

SERATIO BLOCKCHAIN 2.0

*Values Based Impact
Interventions*

Maryam Taghiyeva
MA

Kelig Aujogue
PhD

Haley Beer
PhD

Barbara Mellish
MBA ACIB MIRM

Prof Olinga Ta'eed
PhD FIoD

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Seratio Blockchain: Values Based Impact Interventions

Maryam Taghiyeva MA
Dr Kelig Aujogue PhD
Dr Haley Beer PhD
Barbara Mellish MBA ACIB MIRM
Prof Olinga Ta'eed PhD FloD

Seratio Blockchain White Paper 2.13



Essential Reading: *Seratio Blockchain 1.0 white paper*
"Currency of Intangible Non-Financial Value" ¹

Description: *Modelling and forecasting of both tangible and intangible impact through the use of Seratio® blockchain, leading to intervention solutions through forecasting.*

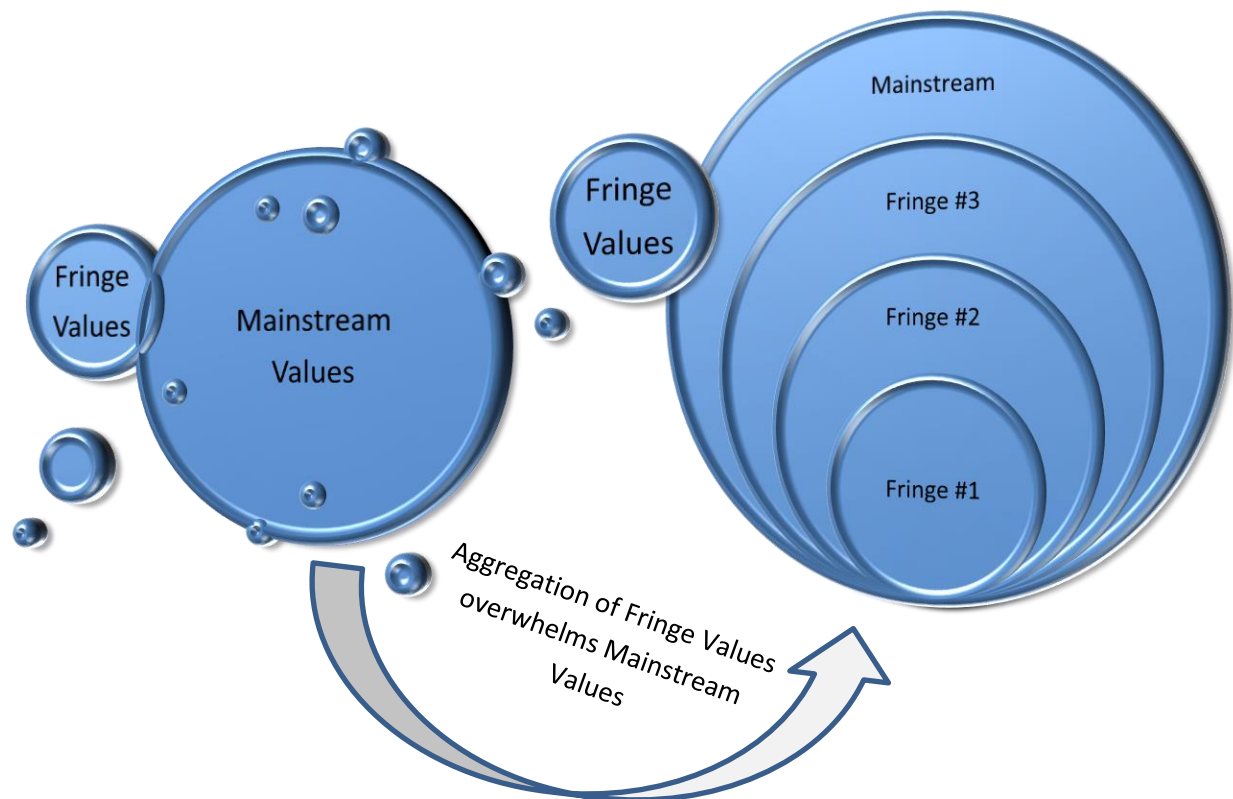
Abstract: *In version 1.0 we proved the direct relationship between tangible financial value and intangible non-financial value, with alignment captured through the Social Earnings Ratio®. This work introduces a way of acknowledging and thereby empowering communities through blockchain technology modelling based on the values of these groups. Almost every aspect of our lives depends on the values we have. Values determine who we are, who we befriend, what we read, what and who we follow, what services we choose. Institutions and organisations who capture and incorporate the values of the community they operate within, increase their presence and hence impact efficiency of the services they provide. By ignoring the values framework, the impact is diminished and sometimes even eliminated if the intangible sentiment is sufficiently negative to destroy the tangible benefits of the intervention. Blockchain modelling allows us to forecast the where, what and how of impact interventions. It shows the power of alignment and acknowledgement of values in generating impact. It also allows us to predict outcomes, and impact, thus enabling improvement to impact efficiency of any intervention.*

Key words: *Value Exchange, Modelling, Impact, Blockchain, Cryptocurrency, Alignment, Community, Acknowledgement, Intervention*

¹ <https://github.com/seratio/whitepaper>

Impact, Communities and Shared Values

Impact is the defining term of the decade. The impact of policy, strategy, ideas, individuals, organisations, immigration, integration, religion and even interventions are the way we rank and weigh the things we do. With restricted funding against the backdrop of mushrooming social costs, public and private institutions, service providers and civil society focus on delivering impact to different communities each with their values set. They are aiming to impact not just communities with mainstreamed values, but also fringe groups. Indeed, most people are familiar with government policies that are drafted by service providers focused entirely on vulnerable communities, but that is no different to companies targeting particular customer-value sets to reach them. The recent phenomena of US elections, Brexit, Italy's Five-Star movements, have all illustrated how the aggregation of fringe values can overwhelm the perceived mainstream value – a 51% governance layer controlling the remainder.



So why do values based interventions work so well in brand targeting and party politics, but so poorly in social interventions? Simply put – the lack of shared values in the latter but 90-100% alignment in the former. Prevention policies almost by definition describe how one set of society – the mainstream – attempt to intervene with another set of society with wholly different set of minority values. Whilst the intervention often fulfils the receiver's tangible needs, the lack of aligned values mean that often, the more significant intangible benefits are not transacted, and even the tangible benefits rejected as a result of trust issues. Such interventions often alienate rather than mediate the desired outcome. As a result, communities

with strongly bonded mainstream values generate even more intangible non-financial values between them, whereas communities with fringe values become more and more fragmented and antipathetic to change.

