Development of a Self-Manageable News Virtual Environment

Fabio Machado de Oliveira[1], Carlos Henrique Medeiros de Souza[2], André Fernando Uébe Mansur[3] , Bruna Moraes Marques[4] and Fabrício Moraes de Almeida [5]

[1]Universidade Estadual no Norte Fluminense – UENF, Campos dos Goytazazes-RJ, Brasil,
fabiomac@gmail.com
[1]Universidade Estadual no Norte Fluminense – UENF, Campos dos Goytazazes-RJ, Brasil,
chmsouza@gmail.com
[3]Instituto Federal Fluminense – IFF, Campos dos Goytazazes-RJ, Brasil,
andreuebe@gmail.com
[4]Universidade Estadual no Norte Fluminense – UENF, Campos dos Goytazazes-RJ, Brasil.
[5]PhD in Physics (UFC), with post-doctorate in Scientific Regional Development (DCR/CNPq). Researcher of the Doctoral and Master Program in Regional Development and Environment (PGDRA/UNIR). Leader of line 2 ― Technological and Systemic Development, and Researcher of GEITEC ― Federal University of Rondônia, Brazil. E-mail: dr.fabriciomoraes001@gmail.com

Abstract— This work proposal contributes to the advancement of the frontier of knowledge in the area of new information and communication technologies, where the object of this study helps to understand the particularities of cyberspace and cyberculture. The discovery of new technological resources produces theoretical and practical unfolding of new socio-technical elements in the knowledge age. To materialize this proposal, it was necessary to reflect deeply on information systems and database storage in light of the General Theory of Systems, revisiting its concepts and abstractions, converging to define open systems. Due to its generalist nature, adherence with the 3C model, for the development of collaborative systems, as well as its variables and technologies, have proved to be the cornerstones of framewok development to house a self-manageable news virtual environment (AVNA). Supported by the theoreticians who studied and established the primacy of consolidated terms and concepts, an innovative thesis was derived that establishes a synergy between techno-social elements, designing a system to host news production, considering new elements present in the context of a society each more connected and with new demands. Finally, all the theoretical conception architecture, software engineering and systems modeling techniques, have produced the genesis of vectors that added up in the development of a collaborative system, open and committed to meeting the technological and social demands of the producers and consumers of inserted news in cybercultural dromocracy.

Keywords— Communication, Collaborative Systems, New Technologies.

I. INITIAL CONSIDERATIONS

Just as demand defines and influences supply or production, the development of information and communication technologies has changed our forms of relationship in work, study and leisure. For Monteiro (2007), this virtual world is not only conceived by representation, but through simulation we have real world possibilities and reflexes.

The author points out that "the virtual is not the opposite of the real", as well as, the cyberspace is linked to the real world by the flows of dematerialization of social relations that connect in a network, that is, "what was concrete and material acquires an immaterial dimension in the form of electronic impulses" (MONTEIRO, 2007, p.14).

Thinking of a system that can host journalistic or news production in a collaborative way that is fed back and maintained in a self-manageable way, represents a sustained innovation in the consolidation of cyberspace and cyberculture that fosters a new society with a new notion and representation of the Space time.

The development of this system is divided into five parts, where the concepts of cyberspace and cyberculture were first presented and discussed, together with their main authors and researchers who focused on the understanding of the phenomena which are present in their natures.

The second part presents a theoretical contribution of the General Theory of Systems, aiming at basing the concept of systematization, presenting the development and maintenance of a self-manageable system that hosts and serves news, considering the new skills and behaviors of readers and news authors. Deepening the theoretical elements, in the third part, the focus is the 3C model, which reveals tools available for the development of systems of a collaborative nature. Collaborative systems add concepts of collective intelligence and generation of knowledge, which in an increasingly connected world converges to the fullness of its potentiality.

The primacy of the conception of a system composed of such peculiarities, which is indeed difficult, is more simplified and objective, when we use the strategy of adopting an acronym. With regard to a self-manageable system that feeds on journalistic production or the news of its authors and readers, it is best expressed as the Self-Manageable News Virtual Environment (SMNVE), highlighting in this nomenclature its main characteristics as well as production and consumption of news by individuals inserted or orbiting in this environment by heterogeneous interests and motivations.

The theoretical specification of the environment was contemplated in the fourth part of this work, therefore, it is possible to note the convergence of all the main theories considered a priori, which gave origin to the support vectors of the structuring elements of an innovative environment, marked by unique and peculiar concepts.

Finally, the fifth part deals with presenting the architecture and organization of the environment, as well as detailing the Software Engineering artifacts, such as: requirements analysis, class diagram, database modeling, framework for web development, as well as the programming language and other technologies that sustained the development of this environment. At this point, the work reveals the details of modeling and design of the virtual news environment, differentiating it as self-manageable, thanks to its news classification algorithm, which integrates many variables observed in the adhesion usability of its actors.

II.   CYBERSPACE AND CYBERCULTURE

The canonical model of communication, also known as cybernetic model, has its main precursor the mathematician Norbert Wiener, who, in 1948, publishes the book, "Cybernetics", which sowed the basis for the conception of biological or mechanical living organisms and the notion of information. Later, this work served as inspiration for countless filmmakers in science fiction. Yet, he also laid the foundation for both the development

of computer science and awareness of the importance of interdisciplinary. Cybernetics according to this author is "the art of governing" (from the Greek kybernetiké, pilot). During the Second War, he had his studies directed to missile guidance and automatic piloting of airplanes.

