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INTEGRATED DECISION MAKING PLATFORM I. FRONTEND COMPONENTS BUILT ON TOP OF THE DECISION BLOCKCHAIN

BY

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Abstract. Although human evolution was primarily driven and inspired by observing nature and natural phenomena, little to no effort was allocated to finding ways in which we can integrate the solutions nature has to offer in the way we organize ourselves as a society and the way we make decisions as individuals or groups. Decision making, as a concrete manifestation of our will, is the fundamental process that allows for meaningful change to happen. Optimizing the way we make decisions and creating correlations between the decisions we make, the actions implied, and the effects the actions bring on the governed body (individual or group) will allow us to improve both the way we make decisions and their outcome. At the same time this will help us identify the primary directives that need to be considered as fundamental parameters when making decisions that affect organic life, with the intention of reaching a consensus, in the form of a universal wise normative that will be unanimously accepted by all humans regardless of gender, nationality, religion etc.

Keywords: organic integrated decision making platform; swarm decision making platform; peer validated voting; collaborative decision making; participative organic governance.

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1. Introduction

This article is part of a series of articles describing the individual layers of an Integrated Decision Making Platform. The components described in each article can be independently implemented and work as standalone applications but if properly combined they bring a synergistic effect that can also be seen in the way the human internal organs work together to form one coherent and singular organism. For this article we will describe the frontend layer that works together with the Decision Blockchain, also briefly described inside this article.

The frontend component architecture for the Integrated Decision Making Platform which is the subject of this paper is modeled around the anatomy of the human body, more specifically the way the central nervous system works and connects the brain and its two hemispheres (Springer *et al.*, 1998) with the rest of the body through the vertebral column and nervous ganglions located around the body that route and filter messages coming from individual cells.

A nervous ganglion is a nerve cell cluster or group of nerve cell bodies that has the purpose of intercepting signals coming from the neural cells located around the body, which have the role to sense external stimuli, and after filtering and prioritizing the signals, forwards them to the brain which decides on the action which will be taken according to the received signal.

The human nervous system is already built like a governing system and all its functions can be perfectly modeled and implemented in a real platform.

The different organs that the human body contains can be found in real life as Organisations and Corporations, but without a central point of governance that coordinates them, these organs act against each other instead of cooperating.

Because we now possess the technology to recreate our body's perfect governing system it's only natural that we implement it and in doing so remove all possibility of corruption to ever take control of any organisation vital to human well being.

By implementing a system that's naturally built for us by nature itself we take the responsibility from any small governing group of people and distribute it to each and every one of us.

In order to evolve as a species at our highest potential we need to gather, classify and act upon any good ideas that can arise in anyone's mind not just a few that are in power like the previous systems.

Based on this overview of the human body's natural governance system we have designed a Multilayered Integrated Decision Making Platform, using blockchain technology for transparent, incorruptible and distributed data, human swarming for collaborative issue framing (Surowiecki, 2004; Rosenberg, 2015), problem solving and policy creation, felicific calculus algorithm used in the feedback control component (Max Haller and Markus Hadle, 2004), bayesian networks as part of the decision making support system, and all architectured using the microservice pattern for a robust infrastructure.

2. Decision Blockchain

The blockchain is a way of storing data that creates a distributed and decentralized database which ensures data consistency through cryptography. Blockchain technology became popular because of the Bitcoin crypto currency. Crypto currency is a form of digital currency that uses the blockchain as a ledger for financial transactions, which also provides transparency because of its distributed and decentralized nature, and cryptography as a means of protection against double spending.



Fig. 1 – Simple Blockchain structure.

Even though, so far, most of the use cases for blockchain involved cryptocurrencies we can extend the way we use it in fields where it can have an even greater impact, like human decision making and social governance.

The distributed and decentralized database that the blockchain provides has two properties that makes it a perfect candidate to be at the base of a trust-less collaborative decision making platform:

- 1) Transparency because data is shared between all the nodes of the network, which in the case of a decision making platform would translate to deciding agents, everyone will have access to the whole history of transactions or decisions that were taken until any given point, this means that any new decision or transaction will automatically take into account previous decisions.
- 2) Incorruptibility data stored on the blockchain cannot be altered because locally altering any unit of information on any given block would create an inconsistency between the altered blockchain and all other nodes on the network.