In order to improve the impact of interventions, there is a need for an alternative approach, one that embraces heterogeneity of the community in one given area. An approach that acknowledges community members and their values, not just prevailing ones but alternative values as well. One that would empower and bring various communities together to effectively address the problems emerging in that area, and one that would help various service providers and policy makers increase the impact of their delivery. It is very evident that there is almost no science behind our current understanding of impact, most clearly displayed when we compare the rising resources being used to bring happiness into the world, juxtaposed against rising problems and suffering. We need a new lexicon of impact, one that can scale from the individual through to the world, from mental health interventions through to global environmental solutions, and one that seamlessly brings understanding of the impact on our thoughts, citizens, families, communities, networks, organisations, cities, regions, countries and then of course, globally.

Philosophical Antecedents

To build a values based model is no trivial exercise, and worst still, to understand the value of values adds infinite chaotic behaviours. Whilst we know that value is buildable, and that values forms the framework of society, it is remarkable how little we understand about capturing both value and values, transacting them, transferring them, and even acknowledging them. When we pass a homeless person and they smile at us, they have shared some of their love with us, but they have not transacted it as they haven't lost it. In return although we may choose not to donate any money, just our acknowledgement of their existence can empower self-respect.

The science of intangibles and non-financial assets is immature. There appears to be too many parameters and the process too difficult to determine. In any case, the values component is not deterministic in nature. Does value flow from high to low like a fluid? Newtonian scientific paradigms are too piecemeal to provide a comprehensive answer. Are values man-made or natural? Values can emerge from an external object like watching a flower, so it can be argued that their cause is natural. Nevertheless they are felt by humans and 'evaluated' by humans therefore they are also man-made. They are also not consistent as they are individual to each person.

Does value always flow from greatest value to lowest value like thermodynamics? Obsessed by the movement of value, the Centre for Citizenship, Enterprise and Governance (cceg.org.uk) think tank has studied many paradigms to provide a handle on understanding value – including energy, particle physics, capacity development, particle physics, biological osmosis, systems theory, network theory ... the list is endless. Whilst useful to provide paradigms to allow us to comprehend various scenarios, none fit broadly across the range of challenges we have identified. Indeed Phronetic Social Science followed the criticism of social scientists attempts to

emulate natural science as the unpredictability of human beings has meant each successful example is met with a counter example. To resolve this we have relied on the practical wisdom called for by Aristotle's Phronesis to arrive at a remarkably coherent solution, at least so far.

The only value based system formulated on values is, of course, currency. Financial value of our time, endeavours, organisations, our health, our ideas are continuously being evaluated. Currency is ubiquitous, historic, understood in all corners of the planet, and has an exchange system that is mature from bartering through to Forex. Ironically, FIAT currency forms a central backbone that unites the world and may well be the only man-made artefact as crucial as organic artefacts such as air, water and heat to survive. To mathematically model, however, requires a digital paradigm of the currency model and of course the blockchain allows this across the online world, the Internet-of-Value.² Nevertheless it has provided the finite 'particle' on which value flow can be modelled and to which we can apply known modelling techniques such as Markov process and Monte Carlo simulation to extrapolate a future.

Modelling of value is not, however, at ground zero. Extensive empirical research³ by CCEG summarise some of the dependencies of value attributes as:

- Transference
- Geospatial
- Temporal
- Directional
- Transactional
- Frequency

Yet to uncover are the answer some to some of the remaining fundamentals which include:

- Negative value
- Value equilibrium
- Value density
- Eternal value
- Acknowledgment of value
- Scaling of value

This paper, the second in a series, goes on to address some of the remaining issues and to incorporate them into the Seratio Blockchain.

² Beer H., Philosophizing on the potential of Blockchain: Making social value metrics mainstream, Internet-of-Value Blockchain: Digitizing Social Conscience, University of Cambridge (November 2016)

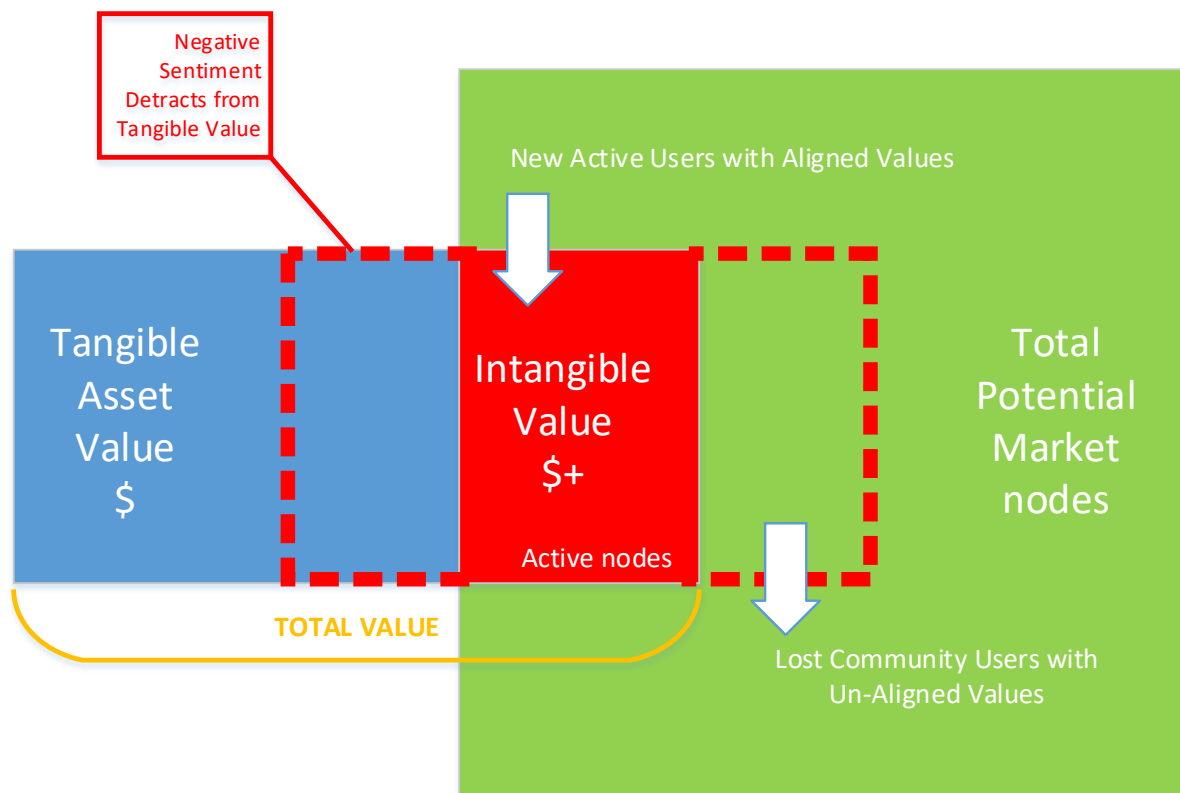
³ Hrabetova J. and Taeed O., Measurement of Intangibles In Current Society: Challenges, Perspectives and Choice, International scientific conference in Cultural Studies, Yekaterinburg, Russia (March 2016)

Extending The Theory to Impact Modelling

In Whitepaper 1.0 we used Social Earnings Ratio® (S/E) to define the 'Currency of Intangible Non-Financial Value'¹ to allow the transaction of value based on values. Formulaically the main conclusions were:

- (i) Total Value = Tangible Financial Value (\$ - p/e) + Intangible Non-Financial value (\$⁺ - s/e)
- (ii) Financial Value = f ([Potential Market x Alignment x Share Price] + [Social Performance])
- (iii) S/E ~ Blockchain Total Value

This whitepaper extends the theoretical framework to develop an Impact Theory based on Internet-of-Value Blockchain demonstrating further key axioms.