The primacy in citation of the term cyberspace is attributed to Gibson (1984) in his book Neuromancer, which shows an abstract world with representations of the real world and where computational technological resources provide the mind with a fluid journey and continues wherever it wishes.

Using the most current theorists, Lévy (1999) reports on the artificiality of non-physical environments, that is, virtual spaces that concentrate large numbers of individuals connected by common or unimportant interests.

Castells (2001) says that cyberspace is a new space, known as the worldwide computer network.

The knowledge about the use of resources by primitive man is remarkable in order to gather and preserve the knowledge, experiences and ideas that formed his culture, that is, how he identified himself in the environment and with the other individuals.

To clarify this issue, Santos (2002, p.50) states: "Culture is the dimension of society that includes all knowledge in an expanded sense and all the ways in which this knowledge is expressed. It is a dynamic, creative dimension, itself a process, a fundamental dimension of contemporary societies".

The network society generates cyberculture as a space within this place of communication through computers. To paraphrase Capobianco (2010), the technological advances are absorbed by the different social sectors that underpin the cyberculture, as well as require a new format for labor relations, education, leisure and communication among people.

In the understanding of Eugênio Trivinho on cyberculture, the author presents the following definition:

> Cyberculture means the material, symbolic and imaginary configuration of human life corresponding to the worldwide predominance of advanced digital technologies and networks in the sphere of work, leisure and leisure. (TRIVINHO, 2007, p.116).

To enrich the understanding of what the cyberculture is, Souza (2009) says that it is formed by the set of customs and knowledge added to the technological apparatus implanted, however, they are still referenced in traditional customs and practices. In this context the internet presents itself as the greatest exponent of cyberculture.

III.   GENERAL THEORY OF SYSTEMS

In a society that lives and consumes technological advance with great intensity, the term "systems" is widely spread. The constant need to implement new means of accomplishment of tasks, makes ideas emerge with systemic elements, seeking to maximize efficiency and minimize costs.

Revisiting the paradigms that marked the development of thought in the Christian era can contribute to the understanding of how multiple factors influenced the advances of scientific knowledge. According to Sühnel (2001 cited by Uhlmann, 2002), the classification outlined in Figure 1 reveals this path:

O Desenvolvimento do Pensamento da Era Cristã	
Segundo Prof. Norberto Sühnel da UFSC	
Período (aprox.)	**Era do / da**
800 até 1600	paradigma Escolástico (Idade Média)
1500 até 1700	paradigma Renascentista
1700 até 1800	paradigma do Mundo Mecanicista e do Determinismo
1800 até 1900	hegemonia do paradigma Determinístico
1900 até 1950	paradigma da Teoria da Relatividade e da Mecânica Quântica
1950 em diante	Teoria Geral de Sistemas ou do paradigma Holístico

Fig.1: The development of thought
Source: UHLMANN (2002, p.4)

For Sühnel (2001), in the Scholastic paradigm, the direction of the way of thinking was conditioned by religious dogmas, opposing this idea, the Renaissance paradigm, rebelling to the dictates of the Catholic Church and seeking a "rebirth" of the sciences. This author also explains that the Mechanistic and Deterministic paradigms had in common the idea that natural phenomena needed methodical and mathematically based studies, seeking a kind of equation that revealed the equilibrium and functioning of the universe.

In the paradigm of Relativity Theory and Quantum Mechanics, in light of their complexities and scope, they point to the need for a more holistic view that contemplates several variables, finally leading to the Holistic or General Systems Theory paradigm, with its genesis already in the 20th century, with a striking transdisciplinary aspect and approaches of: systems philosophy, systems engineering, systems analysis, management and empirical research.

Abbagnano (2000) reminds us that the concept of a system is already consolidated in ancient Greece, in terms of the tradition of communication of knowledge, with a focus on constructs, employed by philosophy in "organized deductive discourse", indicated by "premises and conclusion", that is, "a discourse that constitutes a whole whose parts derive from one another".

From the late nineteenth and early twentieth centuries, many authors presented their definitions of the concept of system, but a priori, the modern western landmark of thought directed to approach the "all integrated" is attributed to Ludwig von Bertalanffy, through works published between 1950 and 1968, conceived in the model of open system, where the environment configures a continuous interchange of interaction with the complex of its constituent elements (BERTALANFFY, 1968).

Bertalanffy's (1968) proposal unified several chains of thought that were convergent in considering, analyzing from the perspective of the parts, interacting in the environment, forming, configuring and defining the whole. Figure 2 presents a semiotic representation of the General Systems Theory.
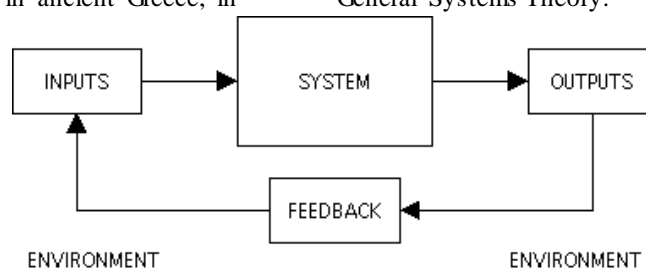

Fig.2: Diagram of the General Theory of Systems
Source: (BERTALANFFY, 1968, p.69)

With the advancement of the scientific knowledge, the contribution of this theory gets clear, in the scope of research thinking in relation to the challenges of complexity that are imposed during the process of knowledge construction and the dromocratic changes present in the society of the information.

