Management of authoring in socio-interactionist environments

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ABSTRACT

The provision of social-interactive virtual environments available for online cooperation, come up with attending different needs of group work. The work of writing, individual or cooperative, is supported by authoring environments that use message exchanges as the main way for communication and cooperation. This paper identifies crucial requirements, in order that socio-interactionist environments can offer computational support to the maintenance of the relationship between author and authorship. By MOrFEu Software, based on the proposal of [6], we present a computational support for creating cooperative virtual spaces, which aims to support collaboration by coordinating the interactions and organization of individual and collective productions.

RESUMO

A oferta de ambientes virtuais sócio-interativos, disponíveis para cooperação online, propõe atender diferentes necessidades de trabalho em grupo. O trabalho de produção textual, individual ou cooperativo, é apoiado por ambientes de autoria que utilizam trocas de mensagens como principal artefato de comunicação e cooperação. Este trabalho identifica requisitos críticos para que os ambientes sócio-interacionistas ofereçam suporte computacional à manutenção das relações entre autor e autoria. Através do Software MOrFEu, baseado na proposta de [6], apresentamos um suporte computacional para criação de espaços virtuais colaborativos, que tem como objetivo apoiar a colaboração, através da coordenação das interações e organização das produções individuais e coletivas.

KEYWORDS

Authorship, hypermedia, cooperation, availability

INTRODUCTION

What we are watching now is a big transformation in how to deal with the text and the writing: it's a revolution of electronic text. It is, in fact, at the same time, a revolution in the art of producing texts, a support writing revolution, and a revolution in the practice of reading [3].

The suffered changes by EAD, called "EAD generations" pointed out by Belloni [1] reflect the different treatments given to the authorship. Through Information and Communication Technologies (ICTs) the authorship is trying new ways of particularly expressions in the training content, collaborative writing and the use of hypertext. Through the resources of digitalization, multiple sources of information and knowledge can be created and socialized over content presented in a hypertext, mixed, and multimedia resources with simulations.

In cyberspace the authorship derives from a process of integration of media elements (text, audio, video, and illustrations) to generate a hyper document. Beyond the access and diverse possibilities of readings, the learner who interacts with digital content can also communicate synchronously and asynchronously with other individuals in many interactive modes one-one and one-all common of structured mediations by the media as print, video, radio and television; and mainly all-all, of cyberspace itself [9].

In this direction, the person moving into a cyberspace with the click of the mouse, shall be able to access a variety of features such as video, graphics and other media. This interactive action with the virtual space invites students to participate autonomous and unpredictable. Thus the hypertext with non-sequential structure, consisting of a network of interconnected texts, with multiple inputs and outputs, serves as a device for communicational intervention [9].

Thereby, the authorship's environments should provide facilities for the projects' builders, to make available interactive tools that expand their collaboration networks [2]. The authorship and the expression's activities defined by the individual, allow this one to build and reinvent their projects to receive and respond to challenges, to express their inner world [8]. In this sense, the dialogue between subject-authors, constantly rebuilds learning environments, because its essence is the idea of transformation [8].

In these prospects we perceive some gaps in computer support with author, authorship and authorship spaces relationships. In this paper, we identify the crucial requirements to support authoring and co-authoring. We exhibit software to computational support to these needs, as well as decisions taken to support the authorship's composition, socialization and recovery **of** collaborative in virtual spaces.

RELATED WORKS

While [2], [6] and [8] reported the authorship importance in

the learning process, [10] relates the difficulty in managing authorship spaces. This difficulty transits in several aspects from the group coordination, of individuals working cooperatively, until the authorship recovery when the spaces that have been published are no longer available.

The founded difficulties in collaborative editors (wikis) are also presented in [10]. The collaborative editors allow freedom in creating hyper documents with several co-authors. However this freedom implies potential management conflicts, and identity of each contribution. We added the identification problem of each contribution in its singular form. Once a co-author can contribute with part of the authorship, is not easily transparent the recovery of their contribution. The recovery of the history/contributions changes is limited, in most systems, only the final document version is presented.

According to [4] the cooperation, presuppose the interaction, the collaboration and the mutual relationship involve respect and hierarchy among them, an attitude of tolerance and coexistence with the differences in the process of constant negotiation. Every decision-making in a collaborative learning environment has implicit the group consensus, which each individual that contribute is autonomous. Therefore the access to their individual contributions should be guaranteed by the systems that support the collective authorship.