If impact parameters govern, the Seratio Blockchain 2.0 extension to 1.0 needs to add the following mechanisms to reflect the market observations:

- Degree of Impact is directly correlated to alignment between the impactor and impacted, ensuring high efficiency of value transfer.
- Impact is deteriorated by both a loss of alignment of shared values, and loss of positive sentiment from the impacted community despite any tangible benefits at play.

- Negative sentiment and alignment associated with an intended positive intervention could lead to zero or even negative impact frustrating the desired outcome entirely.

These extensions to the theory allows us to utilise the transaction of value blocks contingent on the shared values of the impactor (often a service provider) and the impacted, using real life sentiment parameters. The approach taken in this study is:

- Define the theoretical framework targeting one homogenous value community but with multi-service providers
- Model in 3D the effect of point impact using real life data
- Same theoretical framework based on multiple value communities - mainstream and fringe
- Model in 3D the effect of point impact on the movement of value from one community impacting on another

Seratio Impact Theory: Single Value Community

Seratio's Social Earnings Ratio® (S/E) is an intangibles attribute that articulates non-financial (intangible) value in a single index. S/E was created in 2011 as the corollary to the Price Earnings Ratio (P/ E), the universally accepted financial value index. The metric is constantly being improved, initially being used to calculate non-financial value of the business enterprise, it has been further developed and deployed to monitor and articulate non-financial value of a country, region, city, organisation, network, community, family, citizen, and even individual thoughts.⁴



To model impact of one community or service provider, on another, requires a basic model of how discrete blocks of value are transferred in a given area within a specified time period.

⁴ Ta'eed, O. "A Currency to Deliver Meaning to Our Lives", CCEG Social Value and Intangibles Review, pp 74-45 (April 2015)

Given the common familiarity to fluid properties and behaviour it is easiest to use a fluid based visual cue to articulate this; the word 'flow of value' is easiest to represent in terms of 'flow of fluid' with compressible volumes of dense fluid being represented by blocks of dense value. Then the general equilibrium balance equation of flow suggests:

$$y(d, t, f) = \underbrace{A(d) y'(t)}_{Y(d, t)} + X(d, t, f) \quad (1)$$

$$A(d) = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{bmatrix} \quad (2)$$

$$y'(t) = \begin{bmatrix} SE_{a_{11}^g} & \cdots & SE_{a_{1n}^g} \\ \vdots & \ddots & \vdots \\ SE_{a_{m1}^g} & \cdots & SE_{a_{mn}^g} \end{bmatrix} \quad (3)$$

$$y''(f) = \begin{bmatrix} PV_{a_{11}^g} & \cdots & PV_{a_{1n}^g} \\ \vdots & \ddots & \vdots \\ PV_{a_{m1}^g} & \cdots & PV_{a_{mn}^g} \end{bmatrix} \quad (4)$$

where $y(d, t, f)$ is total value generated on a certain area d within the time t via budget f ,

$A(d)$ – value travel area, represents a matrix of the parameters which are area dependant - a_i ;

$y'(t)$ – impact efficiency of the analysed entity, which is value creation velocity, represents a matrix of the SE scores of the total area parameters a_i^g ;

$y''(f)$ – worth of the analysed entity, which is value creation acceleration, represents a matrix of the PV scores of the total area parameters a_i^g

$A(d) y'(t) y''(f)$ – value created (with the help of related entities) by the analysed entity in area d in time t via budget f ;

$X(d, t, f)$ – value created by other entities in area d in time t via budget f .

It is more convenient to split both time period and area in smaller parts. Besides, in order to keep the formula as compact as possible $A(d) y'(t) y''(f)$ is substituted with $Y(d, t, f)$. Then, total social value concentrated at a certain area in certain time is:

$$y(d_n, t_m, f_n) = \sum_m \sum_n (Y(d_n, t_m, f_n) + X(d_n, t_m, f_n)), \quad (5)$$

where $m=0, 1, \dots$; $n= 1, 2, \dots$

For example, to make the formula more vivid, value brought by the analysed entity in a year t in an area d divided into n smaller parts is:

$$\begin{aligned}
Y(d_1, t_1, f_1) &= [a_{d_1} \quad b_{d_1} \quad \dots] \begin{bmatrix} SE_{a_g} \\ SE_{b_g} \\ \vdots \end{bmatrix} \begin{bmatrix} PV_{a_g} \\ PV_{b_g} \\ \vdots \end{bmatrix} \\
Y(d_2, t_1, f_2) &= [a_{d_2} \quad b_{d_2} \quad \dots] \begin{bmatrix} SE_{a_g} \\ SE_{b_g} \\ \vdots \end{bmatrix} \begin{bmatrix} PV_{a_g} \\ PV_{b_g} \\ \vdots \end{bmatrix} \\
&\dots \\
Y(d_{n-1}, t_1, f_{n-1}) &= [a_{d_{n-1}} \quad b_{d_{n-1}} \quad \dots] \begin{bmatrix} SE_{a_g} \\ SE_{b_g} \\ \vdots \end{bmatrix} \begin{bmatrix} PV_{a_g} \\ PV_{b_g} \\ \vdots \end{bmatrix} \\
Y(d_n, t_1, f_n) &= [a_{d_n} \quad b_{d_n} \quad \dots] \begin{bmatrix} SE_{a_g} \\ SE_{b_g} \\ \vdots \end{bmatrix} \begin{bmatrix} PV_{a_g} \\ PV_{b_g} \\ \vdots \end{bmatrix}
\end{aligned} \tag{6}$$

Case study – West Midlands Fire Service

We sought access to live data; following previous research, we have access to empirical data from the West Midlands Fire Service (WMFS) in the UK, who are the largest fire provider outside London⁵. WMFS has an annual budget of c. UK£ 120m with 10% on firefighting, 45% on statutory training, and 45% outreach to a population of c. 3 million. They operate within a multi-commissioned framework to the same region, alongside other blue light services (police, ambulance) as well as health providers, social services, employment services, etc. Each provider has an impact on their own target community, but also secondary impact on adjacent communities – not only physically adjacent but possibly sharing similar values and agendas. Each provider has its own social impact S/E attribute representing its impact efficiency into the region, as well as impacts to adjacent commissioned providers. From the receiver community, they are recipients of multi-impact provision to address fire, disability and employment outcomes. For the purpose of this initial exercise, we assume only one homogenous community although later we dichotomise between mainstream and fringe communities with different values.