MODEL 3C FOR THE DEVELOPMENT OF COLLABORATIVE SYSTEMS

The complexity of this type of proposal demands new strategies in the development of systems and the 3C Collaboration model (Communication, Coordination and Cooperation) has shown to be an advance in systems development paradigms. According to Ellis, Gibbs and Rein (1991), the primacy of the Model 3C proposal establishes the need for a joint work of experts that included social scientists and computer scientists in the effort to promote more integration of individuals with technologies, establishing three dimensions of collaboration, i.e. communication, coordination and cooperation. Therefore,

> Communication is related to the exchange of messages and information between people; coordination is related to the management of people, their activities and resources; and cooperation, is the production that takes place in a shared space (MICHALSKY, MAMANI, GEROSA, 2010, p.1).

Empirically, the 3C model is presented as a means to classify collaborative systems and an adaptation of the original diagram can be seen in Figure 3.

Fig.3: The diagram of the 3C collaboration model
Source: (MICHALSKY, MAMANI, GEROSA, 2010, p.1)

These efforts inaugurate a new field of multidisciplinary studies called Computer Supported Cooperative Work (CSCW). (Ellis, Gibbs, Rein, 1991, p.39).

SELF-MANAGEABLE VIRTUAL NEWS ENVIRONMENT - SMVNE

This paper is also concerned with proposing a re-reading of the main historical studies of press equipment and technologies, considering their impacts on the development of humanity. Consequently, a review, also of a historical nature, of the evolution in the logistic process of production and distribution of newspapers is necessary, interweaving a comparison of this mechanism through information and communication technologies.

Initially, from a bibliographical research, we will present the technological concepts of the terms used in the research on general systems theory, dynamizing the understanding of social collaboration software environments, Wiki environments, as well as their tools and applications.

The field research presented the technological artifacts that will sustain the development of a system of great complexity. Before arriving at the analysis of the questions to be raised in this research, it is necessary to carry out a conceptual analysis on some social implications that are present in this technology innovation and to reflect critically on the possible positive and negative unfoldings for the network society.

The core of the system follows the Wiki software model, which, according to Primo (2004), can be analyzed and framed as a collaborative software.

Created by Cunningham (1995), the first Wiki was made available on the web under the name Portland

Pattern Repository. Cunningham's proposal was to develop a site that made it possible for users to generate content. Another peculiarity that has determined the success of this social software is its type of free use license, i.e. GNU GPL license, which freely allows its copy, redistribution and adaptation to the needs of users' demands.

> (...) Wikis have several purposes: they can be used as dynamic web sites, tools for project and document management, and mainly as dynamic knowledge bases adaptable to different environments such as companies, schools, universities, civil society organizations and the web itself (RAMALHO, TSUNODA, 2007, p.1).

The operation of the system is based on a time-line news accessed by producers and consumers of news. To produce news on the platform, it is necessary to register an identification with acceptance of the terms of responsibility of authorship and publication auditable. With the advancement of credibility and number of postings of news positivadas by the authors, the system stratifies its degree of influence and analysis of the flows that vary in the time-line of news. This way the system establishes a cycle of news that can be segmented by areas of interest or general aspects, which allows the reader to be the producer of the news that it consumes. The modeling represented by Figure 4 presents this idea.
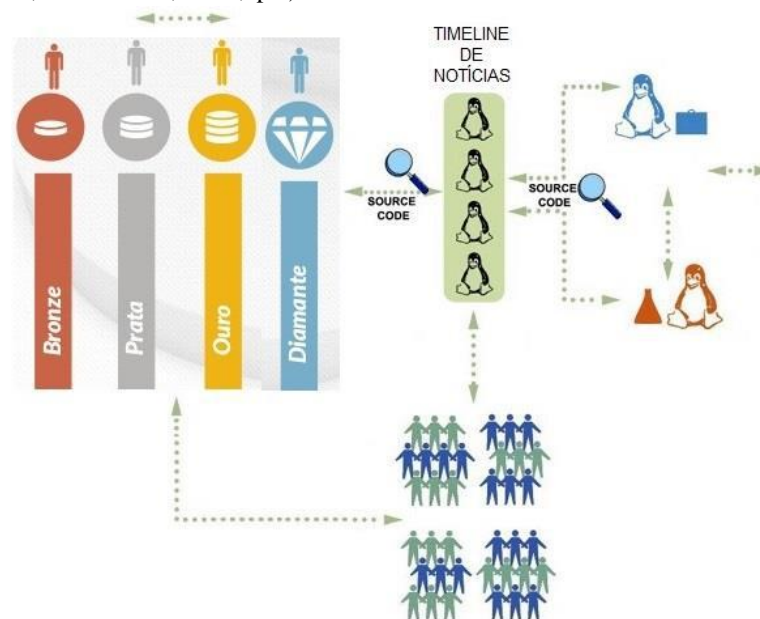