2.1. Decision Blockchain as Artificial DNA

The Decision Blockchain can be seen as the artificially created DNA of any Body of Governance (Manolache, 2017), where each individual is the equivalent of a cell and each cell contains a full copy of the whole blockchain just like biological cells contain a full copy of the DNA. Each fork created in the decision blockchain with the purpose of defining a new institution with its own internal rules and role is equivalent to the different organs of the human

body that have specialized functions useful for the whole body. The Deciding Agents have roles that are equivalent to the different cell types the human body, each with their own well defined purpose.

2.2. Decision Block

The fundamental type of block in a decision blockchain is the **Decision Block**. On top of the decision block, which is the primitive block type, we can have additional block types that will have their properties defined by the deciding agents through the fundamental decision blocks. The decision block will specify the object applying a certain decision and the object that can be affected by it. The objects used in decision blocks will be described in special blocks derived from the basic decision block and should be previously added to the blockchain. The decision block will specify the object(s) applying a certain decision and the object(s) that can be affected by a decision as well as the logic that connects and describes the interaction between the two objects.

Using different block types will allow us to fork and create different institutions, organisations, layers of governance, deciding agent hierarchies based on different types of votes (trust/wisdom) and also create context dependent systems of governance that only affect a certain branch of the blockchain and the deciding agents involved in it. Each of these sub chains will be created with a specific purpose in mind and annexed to a previous decision block.

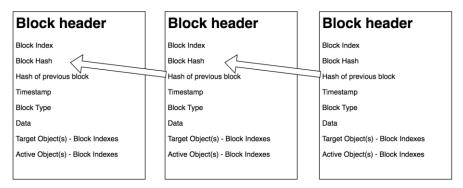


Fig.2 – Basic Decision Block used in a Decision Blockchain.

Through decision blocks we will store the normative, principles, constitution, legislation and deciding agent roles of the governed body and the organizations and institutions that evolve inside of it.

In order to accurately model how decisions are made in real life we will need a few more block types:

1) **Definition Block** – will be defined using a primitive decision block but with the added type member specific to a decision block. A definition block will contain the description of a concrete or abstract object. The

- purpose of the definition block is to be used as a reference in other decision blocks. For example: definition for energy, definition for human, definition for president, etc. The Definition Block can have global effect or contextual effect.
- 2) **Action Blocks** will define an action that an object, defined in a Definition Block (example: Institution), can exert on another object, Resource, Deciding Agent or Unqualified User.
- 3) Resource Block will record the stock or supply of valuables such as money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively. The Resource Block will also keep track of resource usage by recording negative values after they are allocated. The Resources can be administered, regulated and supervised by a special organization established through the decision blockchain.
- 4) **Deciding Agent Block** this will store personal information pertaining to a deciding agent like: public key, name, strengths, weaknesses, skills, etc. Each new Deciding Agent Block will be introduced in the blockchain only after being validated through votes by existing deciding agents depending on the existing legislation introduced in the blockchain at any given time.
- 5) **Vote Block** will store a vote made by a deciding agent and it can have different subtypes:
- a) **Vote of Trust Block** this block will be linked to an existing Deciding Agent and can only be given by another existing Deciding Agent. Each Deciding Agent can only give one vote of trust. The minimum period of time that a vote a trust will be valid will be defined through a Decision Block Once a vote a trust is given the Deciding Agent receiving the vote will carry the authority and responsibility of the Deciding Agent from which he received the vote.
- b) Vote of Validation Block this block will be linked to a Decision Block and based on the existing legislation, which can be found on the blockchain, it will be needed to validate a certain Decision Block. When a new decision is made, using an independent interface that extracts data from the blockchain, the Deciding Agents that are needed for a vote to be validated will need to use their private keys to create a Validation Vote for the decision being added, if the Validation Votes don't reach the needed critical mass (calculated in total votes of trust), in accordance to the existing legislation, the Decision Block and Votes of Validation Blocks will be discarded and not added to the blockchain. In order for a Validation Vote to be Submitted the Deciding Agent also has to provide a short logical explanation for the reason they are validating the vote. This way we make sure the Deciding Agents understand the reason for their vote.
- c) **Vote of Invalidation Block** this is an optional block type and it will be linked to a Vote of Validation Block. If the voting reason attached to a Vote