One can calculate total social value created in the West Midlands region by the West Midlands Fire Service (WMFS) in one year (September 2013 to September 2014) using S/E Ratio. West

⁵ Daly J., McCabe S, Brook B. and Tæed O., Social Value in UK Public Procurement Longitudinal Study of West Midlands Fire Service, 25th IPSERA Conference 2016, Dortmund (March 2016).

Midlands is the main area d that consists of seven local authority areas - d_1, \dots, d_7 . Given that and also taking account that $m=1$

$$y(d_n, t_1, f_n) = \sum_n (Y(d_n, t_1, f_n) + X(d_n, t_1, f_n)), \quad (1a)$$

where $y(d_n, t_1, f_n)$ – total social value created in West Midlands in 2013/2014;

$Y(d_n, t_1, f_n)$ – social value created by WMFS in 2013/2014;

$X(d_n, t_1, f_n)$ – social value created by the other entities in West Midlands in 2013/2014;

$n= 1..7$.

Since the value created by WMFS (and related organisations) is of the most interest here, we assume for the purpose of this exercise that there no social value is created by other (unrelated) organisations:

$$X(d_n, t_1, f_n) := 0 \quad (7)$$

Then,

$$y(d_n, t_1, f_n) = \sum_n Y(d_n, t_1, f_n) \quad (8)$$

Here we consider three parameters for $Y(d_n, t_1, f_n)$:

a – number of fire incidents registered by WMFS;

b – number of unemployed people in the area;

c – number of people with no disabilities that constrain from active lifestyle.

Below are trial numbers for every parameter per considered area.

Local Authority Area d_n	Incidents (10^3) I_d	Unemployment (10^3) E_d	Health (10^3) H_d
Birmingham	10	49	1000
Coventry	2.8	10	300
Dudley	2.6	11	11
Sandwell	3	13	316
Solihul	1.4	5	206
Walsall	2.5	10	253
Wolverhampton	2.4	12	249

Source: WMFS CSS 2015; Labour Market Statistics 2015; Office for National Statistics 2015

$SE_{I_g} = 1.19; SE_{H_g} = 2.3; SE_{E_g} = 1$; (dummy S/E numbers for health and employment)

$PV_{I_g} = 8.2; PV_{H_g} = 5.7; PV_{E_g} = 6.1$ (where PV is Value of the Service Provider in UK£)

Using data from the table and SE results,

$$Y(d_1, t_1, f_1) = [I_{d_1} \quad H_{d_1} \quad E_{d_1}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [10 \quad 1000 \quad 49] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} = 19865.2$$

$$Y(d_2, t_1, f_2) = [I_{d_2} \quad H_{d_2} \quad E_{d_2}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [2.8 \quad 300 \quad 10] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} \approx 5735.3$$

$$Y(d_3, t_1, f_3) = [I_{d_3} \quad H_{d_3} \quad E_{d_3}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [2.6 \quad 11 \quad 11] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} \approx 289.03$$

$$Y(d_4, t_1, f_4) = [I_{d_4} \quad H_{d_4} \quad E_{d_4}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [3 \quad 316 \quad 13] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} \approx 6055.6$$

$$Y(d_5, t_1, f_5) = [I_{d_5} \quad H_{d_5} \quad E_{d_5}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [1.4 \quad 206 \quad 5] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} \approx 3923.8$$

$$Y(d_6, t_1, f_6) = [I_{d_6} \quad H_{d_6} \quad E_{d_6}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [2.5 \quad 253 \quad 10] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} \approx 4846.7$$

$$Y(d_7, t_1, f_7) = [I_{d_7} \quad H_{d_7} \quad E_{d_7}] \begin{bmatrix} SE_{I_g} \\ SE_{H_g} \\ SE_{E_g} \end{bmatrix} \begin{bmatrix} PV_{I_g} \\ PV_{H_g} \\ PV_{E_g} \end{bmatrix} = [2.4 \quad 249 \quad 12] * \begin{bmatrix} 1.19 \\ 2.3 \\ 1 \end{bmatrix} \begin{bmatrix} 6.1 \\ 8.2 \\ 5.7 \end{bmatrix} \approx 4782$$

$$\sum_{n=1..7} Y(d_n, t_1, f_n) = 19865.2 + 5735.3 + 289.03 + 6055.6 + 3923.8 + 4846.7 + 4782 \\ \approx 45498 \text{ m\$b}$$

where m\$b is a micro Seratio block used for internal calculations for the model, like a particle of value.

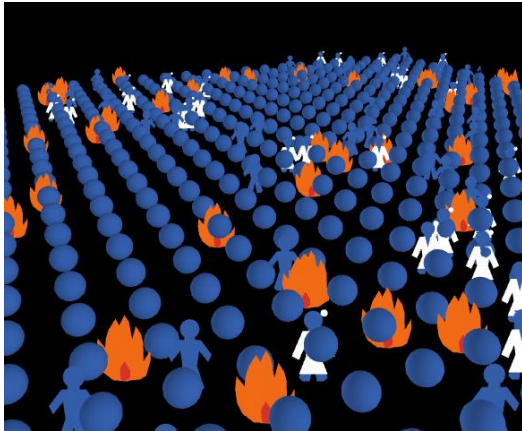
Recalling our assumption that $X(d_n, t_1, f_7) := 0$,