PRODUCTION OF AUTHORSHIPS

We consider in this paper the communication and cooperation activities in cyberspace, originated by exchanging messages. In these interactive and cooperative practices, the dialogical communication is built by the subjects in a process of authorship and co-authorship of senses, where the interactivity is an essential characteristic of the process [9].

These interactive processes can rely on a conceptual expansion of hyper textual organization, called Hypermedia, resulting from the union of multimedia and hypertext [11]. From this fusion, Silva proposes that, in a work hypermedia, the user cannot only choose the paths that will go in its structure, but also change them to create new routes and functionalities [11]. Thus, we can affirm that in a hypermedia work there is no line of correct or closed reasoning, the subjects may be both authors of new ways, or co-authors modifying the already existing. A hypermedia work is, in its essence, interactive and offer libertarians and exploratory features, transcending to a logical thinking and autonomous action, and at the same time reticular [11].

The interactivity said recommends open communication, allowing users to interact, altering and manipulating contents, modifying the message, making it a possible response to the expression and dialog systems. Therefore, we believe that the contribution of individual results (authorship) in an environment of collective authorship will result in a structured hypermedia document.

It is noteworthy that this study puts the term co-authorship as given by [5], where "a text constitutes the crossing of other texts". In

our case are ideas, suggestions, support, message and others. The textual productions, while they retain the author's idea, also reveal co-authors, both in writing and in the use of resources.

Through interfaces, digital allows hybridization and interchangeability between subjects (transmitters and receivers) of communication. Transmitters can also be receivers and these ones will also be emitters. In this case the message can be modified not only internally by the receiver's cognition, but may be modified by the same author, earning plural formats possibilities. Thus the subject won't only receive information, but can be potentially a sender of messages and knowledge [9].

Even recognizing the potential of collaborative environments, available throughout cyberspace, it is essential problematize about their limits, both in technological at the support level, but especially when respecting to provide access to information and knowledge. Virtual environments that promote authorship, while socio-interactionist systems, should support not only the construction, but also the recovery, regardless time or space. However what we perceive is the inadequacy of computational support to support these practices.

THE PROBLEM OF AVAILABILITY

We have identified some critical requirements in software architectures of current collaborative systems, regarding the association between author and authorship. In general, collaborative systems, including Virtual Learning Environments (VLEs), have a software framework able to extend its functionality through the integration of new tools for both cooperation and handling new media. However, it is important to emphasize that the strategy of these environments should not, as is widely applied in these environments, limit themselves to the composition of authorships, but also support in the recovery, maintenance and socialization.

Information Retrieval
We have found that the information retrieval is a resource that can facilitate the use of the environment, both to rescue their individual authors, as to conduct research in shared authorship/collective areas. Thus, facilitates the knowledge socialization, since shared public spaces retain the same interest. It is usual in Virtual Environments for Learning (VLEs), that the messages originated through a forum or a chat, are not recoverable in the same system (single) of searching. The information retrieval in these environments becomes limited and the possibilities for filters and access are hindered.

The same difficulty occurs in individual contributions. The recovery of individual authors, presented individually, in collaborative editors (wikis) does not occur because the collective authorship is placed as the mainly artifact being provided. In this case, recovers and introduces it and visualizing the historic versions relative to the collective authorship. It is therefore only possible to identify/retrieve the authors and their modifications in shared document. The individualized recovery is hampered by rigid data structures established by the systems, or even for systems that integrate them (as occurs with VLEs). Therefore, the recovery problem with

editors in collaborative authorship becomes alike to those occurring in forums, chats, mural, glossaries and other environment tools.

Contextualization

Another factor related to the retrial information is the lack of context of a specific retrieved message. In communication activities a message sent can have a meaning within the context in which it operates. Messages as placements "I agree with your statement" or "We will do now the opposite we have done before" are strongly related to other messages contained in that space and time. Thus the recovery support of the messages on the environment should be concerned, offer viewing options outside (individualized authorship visualization) and in a context (display as part of the collective text) so that its existence has a semantics.

Thereby, it is important that the context may be associated with the retrieved information. Some environments as in the Moodle VLE, provide a hyperlink to access where the messages were originated. This solution only serves to contextualize in the case of the collective space (eg. forum or forum thread) is available to access. Once there is control of access permissions or the space availability, the authorship conveyed in this same space could not be more accessible, thus the context cannot be recovered.