Fig.4: Schematic of system operation
Source: the author himself

Based on the idea of positivation and advancement of credibility and number of news postings, the system stratifies the authors, as well as their degree of influence and revelation in the face of news flows in time-line. Figure 5 shows how this process happens:
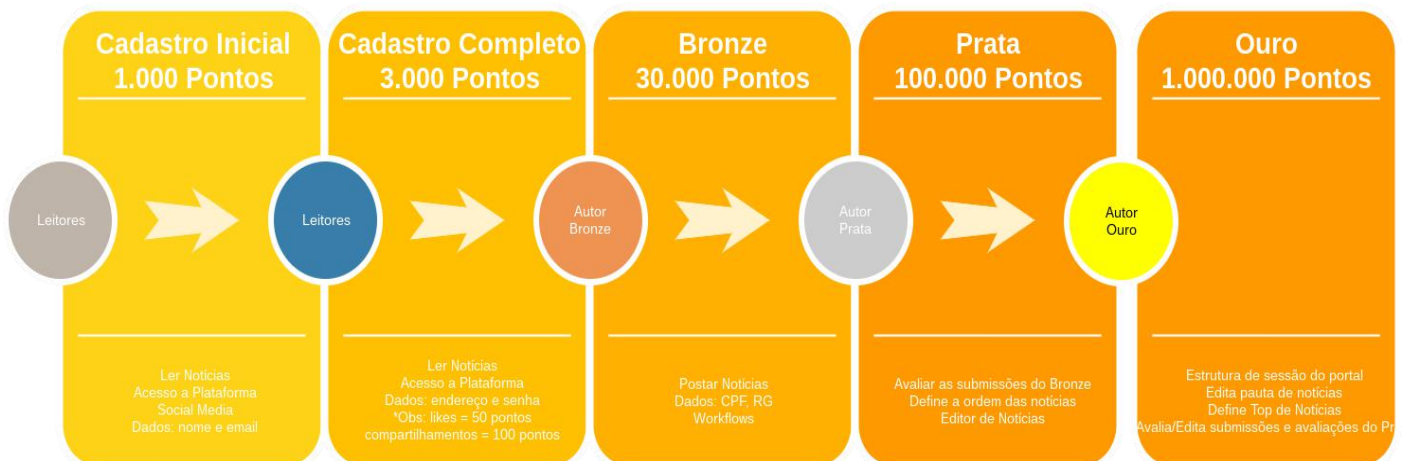

Fig.5: Scheme of classification and punctuation of authors of SMVNE
Source: the author himself

Thus, the project is already born with general and specific characteristics, very striking and objective, to meet the challenges of its proposal.

ARCHITECTURE AND ORGANIZATION OF THE VIRTUAL NEWS ENVIRONMENT

The field research presents the technological artifacts that originated the system, that is, the hosting infrastructure, the class diagram and the main algorithm, the modeling of the database system, as well as the detailing of the technologies used in the construction of the system.

The acronym designed to refer to the system highlights the first letter of each word that names the SMVNE (Self-Manageable Virtual News Environment), making the citation of the system more objective, as well as marking a new category of system with their respective peculiarities.

SMVNE: technologies and development tools

The technological support for the system was the adoption of the Python programming language (https://www.python.org/), using the Flask web microframework (http://flask.pocoo.org/), which was written in the python language. According to Ronacher (2010), Flask prioritizes a framework to address key operating issues with the minimum of packages, along the development and modeling of new elements and new demands can be addressed with the inclusion of other applications or plugins, present in the framework repository. Figure 6 shows visually the combination of technologies used in the development of the system.

Fig.6: Technological artifacts
Source: the author himself

Figure 7 shows how the microframework gears work, so it is possible to understand the range of possible functionalities of the system, as well as guiding system maintenance and auditing work.
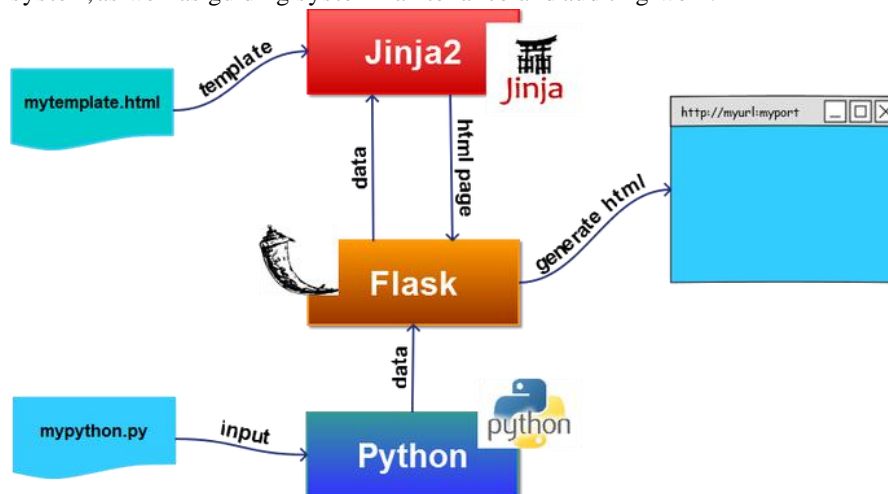

Fig.7: Relationship Entity Model (REM) of the system
Source: the author himself

In the next topic, we will describe the workflow of system activities, guided by modern software engineering design techniques.