$$y(d_{1..7}, t_1, f_{1..7}) = 45498 \text{ m$b} \quad (9)$$

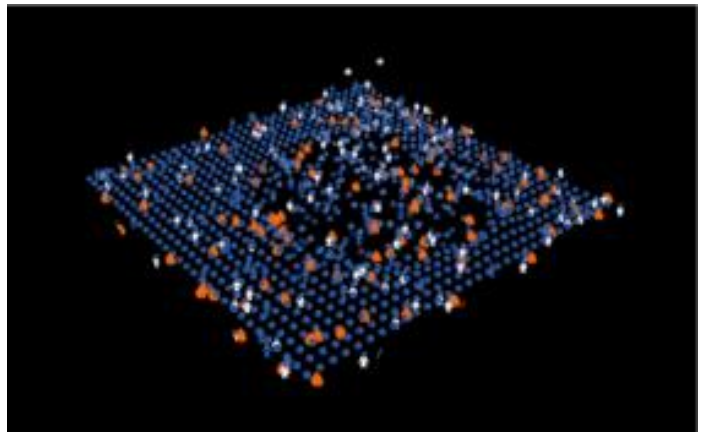
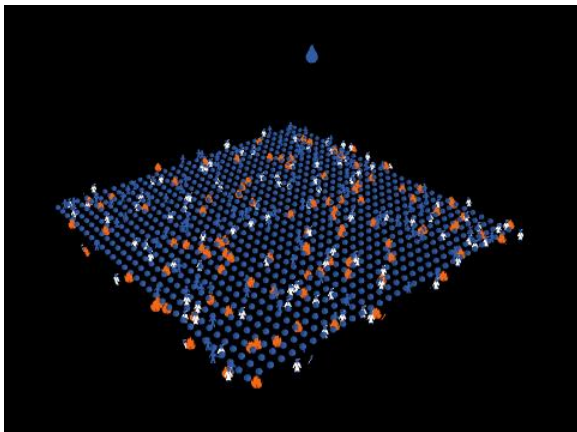
Consequently, if one is to disregard social value created by other (un-associated) entities, there is total 45498 m\$b generated by WMFS (and associated entities) in West Midlands in 2013/2014.

The model⁶ below shows the effect of above described intervention in West Midlands provided by WMFS and 2 other independent service providers (health, employment), all with different social efficiencies, linking it to non-financial outcomes; it assumes a homogenous community with one set of values. This 3D model can be superimposed over a geo-location map.

S/E Ratio Integrated Model Illustration (clickable)



The model allows to go from individual engagement input data from multiple providers (eg. fire, health, employment) through to forecasting the behaviour at a macro level from specific projects. This scalability is an important feature to for the ‘build’ of value from empirical principles.



⁶ S/E Ratio Integrated Model: <https://goo.gl/GZPxYi>

Seratio Impact Theory: Multi-Value Communities

In reality, of course, community is not homogenous and represents different value sets with different attributes. The basis of tribe, community, group behaviour has been well established over 30 years, and is now intuitive to everyone through the propensity of social media communities.

“It is an important principle of social organisation that the loyalties of the individual begin within his/her primary group and other more distant and secondary groups only receive his/her loyalty in so far as their interest coincide with those of the primary group”⁷

Given the above we need to integrate the above Seratio Impact Theory with Seratio® Blockchain Theory:

$$z(p_d, t, f) = \frac{A(p_d) E(t) W(f)}{Y(p_d, t, f)} + X(p_d, t, f) \quad (1.1)$$

$$A(p_d) = [a \quad b \quad \dots] \quad (2.1)$$

$$E(t) = \begin{bmatrix} SE_a \\ SE_b \\ \dots \end{bmatrix} \quad (3.1)$$

$$W(f) = \begin{bmatrix} PV_a \\ PV_b \\ \dots \end{bmatrix} \quad (4.1)$$

where $z(p_d, t, f)$ - total social value generated on a certain area d within the time t via budget f ,

$A(p_d)$ – value travel area, represents a matrix of the parameters which are chosen according to the given values - a, b, \dots , and is d area dependent.

$E(t)$ – impact efficiency of the analysed entity. Represents value creation velocity, that is a matrix of the SE scores of the total area parameters, and is time dependent.

$W(f)$ – worth of the analysed entity. Represents value creation acceleration, that is a matrix of the available proxy data or PV scores, and is money (budget) dependent.

$Y(p_d, t, f)$ – social value created by the analysed entity in area d in time t via budget f ;

$X(p_d, t, f)$ – social value created by other entities in area d in time t via budget f (*can be used for the comparison*).

⁷ Ta’eed O., Systems Approach to Fluidized Beds, 1987, PhD, University of Leeds

Splitting both time period and area into smaller discrete parts, and in order to keep the formula as compact as possible $A(p_d) E(t)W(f)$ is substituted with $Y(p_d, t, f)$. Then, total social value concentrated at a certain area in certain time is:

$$z(p_{d_n}, t_n, f_n) = \sum_n \sum_m \underbrace{(A(p_{d_m}) E(t_m)W(f_m))}_{Y(p_{d_m}, t_m, f_m)} + X(p_{d_m}, t_m, f_m) \quad (5.1)$$

where $m=0, 1, \dots$; $n= 1, 2, \dots$

For example, to make the formula more vivid, social value brought by the analysed entity in a year t in an area d dived into n smaller parts with f finances is:

$$\begin{aligned} Y(p_{d_1}, t_1, f_1) &= [a_{p_{d_1}} \quad b_{p_{d_1}} \quad \dots] \begin{bmatrix} SE_a \\ SE_b \\ \dots \end{bmatrix} \begin{bmatrix} PV_a \\ PV_b \\ \dots \end{bmatrix} \\ Y(p_{d_2}, t_1, f_1) &= [a_{p_{d_1}} \quad b_{p_{d_1}} \quad \dots] \begin{bmatrix} SE_a \\ SE_b \\ \dots \end{bmatrix} \begin{bmatrix} PV_a \\ PV_b \\ \dots \end{bmatrix} \\ &\dots \\ Y(p_{d_{n-1}}, t_1, f_1) &= [a_{p_{d_1}} \quad b_{p_{d_1}} \quad \dots] \begin{bmatrix} SE_a \\ SE_b \\ \dots \end{bmatrix} \begin{bmatrix} PV_a \\ PV_b \\ \dots \end{bmatrix} \\ Y(p_{d_n}, t_1, f_1) &= [a_{p_{d_1}} \quad b_{p_{d_1}} \quad \dots] \begin{bmatrix} SE_a \\ SE_b \\ \dots \end{bmatrix} \begin{bmatrix} PV_a \\ PV_b \\ \dots \end{bmatrix} \end{aligned} \quad (6.1)$$

$$S/E = \frac{SocialValue}{FinancialValue} = \frac{\$^+}{\$} = \frac{EnvironmentalRatio + MoneyLeveraged + ReportedCSR + \left(\frac{PeopleSupported * Capitalisation}{Shares} \right) * AlignmentRatio}{ReportedCSR * 10^{Degree of Separation}} \quad (10)$$

$$P/V = \log_2 \left(\frac{EnvironmentalRatio + MoneyRaised + Donations + \left(\frac{PeopleInfluenced * FinancialWorth}{FamilyMembers} \right) * \frac{PositiveFeedback}{TotalFeedback}}{Donations * 10^{Degree of Separation}} \right) \quad (11)$$

$$\text{EnvironmentalRatio} = \frac{\text{CarbonReduction} * \text{NonTradedtCO2}}{10^6} \quad (12)$$

$$\text{AlignmentRatio} = \frac{\text{PositiveSentiment}}{\text{TotalSentiment}} = \frac{\text{PositiveFeedback}}{\text{TotalFeedback}} = \frac{\text{Aligned}}{\text{PotentiallyAligned}} \quad (13)$$

where *EnvironmentalRatio* represents how environmentally conscious are decisions made by an entity / individual;

