutions automate and optimize accounting, audit, and tax processes such as reporting, reconciliation, controls, and compliance. Libra does not build blockchains, rather their products extract, enhance, monitor, and deliver financial information to enterprise systems and decision-makers. Libra's software will be SOC1/TYPE2 certified in 2018."

Apps that similarly "extract, enhance, monitor, and deliver financial information to enterprise systems and decision-makers" could be developed using Pacio. Our contention is that the more general and flexible approach of Pacio and its Services will appeal to more entities and more developers.

#### 4.2.8 Request Network

Request Network is discussed in Services Competition section 3.3 Request Network above since it seeks to be a "platform", yet it is also an app, and is implemented as an Ethereum dApp. In its app capacity, everything it does could be implemented better as apps using Pacio, especially as apps running on a more capable blockchain than Ethereum.

## 4.2.9 The Accounting Blockchain

In Accounting Blockchain's own words: "Our mission is to empower the global accounting community with the numerous advantages and great trustworthiness of blockchain technology through products that fully integrate advancements in the blockchain field in the most efficient and practical way. The vision is to introduce trustworthy platforms where all parties being big or small can embrace the advantages of blockchain technology without entry barriers and without discrimination, be it size, complexity or geographical location."

That seems a rather trivial approach to the massive topic of accounting and the blockchain. Even though they are in an ICO at the August 2018 time of adding this section to this document, their whitepaper says nothing much about their technological approach.

## 5 Conclusion

There is currently no single competitor offering the full range of features that Pacio will provide, though there are some competitors to aspects of Pacio, and the apps which could be built using Pacio.

Even where non-Pacio "accounting" or "management" apps exist or appear, apps built on the Pacio platform will be competitive or outperform those offerings. Given the power, scope, and flexibility of Pacio, this will be the case for any app using Pacio, but especially to those running on the Pacio Blockchain (or others with zero cost transactions).

# Complete competition matrix

MAIN PROJECTS * full list on page 11	PACIO	NEO	Request Network	Essentia	ConsenSys' Balanc3	Auditchain	PayPie	Ledgerium	bBiller	Fizcal	Verady	Libra	The Accounting Blockchain
Privately funded	✓	✗	✗	✗	✓	✓	n/a	✓	✓	✓	?	✓	✓
ICO	✗	✓	✓	✓	✗	✗	n/a	✗	✗	✗	?	?	✗
Protocol blockchain	Cosmos	Neo	Ethereum	Ethereum	Ethereum	Private BL	Ethereum	Ethereum		???	?	?	own
Token model (ST, UT, CT)	ST	UT	UT	UT	-	UT	CT	UT	ST	UT	?	?	UT
MVP	2020	✓	✓	2018	?	2018	2018	2019	2019	2019	?	?	2019
Team qualification / Whitepaper quality	4	5	4	2	?	3	2	3	2	1	2	1	1
Community (1-5)	1	5	4	3	?	2	2	2	1	2	1	?	3
<b>Semantic Blockchain</b> / Data standardisat.	✓	✗ / ✓	✗	✗ / ✓	✗ / ✓	✗	✗	✗	✗ / ✓	✗	✗	✗	✗
Zero fee transactions for end users	✓	✓	✗	?	?	✗	✓	✗	✗	✗	?	?	✗
Enterprise data focus	✓	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓
TARI®	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Application platform	✓	✓	✓		✗	✗	✗	✗	✗	✗	✗	✗	✗
Triple entry accounting	✓	✗	✓	✗	✓	✗	✓	✓	✓	✓	✗	✗	?
Accounting for fiat/crypto	✓	✗	✓	✗	✓	✗	✓	✓	✓	?	✓	✓	✓
Real-world business data reporting / audit	✓	✗	✗ / ✓	✗	✓	✓	✓	✓	?	✓	✓	✓	✓
Scalability	✓	✓	✗ / Plasma	✗	✗	?	✗	✗	✓	???	?	?	?
Integrated governance	✓	✓	✓	✗	✗	✗	?	✗	✗	✓	?	?	✗
Interoperable event driven business docs/interfaces	✓	✓	✗	✗	for cryptos?	✗	?	✓	✓	✗	?	?	?
Both public / private data	✓	✓	✗	✓	✗	✓	✓	✓	?	✗	?	?	?
Identity management	✓	✗	✗	✓	✗	✗	✗	✓	✗	✓	✗	✗	✗
<b>Focus</b>	Semantic data	Blockchain framework	Enterprise payment	Data storage	Enterprise asset mgmt.	Audit	CRA on accounting	Accounting + audit	Supply-chain payments	Accounting app	Accounting service	Crypto	Accounting

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