of Validation is too weak or irrational it can be challenged by other Deciding Agents and if it received enough support from other Deciding Agents it will invalidate the Validation Vote it targeted. The quantity of Votes of Trust needed to invalidate a Validation Vote will have to be decided previously on the decision blockchain and it will be relative to the number of votes of trust attached to a Vote of Validation Block.

d) **Vote of Wisdom Block** - this is a optional block type that targets a Deciding Agent. This type of block allows for Deciding Agents or Unqualified Users to be rewarded for insightful input on the independent online platform user interface that uses the decision blockchain and will automatically expire after a certain period of time in conformity with the existing legislation. The purpose of this type of vote is to provide extra exposure on the platform's online user interface for people that don't want to be directly involved in the decision making process but are qualified and capable of providing valuable insight, feedback or solutions.

The information stored in the blockchain as a decision block would be immutable because new decisions would only be stored as new blocks and would require the confirmation of the nodes with the highest trust ranking.

When new decision blocks are added they are only validated if they are signed using the private keys of the nodes with the highest trust ranking depending on the amount of votes of trust relative to the total population which should be previously decided in the legislation in the form of decision blocks. The nodes with the highest trust ranking are Deciding Agents that receive votes of trust from the other participants in the decision making process.

Based on the votes of trust we can create an organic hierarchy that will aid us in identifying the most trustworthy people for roles that affect a largest segment of the governed body.

3. Frontend Components Process Flow

The frontend components of the Integrated Decision Making Platform that use the Decision Blockchain as data source are: Profile, Feed, Issues, Organize and Policies.

The components work together to form an intuitive interface to the Decision Blockchain. In order to create the interface and component interaction we studied and emulated the way signals are collected and processed inside the human central nervous system.

3.1. Profile Component Flow

- Users create their account or can login using Facebook Login/Google Plus/Twitter/Yahoo/etc.
- The Profile Page will consist of a simple social network that will only have vital social functionality like, message friends, post pictures, post short statuses.

- Users at first start out with Trust Level One, they can use their Profile page to attract friends to give them a vote of trust. Users will be guided to express their political views, social views, economical views etc.
- The Trust level will be used everywhere around the website to create an organic and dynamic hierarchy. Each user can give their vote of trust to anyone else(once per person) and they can receive votes from anyone else(one vote from each).

3.2. Feed Component Flow

- On the Feed page users can view different news articles or personal issues other people have.
- If an article stands out by being Up Voted by many and the article refers to an issue the person is experiencing, it can be promoted to become an Issue and will be shown in the Issue List page

3.3. Issue Component Flow

- On the issue List page we can have filters that can filter only issues from friends for example, or only issues from your country, or only issues in a specific category.
- All Issues will have tags attached to it, tags will be used to better match similar issues and will also be important for the reports page.
- If a person is interested in an issue it can follow that issue.

3.4. Organize Component Flow

- In community organizing users can organize themselves in order to get support from Social Groups or Individuals with high trust rank to promote solutions for the problems they are facing.
- In Community Organizing users will be able to organize Campaigns of different types: meetings, rallies, email/fax/phone campaigns
- If a person is interested in an issue it can follow that issue.
- The Community Organizing tab will provide the means for users to have their problems heard and attract the people that can solve the problems.
- In Community Organizing we will allow users to add their own Campaign Methods on top of the ones we will have by default (to increase people's creativity in protesting peacefully like all people wearing a shirt with a specific message, call the parents of the person that is creating the issue and so on) and we will promote only Non Violent forms of Protest. We will add a protest etiquette that people can read before starting any Campaign.