AlignmentRatio shows how aligned people are to the analysed entity / individual;

CarbonReduction – amount of tCO2 cut off by the analysed entity in the observed year;

NonTradedtCO2 – price of the non-traded tCO2;

MoneyLeveraged – money leveraged by the entity for the social purposes;

ReportedCSR – claimed CSR spendings;

PeopleSupported – number of people supported per social project;

Capitalisation – capitalisation of the entity;

Shares – number of shares;

PostiveSentiments – number of positive mentions;

TotalSentiments – number of total mentions;

Degree ofSeparation – correlation of network cohesion;

MoneyRaised – money that analysed individual helped raise for social causes in the observed year;

Donations – money donated by the individual in the observed year;

PeopleInfluenced – number of people positively influenced by the individual;

FinacialWorth - financial worth of the individual;

FamilyMembers – number of people in the immediate family.

The *AlignmentRatio* represents the proportion of aligned service users (in a certain area) to all the potentially aligned people in the area:

$$\text{AlignmentRatio} = \frac{\text{Aligned}}{\text{PotentiallyAligned}} \quad (13.1)$$

People are aligned to a certain entity if the services this entity addresses and / or reflects their (users') values. Thus, in fact Alignment Ratio shows the degree of alignment to certain values of people in the impacted (by the entity) area. Therefore, building on formula (10),

$$\text{AlignmentRatio} = \frac{\vartheta_1}{\vartheta_0} \quad (14)$$

$$v_0 = C_k^2 = \frac{k(k-1)}{2} \quad (15)$$

Where ϑ_1 shows how analysed entity is aligned to and / or addresses the given values;

ϑ_0 – how potentially subscribed analysed entity can get in following / addressing given values;

k – number of people empowered by the analysed entity through acknowledging their (people) values.

Given *AlignmentRatio* is in the core of the S/E Ratio, it is legitimate to say that S/E is a function of the Alignment Ratio:

$$S/E = f(\text{AlignmentRatio}) \quad (16)$$

Then, taking into account (10),

$$S/E = F(\text{Values}) \quad (14)$$

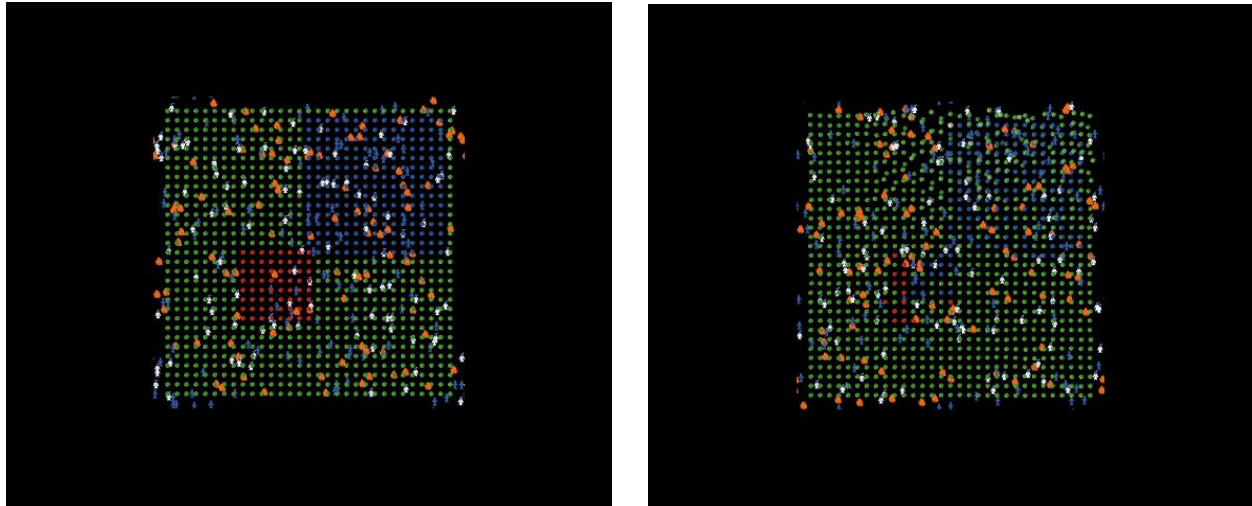
S/E Ratio is the function of the values prevailing among people in a certain area / community. The more positive values (whether mainstream or fringe) are addressed, the higher is the S/E score. On the other hand, S/E Ratio is used to calculate Intangible Non-Financial Value and therefore if S/E goes up so will the Intangible Non-Financial Value. Now, if

$$\text{TotalValue} = \text{FinancialValue} + \text{NonFinancialValue} = P/E + S/E \quad (15)$$

then Total Value of an entity will grow with its Intangible Non-Financial Value. So, by capturing and addressing dominant (moral) values, one can increase non-financial value creation at all levels, total value in particular.

Extending the Modelling to Multi-Value Communities

Applying this extension to multi-value communities, allows us to see the difference between a value transfer between a mainstream (blue) and fringe (red) community when the S/E mechanism is integrated or not.



S/E Ratio Integrated Model Illustration (clickable)

The left hand image shows the lack of value transfer when the red/blue values sets are not exchanged ie. there is shared value. The right hand image shows the value transfer between the mainstream blue community and the red fringe community when the values are exchanged. The parameters in this time dependent, geo-located 3D model can be set on a dashboard (below) for all 3 service providers. Rudimentary Netlogo (Northwestern University Center for Connected Learning and Computer-Based Modeling) coding has been used. It is intended to increase the degree of sophistication although this requires a more flexible platform such as ASCEND from Carnegie Mellon University.