SMVNE: class diagram and central algorithms

The representation of real-world elements by objects in the computational world classifies a system-building paradigm known as object-oriented, because this 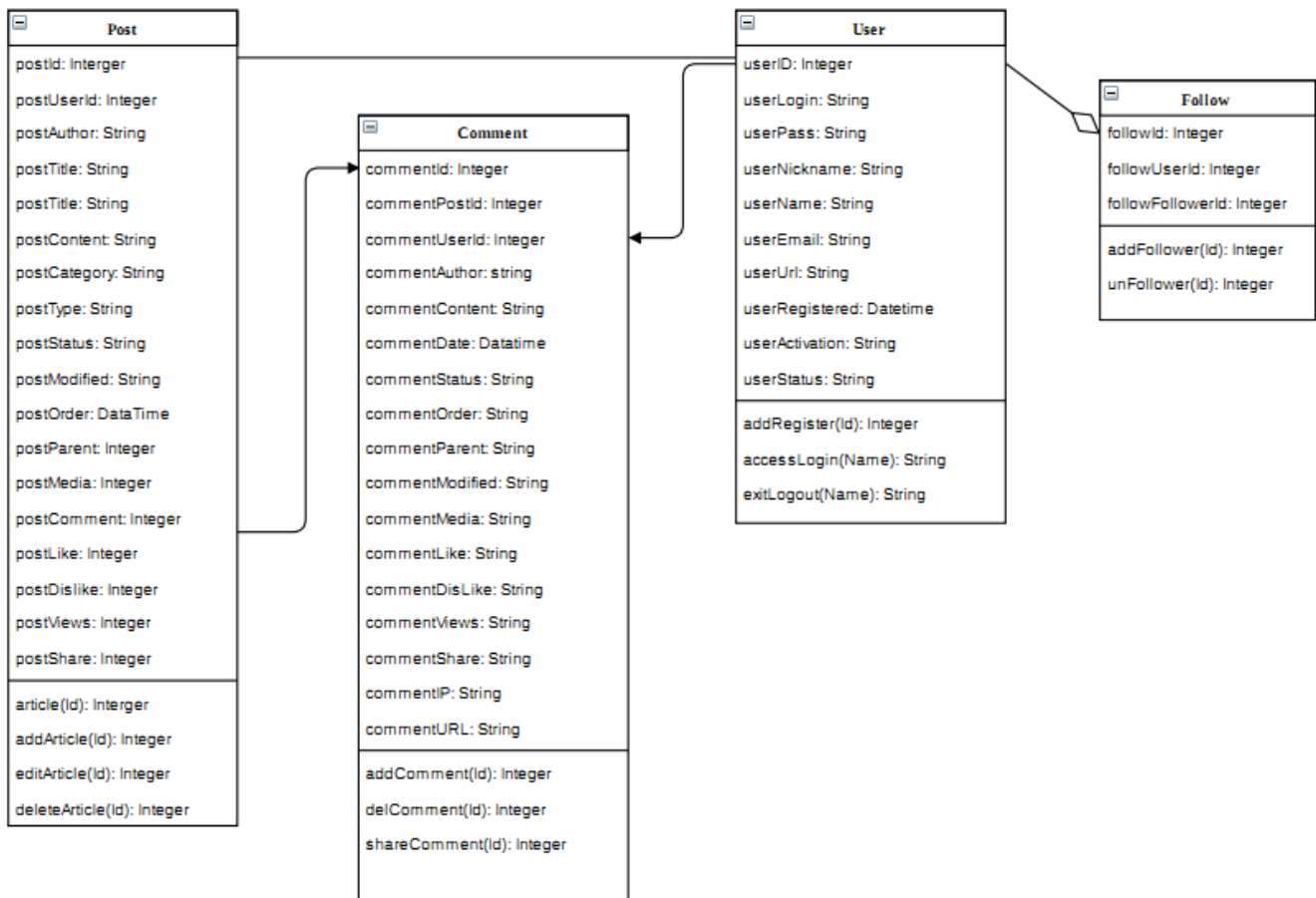way computational objects would always seek the closest proximity to the real object. With this, the work of abstraction and construction of the functionalities and virtual characteristics would be a more faithful copy of this proposal. The class diagram, widely diffused in software engineering techniques that contemplate the object-oriented paradigm, is a great practical example, and we can observe this idea in Figure 8, with regard to the SMVNE.

Fig.8: Relationship Entity Model (REM) of the system
Source: the author himself

The main kernel algorithm of this system essentially uses a data structure, native to the Python programming language known as List Comprehensions, that is, List Understanding, which is a Python implementation of a mathematical notation known and used for sets, where mathematically , the square numbers of the natural numbers are, for example, created by $\{x^2 \mid x \in \mathbb{N}\}$ or the set of complex integers $\{(x, y) \mid x \in \mathbb{Z} \wedge y \in \mathbb{Z}\}$. Thus, the List Understanding seeks out the qualities of a set, but they are not joint in all cases. Below is the cross-product algorithm of two sets, which, in our case, will define our time-line news, considering the most accessed posts with the statistical classification of credibility of the authors (Bronze, Silver, Gold, Diamond) registered in the news platform.

```
def timeline(posts, authors)
    posts = [ "news1", "news2", "news3", "news4" ]
    authors = [ "authors1", "authors2", "authors3", authors4 ]
    time_line  = [ (x,y) for x in posts for y in  authors ]
    print time_line
```

Another resource used for natural language processing was the Natural Language Toolkit (NLTK), developed in Python language, which provides a suite for human language text processing, aiming at the classification, tokenization, parsing, stemming, tagging and semantic analysis, with Portuguese language support. The following is an example of how to tag tags in a phrase.

```
>>> import nltk
>>> sentence = """At eight o'clock on Thursday morning
... Arthur didn't feel very good."""
>>> tokens = nltk.word_tokenize(sentence)
>>> tokens
['At', 'eight', "o'clock", 'on', 'Thursday', 'morning',
'Arthur', 'did', "n't", 'feel', 'very', 'good', '.']
>>> tagged = nltk.pos_tag(tokens)
>>> tagged[0:6]
[('At', 'IN'), ('eight', 'CD'), ("o'clock", 'JJ'), ('on', 'IN'),
('Thursday', 'NNP'),  ('morning', 'NN')]
```

The following is a database modeling that records all system activities, as well as provides integrity and availability of operations.