3.5. Policies

- Each Framed issue becomes the center of attention for Social Groups, these social groups represent people interested in helping out with Policy Creation for the Categories/Domains they are interested in. We can have cases where a person joins all groups or when a user doesn't join any group but he gives the vote of trust to someone else to represent them.
- Each Social Group has a calculated Trust Level based on the users that make up the group.
- Anyone can create a social group if he thinks he has a new unique view of things that can help others that also that have similar interests and activities.
- Social Groups can also act as a syndicate for different roles people can play in society.
- Once you are part of a Social Group, or you created your own, you can take part in Policy Creation and you can increase your influence by promoting valuable Policies for people in different social/economical/political contexts.
- Users of groups can have different roles within the group like: owner, manager, activist, etc
- The owner has the option to promote other users to managers in their groups.
- There can be Social groups that require an Invitation, some will be free to join, others will require approval.
- Policy Making will enable users to find solutions for everyday problems in an organized, dynamic and collaborative way.
- In the Live Issues Tab, we will have the Framed Issues the person is following. If he is part of a Social Group, he can initiate a Policy for any Issue.
- The Policy will be built inside the Social Group but will also be visible publicly and people can comment on them.
- Once Policy receives the required number of votes and provides the best solution for the problem (that will be decided in the Issue Framing Tab when the issue is defined).
- We can have a democratic vote as default, where all people that follow that issue get to vote.
- Once an issue is voted up it will become an active Policy of that Organization, Institution, Nation, etc.
- All Nation Policies/Laws will be shown in Active Policies Page that will be created for each Institution, Organization, Nation, etc. Users will have the possibility to browse through the Policies and request changes by Framing an Issue.

4. Component User Interfaces

The User Interface created for the Integrated Decision Making Platform uses popular and intuitive paradigms with the purpose of enabling any person, regardless of their level of knowledge in computer science, to easily navigate and use it.

4.1. Feed Component

Based on the two different types of ganglions our body uses, sympathetic and parasympathetic, We have created an abstract model to organise and handle the information that the platform receives and processes from and for the users.

The two categories we used are Feed, which contains News and Organic Developments, and Issues which allows information gathered from Feed to be translated into issues that need to be addressed by the different Organisations

that mimic the functions of different bodily organs, these Organisations act like classic Political parties but specialized in real life activities not only politics, which in itself is useless.

The Feed section represents the Parasympathetic ganglia which monitors, gathers and classifies information and the Issues section represents the Sympathetic ganglion system which acts on the impulses received from the different organs.

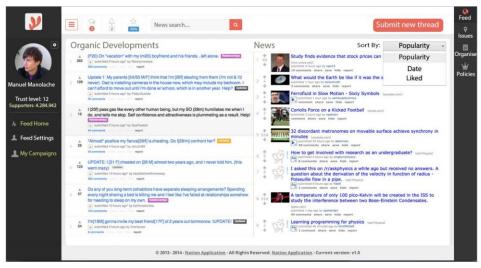


Fig.3 – Feed page.

4.1.1. *Feed* – *News*

In the News category, inside Feed section (Fig. 3), users can submit articles which is relevant to the whole society, like inventions, theories, studies, scientific articles, major social events, and so on.

Any individual can post in the News feed because the voting system will place the news at it's right place as soon as other members categorize it as relevant or irrelevant.

The News feed can also be used to point to resolutions for other ongoing issues that Groups and Organisations try to solve or create policies for. For example if a Policy needs to be created to handle traffic in crowded areas but there is an Article in the News section that talks about Artificial Intelligence Traffic Management, the Group that is trying to develop a solution can reference that News article and bring the people involved with that discovery into the policy creation process and later on create a public Project for the solution to be implemented using that technology.

4.1.2. Feed - Organic Developments

The Organic developments page, inside the Feed section (Fig. 3), allows everyday personal issues to be submitted so the community can collaborate into finding solutions. Organic development threads can consists of any type of issue someone can meet in his daily life, from relationship problems, infrastructure development, public transport issues, and even emergencies of any type like fires, car crashes, and so on.

In the Organic developments sections articles are going to be downvoted or upvoted depending on the relevance and also on the area of impact each issue has.

For example if on residential area there is an urgent need for extra parking spaces someone can Submit a thread regarding it and invite all people living in that area to upvote it. If the number of votes in a specified period of time reaches a certain threshold the criticality of the issue is increased and a message will be sent to Organisations and Parties that work in that specific area. Hashtags are going to be used to signal the area of expertise and other such properties for each Organic Development.