To get started please 'Reset all' and see the instructions in the command center at the bottom

SeratioBlockchain

<p>Service providers</p> <p><input type="button" value="Fire incidents"/></p> <p><input type="button" value="Unemployment"/></p> <p><input type="button" value="Health"/></p> <p><input type="button" value="Calculate the degree of impact"/></p>	<p>Service users (people)</p> <p>num-fires 100</p> <p>total-unemployed Unemployed by gender</p> <p>num-unemployed 100</p> <p>unemployed-males 50 unemployed-females 50</p> <p>num-health 100</p>	<p>Value of the service provider (PV/E)</p> <p>value-WMFS 1</p> <p>value-Police 1</p> <p>value-NHS 1</p>	<p>Impact efficiency of the service provider (SER)</p> <p>ratio-WMFS 2</p> <p>ratio-Police 2</p> <p>ratio-NHS 2</p>	<p>Area specific data</p> <p>degree-of-impact 600</p> <p>community-cohesion 5 %</p> <p>community-density 1 %</p>	<p><input type="button" value="Setup the terrain"/></p> <p><input type="button" value="Show communities"/></p> <p><input type="button" value="Model the intervention"/></p>
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200
Degree of impact of health service provider is -
200

(c) CCEG

Designing Intervention Instruments

The Seratio cryptocurrency solution, first introduced in whitepaper 1.0, conveys not only a tangible financial benefit but is also a vote of alignment to agreed values.⁸



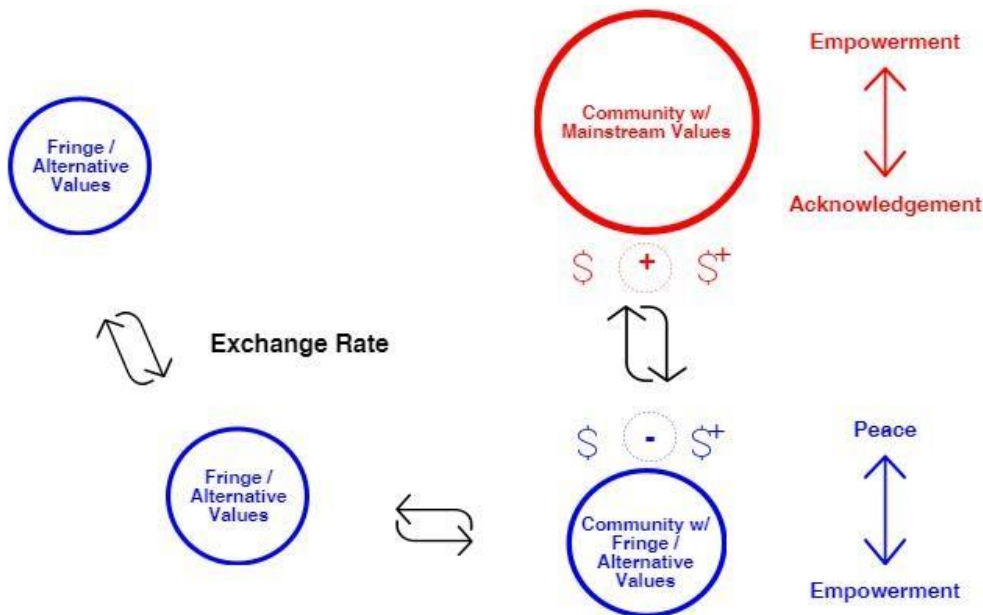
It also has a role in providing understanding the impact space rapidly without complex modelling, as well as a potential instrument to increase impact efficiency. Best to illustrate with a simple example; someone not aligned to Ku Klux Klan values is unlikely to accept KKK coins as payment for goods no matter how materially valuable the coin is and how desperately they need the cash intervention. Our sentiments and alignments determine the efficiency and impact of the transactions and interventions. Every impact intervention conveys both tangible and intangible benefits. In short, the head and the heart. In a Mainstream versus Fringe dichotomy of a community, for example, the impact of mainstream interventions on fringe groups is hampered tremendously by the lack of acknowledgement of the other's values. You do not need to agree with a set of values to acknowledge them. Even if there are material benefits from the intervention, they will not be 'landed' due to lack of trust and shared values.

Whether hypothetically or in reality, modelling based on the issue of cryptocurrencies to specific communities has the dual effect of acknowledging their values (whilst not necessarily accepting them), but will be seen as an empowerment from their side. Designing

⁸ <http://ow.ly/9nD3306wUdk>

engagement with different communities using this new language of values allows a clear transaction of both tangible and intangible values to be identified and traded as part of design process.

The vote of alignment by owning/ using a cryptocurrency is very transparent however there are even greater benefits to be seized. Blockchain democracy with its 51% consensus governance layer can be used as a powerful enabler to give fringe communities a more empowered voice, a pathway to participation for previously dis-engaged non-aligned individuals. A key tool for engagement of fringe groups within interventions.