SMVNE: database modeling

Figure 9 shows the modeling to house data persistence in a relational object model.
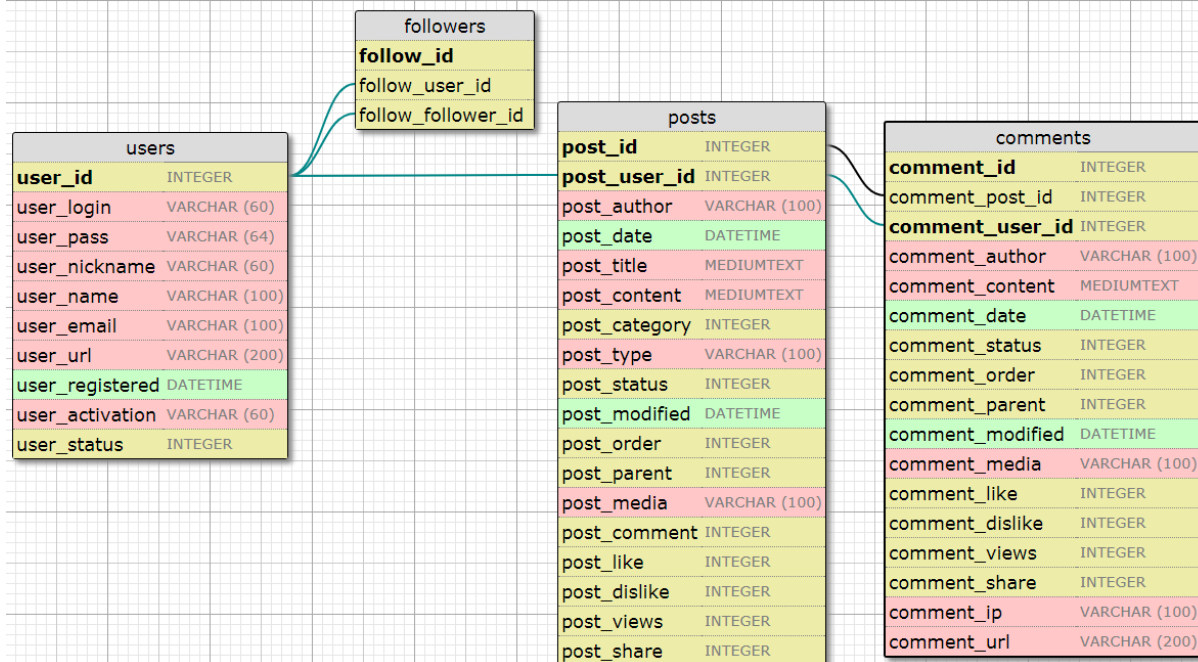
Fig.9: Relationship Entity Model (REM) of the system
Source: the author himself

The next topic specifies the system implementation process, as well as the infrastructure elements to house the same.

SMVNE: infrastructure, implementation and hosting

In order to house this system, from the beginning a VPS (Virtual Private Server) type server was chosen to make possible the hardware expansion, according to the demand of access and adhesion of new users. This type of infrastructure is based on Cloud Computer, with the server fully virtualized, with remote access via SSH protocol, which allows administration of the environment very safe and qualified.

The Digital Ocean service (www.digitalocean.com) was chosen to provide network administration tools for virtualized servers with a primary

DNS (Domain Name Server) server registration functionality, as well as a domain server hosting the system. Thus, as the administration interface of Digital Ocean, the task of publishing the domain becomes easy and efficient.

Finally, the implementation of the system advocates the adoption in Web Proxy server for an initial contribution of the connections and simple HTML request on port 80, the chosen server was the NGNIX, for being admittedly fast and stable. Consequently, a second Web server, native to the Flask framework, running on port 5000, is responsible for processing system functionalities, as well as persistent compilers in MySQL Server database.

Figure 10 graphically explains the operating mechanism of the system in production environment.
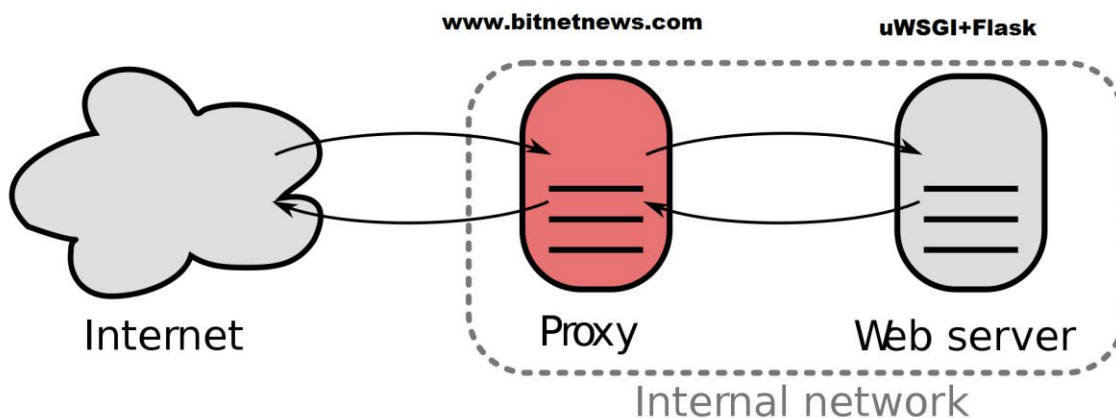

Fig.10: Relationship Entity Model (REM) of the system
Source: Google Images

In Figure 11 we can understand in detail each step of the system operation, where:

1. Web client requests (browsers)
2. Proxy web server from primary requests to basic requests
3. Communication interface
4. Secondary request webserver
5. Interaction interface with the Flask micro framework and the Python language
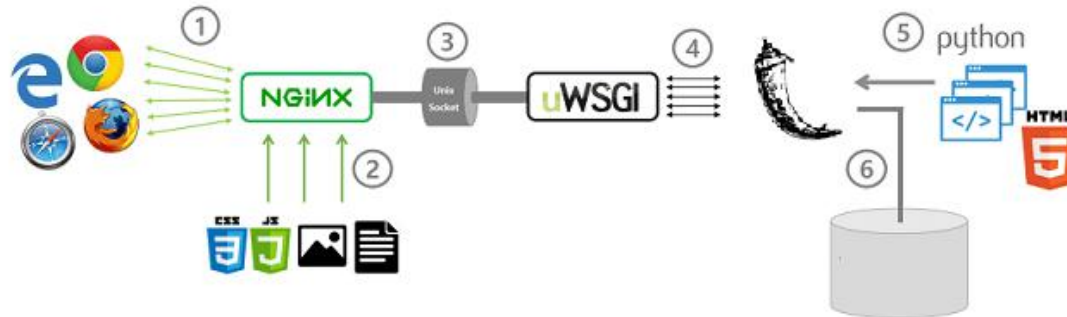6. Persistence and queries to the database system

Fig.11: System architecture in production
Source: adapted by the author

To increase the visibility of the environment, the domain www.bitnetnews.com has been registered, in the maximum convergence intensity of access in any device that has a web browser, with responsive screen accessibility, that is, the environment screen adapts to the size of the screen of the device, being this a desktop computer, notebook or even a smarthphone. Finally, Figure 12 shows the system in production, consolidating the defined objectives, and with a responsiveness technology that aims to guarantee its usability in any screen dimension, increasing its accessibility and comprehensiveness.
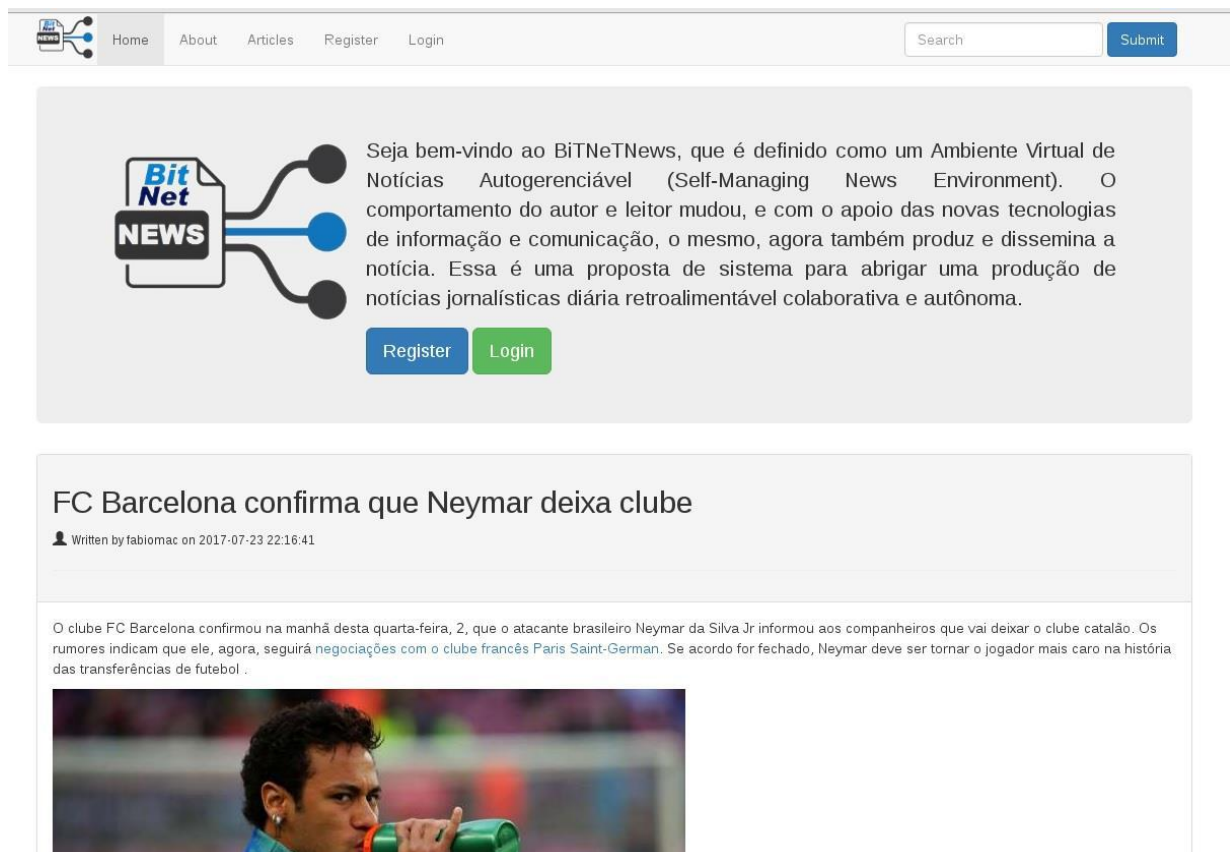

Fig.12: SMVNE – Home screen
Source: the author himself

IV. CONCLUSIONS

The initial theoretical elements contextualize this research, as well as establish the conceptual and scientific bases, retaking the main authors and researchers who innovated and contributed to the consolidation of scientific knowledge. Thus, the interpolation of theories, mediated by interdisciplinarity, shows a fertile ground for the unprecedented theoretical conception presented in this research.