Once an Organic Development reaches a certain criticality, Organisations and Parties can address it and start creating Policies or Projects that will fix the issue and assures no other future issues of that nature can arise and if they do an automated plan of action will be used and laws to prevent that will become active.

Another example of Organic Development can be people complaining there are no parking spaces around some area, once the Issue is upvoted to reach a critical priority level, an Organisation can address the Issue and create a City Project that can build fast parking spaces using available technology, which will be used for all issues of that sort around the City.

4.2. Issues

The Issues section can be seen as a bug reporting application like Jira and Bugzilla but instead of reporting software bugs we report real life issues that are derived from the Organic Development Feed that reached a certain level of popularity and have groups of specialized citizens, parties or financial organisations find fixes for them.

4.2.1. Issues List

On the Issue List page (Fig. 4) users can see a list of Issues that match their personal settings, like Location, Tags, Categories, ordered by different fields. Each Issue can be created by party or organisation members and can be derived from an Organic Development that become popular.

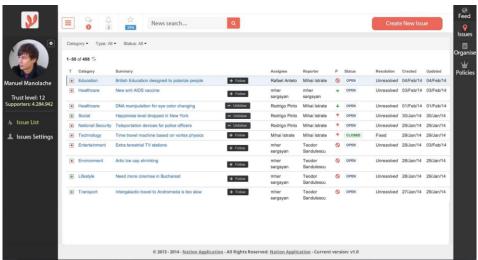


Fig. 4 – Issue List

Once a party member opens an Issue or gets invited by another party to join solving an issue it will show up in their Group followed Issues so they can discuss and find solutions together with their group.

Users can request email updates for the issues they are following by setting it up in the Settings Page.

The interaction between regular users and any ongoing issue is limited to only commenting. Party and Organisation members can come up with solutions in the form of laws, campaigns, projects, meetings and so on, with the purpose of fixing the issue and any other that can eventually arise of the same type.

Once an issue was solved the status will change to Closed. If the users wants to find out more information they can click on the Issue and go to the Issue page where all the details regarding it will be displayed.

4.2.2. Issues Page

On the Issue Page (Fig. 5) Users have access to all details regarding the Issue like, Category, Priority, Tags, Status, Number of followers, Comments, Groups, Commits done by different Groups and Organisations, Source for the current solution and so on.

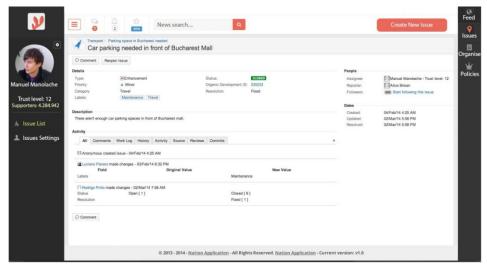


Fig.5 - Issue Page

If any regular user wants to help they can do so using the Comments section, in the Comment section any relevant comment can be upvoted so everyone will be made aware of relevant information that was submitted by anyone following the Issue.

In the Work Log we can see what each Group or Party is working on related to the Issue and their latest conclusions.

In the History Tab we can see time labels referring to groups joining the Issue, Submitted partial solutions, and other relevant information sorted by the date of submission.

The Activity Section will display Actions started by the Groups or Parties in order to find a solution like meetings, information gathering, research.

The Source Tab contains the latest accepted partial solution from which other joining Parties can start and branch to improve on.

The Reviews Section allows users from all parties to collaborate in discussing the partial solutions they found so far and post reviews to each other's solutions.

The Commits Tab will show a list of committed material like legislation, projects, meetings, that are considered to be a solution for the Issue at hand.

Once a solution is considered complete by the majority, calculated in total votes of trust, the Issue will be flagged as Fixed and the solution implemented in the circle or area the Issue can appear, for a street, a Corporation, for a whole City, or Nationwide.