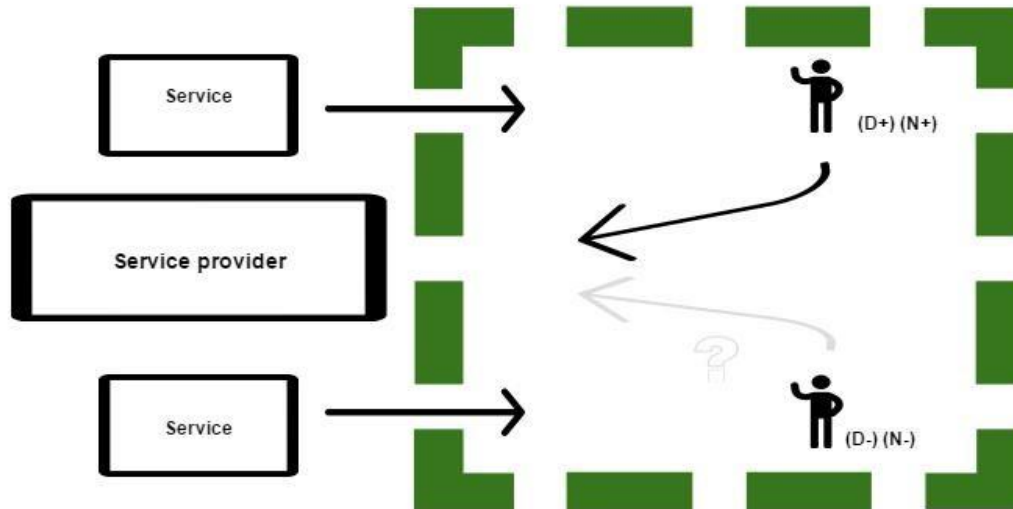


Intervention Strategies

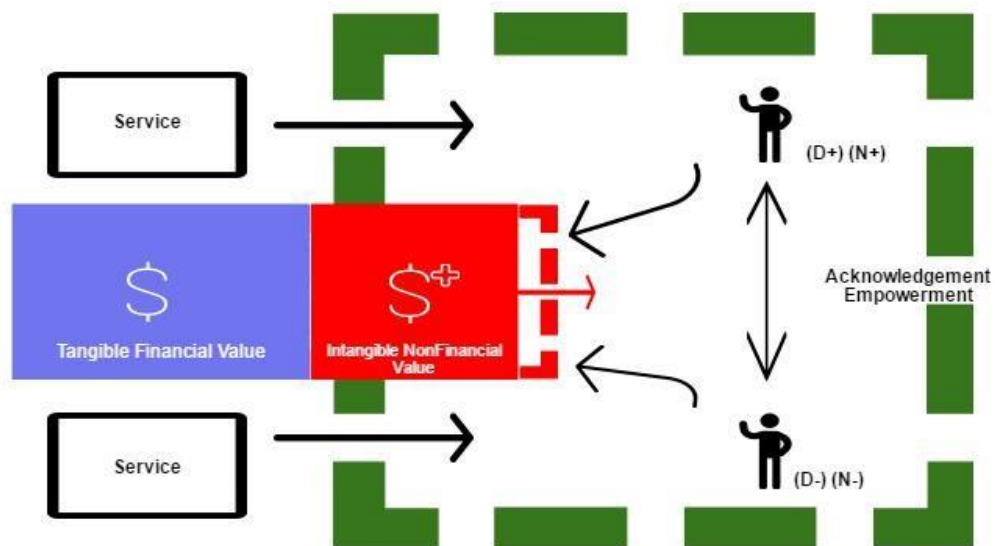
Once designed, these can be turned into reality through small trials or larger engagement strategies. Allowing the fringe community to govern over a small budget, for example, share power and dialogue and enhances the shared value strategy. If the trial goes well, a wholesale approach may lead to an actual issue of the community cryptocurrency which can be sold and bought as well as exchanged to other value-based cryptocurrencies, loyalty schemes, services etc in the area – hence the rising popularity of hyperlocality and regional/city currencies.

The figure below illustrates the effect of a service intervention as it is today in regards to influencing various communities. Communities with mainstream values are highly aligned to their values (indicated as D+, D stands for Depth of the Alignment) and bonded (N+, N is for Network). These communities benefit from the services and policies and so service providers create positive change within them. Communities with fringe values tend to have weak alignment indicators (D-) and are often divided (N-). As it was described above, these

communities are more difficult to influence. Therefore, the lack of shared values makes it difficult to establish any progress with these target communities.

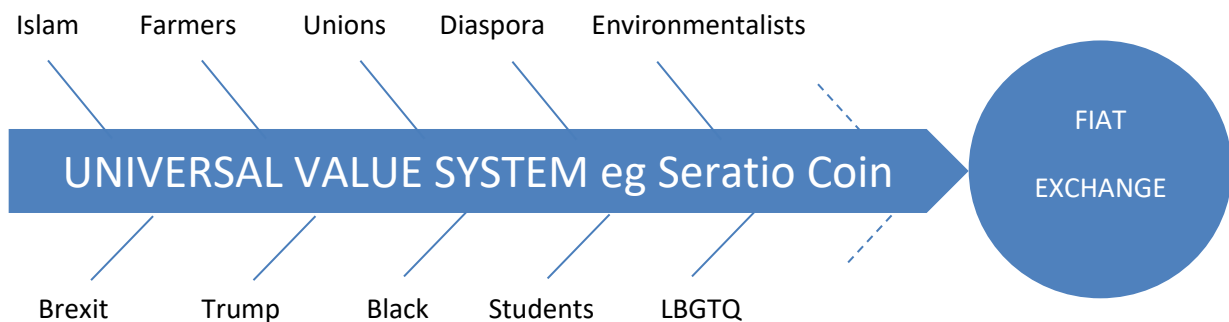


The situation changes, if we introduce acknowledgement of these communities with alternative values. Service providers can exchange part of the budget to coins of either community they wish to interact with. This exchange will allow members of the chosen community to vote for the allocation and expenditure of their community coins. This increased transparency leads to greater alignment to the service provider, and in turn, its service. The service provider benefits from increased trust as well as value it creates for the beneficiaries without incurring additional costs. It has the additional benefit of mainstreaming the difficult to reach.



Coping with Multiplicity of Voices

Whether an individual or a society, there are a multiplicity of voices that are internal to us. Vibrant, uniform, cohesive, directed, well defined, transactional, clear and large communities tend to dominate the discourse. Minor sidelined voices may be powerless, but often are the most aggressively and troublesome to the mainstream. If each of these voices had their own currency, whether real or imaginary, the exchange rate between them would be saying something about their potency or lack of. We can all own several voices, coins, beliefs ... values at the same time, sometimes seemingly conflicting. What is important is to give every coin a recognised space and exchange mechanism and let market forces determine their value to the rest. Ignoring a voice without a value exchange forces them to be disruptive in their quest to articulate their values. Whether Bitcoin or Brexit coin, we buy what we want.



This work introduced a completely new way of increasing impact efficiency. It started with exploring how value is created by different actors and how it can be calculated using the Social Earnings Ratio. There is an established linkage between impact efficiency of the impactor and values of the communities they interact with. Building on that, we demonstrated that those who consider the values of the communities they operate for, can increase impact efficiency of the services and policies they deliver through mutually beneficial value exchange. Acknowledging not only mainstream but also alternative values delivers empowerment of the communities and that in turn brings effective institution-beneficiaries cooperation. This provides for highly efficient policies and services because they are value adapted and capable of providing representation from a multiplicity of voices.

Background Note

Information on the open source Social Earnings Ratio® (Creative Commons, 2011) may be found at the not-for-profit Think Tank, Centre for Citizenship, Enterprise and Governance (www.cceg.org.uk) which focuses on Movement of Value. CCEG has received over 100 commissions, shown at www.socialearningsratio.com and operates 10+ SaaS platforms through the trading arm Seratio Limited (www.seratio.com). CCEG has over 50,000 members including 6,900 heads of CSR of the world's largest companies and 2000 politicians. Members receive the journal Social Value & Intangibles Review <https://issuu.com/seratio>. CCEG has founded the IoV Blockchain Alliance for Good (Bisgit.ioV) at www.bisgit.org

Whitepaper Schedule

Updates are available at:

<https://github.com/seratio/whitepaper>

- 1.0 Currency of Intangible Non-Financial Value (October 2016)
- 2.0 Values Based Impact Interventions (December 2016)
- 3.0 Transference of Value across Scale– (value of our thoughts to global value through citizen value, family value, network value, organisational value, city value, regional value, country value, world value)
- 4.0 Zero Sum Gain Acknowledgement of Value – where value is not transacted, lost or gained but acknowledged
- 5.0 Niche Applications (Ethical Leadership, Mental Health, Health & Wellbeing, Eternal Value, Brand Value, Provenance, Capacity Development, etc)

Contact

Centre for Citizenship, Enterprise and Governance
Bureau 112 UN Innovation, Green St, Northampton, NN1 1SY, UK
info@seratio.com
Tel: +44 1604 550100