The development of a self-managed virtual news environment model seeks to meet the demand of readers and authors, immersed and based on the use of new information and communication technologies.

The complexity of this type of proposal demands new strategies in the development of systems and the 3C model of Collaboration (Communication, Coordination and Cooperation) has been an advance in the paradigms of development of systems of this nature.

The use of open technologies has added many different aspects to the environment, that is, an alignment with new proposals and software engineering methodologies, with adherence to the needs of deployment, maintenance and support of a multiplatform system and adapted to different devices.

As a suggestion of future work, we have included the inclusion of Machine Learning, through the implementation of artificial neural networks, with supervised learning to assist in the selection of news that compose the main time-lime.

The development of this system has a very relevant differential in the context of user interaction, as well as its proposal to meet new demands of news production and consumption in an increasingly connected society.

REFERENCES

[1] ABBAGNANO, Nicola. (2004). Dicionário de Filosofia. 4ª ed. São Paulo: Martins.

[2] BERTALANFFY, L. Von. (1968). General system theory: Foundations, Development, Applications. New York, George Brazilier.

[3] CAPOBIANCO, L. (2010). A Revolução em Curso: Internet, Sociedade da Informação e Cibercultura. Estudos em comunicação n.7, Vol 2. Portugal: Covilhã p.175-193

[4] CASTELLS, Manuel. (2001). A sociedade em rede. v.1. 5. ed. São Paulo: Paz e Terra, in A era da informação: Economia, sociedade e cultura.

[5] CUNNINGHAM, Woward G. (2017). "Ward". **WikiWikiWeb**. 1995. Disponível em: <http://wiki.c2.com>. Acesso em: 18 nov.

[6] ELLIS, C.A., Gibbs, S.J. & Rein, G.L. (1991) Groupware - Some Issues and Experiences.

[7] GIBSON, Willian.(2003). Neuromancer. São Paulo: Aleph.

[8] LÉVY, Pierre. (1999). Cibercultura. São Paulo: Ed.34.

[9] MICHALSKY, Straus, MAMANI, Edith Zaida Sonco, GEROSA, Marco Aurélio. (2017). **A Inteligência Coletiva na Web: uma análise de domínio para o jornalismo online**. Anais do VII Simpósio Brasileiro de Sistemas Colaborativos [SBSC 2010], 2010, Belo Horizonte, Brasil. Disponível em: <http://lapessc.ime.usp.br/public/papers/11065/2010.WebMedia.AD_Jornalismo.pdf>. Acesso em: 17 de nov.

[10] MONTEIRO, Silvana Drumond. (2017). **O Ciberespaço: o termo, a definição e o conceito**. *DataGramaZero - Revista de Ciência da Informação - v.8 n.3 Jun/07* . Disponível em: <http://www.brapci.inf.br/index.php/article/view/0000004482/5da6e04fed112be3f317b5ef916e48ea/>. Acesso em: 17 nov.

[11] PRIMO, Alex. (2004). Enfoques e desfoques no estudo da interação mediada por computador. In: BRASIL, André; FALCI, Carlos Henrique; JESUS, Eduardo de; ALZAMORA, Geane (Orgs). Cultura em fluxo: novas mediações em rede. Belo Horizonte: Pucminas, p. 36-57.

[12] PRIMO, Alex. (2007). Interação mediada por computador. Porto Alegre, Sulina.

[13] PRIMO, Alex; BRAMBILLA, Ana Maria. (2007). **Social Software e produção do conhecimento**. Disponível em: <http://hdl.handle.net/1904/17782>. Acesso em: 10 ago.

[14] RAMALHO, Leiridiane, TSUNODA, D. F. **A Construção Colaborativa do Conhecimento a Partir do Uso de Ferramentas Wiki**. VIII ENANCIB – Encontro Nacional de Pesquisa em Ciência da Informação, 28 a 31 de outubro de 2007, Salvador, Brasil. Disponível em: <http://enancib.ibict.br/index.php/enancib/viiienancib/paper/view/2870/1998>. Acesso em: 02 de nov. de 2017.

[15] ROMACHER, Armin. (2017). **Flask web development, one drop at a time**. Disponível em: <http://flask.pocoo.org/>. Acesso em: 28 set.

[16] SANTOS, Milton. (2002). A natureza do espaço: técnica e tempo: razão e emoção. 4. ed. São Paulo: EDUSP.

[17] SOUZA, Carlos Henrique Medeiros e GOMES, Maria Lúcia Moreira. (2009). Educação e Ciberespaço. Brasília: Usina de Letras.

[18] SÜHNEL, Norberto. (2002). A Emergência do Pensamento. Holístico Santa Catarina

[19] TRIVINHO, Eugênio. (2001). A Democracia Cibercultural. Paulus, 2007.

[20] UFSC, 4/02.

[21] UHLMANN, Günter Wilhelm. (2002). Teoria Gerals dos Sistemas: do atomisno ao sistemismo (Uma abordagem sistémica das principais vertentes contemporâneas desta Proto-Teoria, 2002. Disponível em: <http://www.cisc.org.br/portal/biblioteca/teoria_sistemas.pdf>. Acesso em: 20 set.

[22] WIENER, N. (1948). Cybernetics (or the control and communication in the animal and the machine). New York, The Technological Press Wiley & Sons, 212 p.