6. Conclusions

Genetic code is activated/deactivated by beliefs/logical patterns that unfold in the form of physical neural connections, neural circuits and neural pathways and it's stored in the epigenome. These genetic switches are triggered by both the mental environment of a person but also by external social environment factors, so any improvements that can be applied to either of the two will enhance the overall quality of life.

Using an organically coherent system of governance emergent from the natural fractal expressed in the anatomy of the human body (Mandelbrot Benoit, 1983), such as the Organic Integrated Decision Making Platform we are proposing, will align the human race to its full evolutionary potential, both at a personal and social level. In order to achieve this we need to gather, classify and act upon any good ideas that can arise in anyone's mind, not just a few that are in power at a certain time, like the previous, prone to corruption, systems.

Because we now possess the technology to recreate our body's perfect governing system it's only natural we implement it and start using it, and in doing so remove all possibility of corruption to ever take part in the governing process like it happened so many times in the past.

By implementing a decision-making system that's specifically designed for us by nature itself, and use it in fields such as social governance, we take the responsibility from any small governing group of people and distribute it to each and every one of us, in accordance to our individual capabilities and predispositions.

As we observed in all natural systems that involve decision making our integrated decision making platform should enable all the participants to negotiate in synchrony, adapting decisions emerging before them in real-time. Deciding agents don't express static views, but continually assess and reassess their own unique convictions with respect to each of the possible outcomes, weighing their personal confidence and preferences. With all participants doing this in parallel, the body of governance can quickly converge on solutions that reflect the collective will of the group. This is why swarms are able to efficiently capture a group's collective wisdom (Seeley & Thomas, 2012; Seeley *et al.*, 2003).

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PLATFORMĂ INTEGRATĂ PENTRU LUAREA DECIZIILOR I. COMPONENENTELE DE INTERFAȚĂ ALE LANȚULUI DE DECIZIE

(Rezumat)

Scopul lucrării este alinierea cu schimbul de paradigmă din guvernare bazată pe reprezentanți în auto-guvernare prin crearea unei platforme integrate de decizie și guvernare socială având ca model anatomia corpului uman.

Lucrare prezentă face parte dintr-o serie de articole în care sunt prezentate componentele ce alcătuiesc platforma. În cazul lucrării de față sunt prezentate componentele ce fac parte din interfața platformei. Componentele ce fac parte din interfața platformei integrate de decizie și guvernare socială sunt: Feed, Issues, Organize, Policies, User Pofile.

Pagina de Feed colectează mesaje și articole venite din partea cetățenilor ce sunt filtrate pe baza de hashtag-uri și folosind voturi (UP/Down) lista mesajelor este ordonată în funcție de popularitate și criticalitate. Dacă un mesaj/articol devine popular acestuia îi crește prioritatea, devenind critic și este transferat în pagina de Issues. În pagina de Issues apar mesajele cu grad mare de prioritate venite din partea populației ce vor fi prelucrate de organismele specializate a statului în funcție de hashtag-urile atașate fiecărui mesaj. Fiecare Issue poate fi adresat de mai multe organizații atât timp cât problema coincide cu domeniul lor de specialitate. Un Issue poate avea ca sursă o problemă organică, apărută în rândul unui cetățean de rând (asfaltarea străzii) sau ca o îmbunătățire venită în urma unui studiu ce populația dorește să fie implementată (implementarea unei platforme de educație online). In pagina de Organize găsim

campanii create de cetățeni sau organisme de stat ce au ca rol educarea opiniei publice în diverse probleme cu care societatea se confruntă. Campaniile pot fi evenimente publice pe diverse tematici, întâlniri de discuții între grupuri în jurul unui interes comun, transmiterea unor informații relevante prin telefon/fax/email. In pagina Policies vom avea legislația aflată în vigoare, creată ca răspuns la problemele trecute (Issues), ce au fost scrise de Grupul Legislativ cuprins din cetățeni cu grad mare de încredere care au capabilitățile necesare. În pagină personală avem informații personale despre fiecare cetățean, nume, gradul de încredere, hastaguri ce reprezintă interesele și capabilitățile personale, orașul și țara. Mai putem găsi Organizațiile sau Instituțiile publice din care el face parte, ultimele idei promovate și o istorie a contribuțiilor în problemele sociale trecute.