Availability

The integrated tools to VLEs have mostly business rules independent of the platform environment. While this is positive in some respects, in others allow gaps in the availability of supporting information. This occurs because the messages are strongly related to the spaces created by these tools, therefore when the subject participates in two or more courses (it is common to course disciplines being inserted as new courses) simultaneous, this user needs to access each course to recover its authorship created respectively in each space. The availability becomes a crucial factor when courses are closed or deleted, so all participant information along with knowledge registered in there, becomes inaccessible.

The availability of authorship should be in favor of the author regardless of time or space. We can consider that tools like chat, wiki, glossary and forums can be deleted or deactivated, but is essential for the author that his productions, contained in there, must be available/accessible by their authors and co-authors, for recovery purposes and contextualization

Consistency

The problem of unavailability results in other intrinsically related problems, as retrieval information problem and the consistency in the relationship between author and authorship. Once all authorship is tied to the space, all productions will be lost in case of exclusion/removal of space. The relationship maintenance between copyright and authorship is impaired.

The availability of shared spaces becomes public and private at different times. And when the space or the tool becomes inaccessible by the user, their authorship follows the same rules of availability.

Privacy

Activities in favor of learning may favor the exercise of reflection on the part of individuals when they are in the process of construction, it may require tools that assist the transformation of their thoughts and knowledge on authorship in the form of hypertext in the virtual environment. This activity may require privacy or restrictions for sharing their authorship (authorship spaces) before making it public.

In environments where the primary artifact for communication and cooperation is the text message, support the creation of private authorship should be common in this environment, favoring the ripening of authorship, achievements of notes and reflections, allowing centralize them in the same cyberspace. This avoids the appropriation of new spaces or unbundled tools to the environment because the initial versions of authorship may be useful at a later time, making them available and recoverable.

The History and Versioning

It is important to say that, once registered, the recovery of the historic   of changes from a particular author can facilitate the visualization of the path of knowledge built. The history version of a particular authoring will enable the author to revisit thoughts, decisions and manifestations that occurred in the past as well as its evolution through changes. This fact may help new reflections.

Currently, version's control occurs in collaborative editing tools like wiki. However, only the shared text is actualized. We understand that each individual contribution in the shared space should be linked to its author and should be capable of versioning and recovery.

The strategy of recording and retrieving historical versions may allow more than just interaction and evolution control of a text (or discussion). Its application can be extended both to cooperation activities, as communication. Its application allows to be used in any authorship, although it is not common in authorship tools. We have not identified this as an essential requirement for the relation of author-authorship, but its adoption would enable new ways of recording, organizing and retrieving their productions.

MULTI-FLEXIBLE ORGANIZER FOR VIRTUAL SPACES

As shown by the experience of [6] in the group monitoring of people from distant learning courses and other curricular activities that emphasize the incorporation of pedagogical approaches, the adoption of Integrated Virtual Environments has not been adequate. In general, these environments allow the configuration to use of a restricted variety of communication tools, of predefined structure, with limited configuration facilities [12].

Authoring tools, currently available, still follow the models that were built historically to seek group needs in specific activities but limited, without the possibility of flexibility in interactions or the possibility in recoveries of artifacts produced independently of time and/or space.

Under these perspectives Menezes proposed in [6] the design of MOrFEu - Multi-Flexible Organizer for Virtual Spaces. Based on this concept, in [13] was proposed software architecture aimed a computational support for the creation of Collaborative Virtual

Workspaces suitable for conducting Pedagogical Architectures (APs) [8], based on cooperative activities based in messaging (hypertext). The main purpose of MOrFEu is to allow flexibility for different articulate ways, and organize interactions in productions, referring to "authorship spaces" reorganized and flexible, taking as support systematized assumptions. Currently the software is available in [7].

One of the goals is to favor new possibilities with people's interactions organization, of their digital libraries (multimedia) and their individual and collective productions, including those resulting from interactions, so the individual aspects could be rescued by each one, promoting adaptive characteristics to the environment.

The MOrFEu allows modeling of virtual spaces according to the each collaborative activity needs, as well as the interests and preferences of users [13], and therefore may serve one or more individuals in their interaction or production needs. The flexibility proposes is based on the possibility of transferring responsibility to users for the creation and management of their individual or collective productions. It is forecasted, in the environment, interconnections between the virtual spaces of different users so, each one can interact with the space of others, adding or changing their authorship.

The main element that adds the conception proposed by [6] is the media, also called spread space. The media allows the creation of individual and collective virtual spaces by the user (administrator), as their need to organize their information, communicate or cooperate. Thus the media enables the creation of collaborative spaces that enables interactivity from message exchanges.

We consider that an authorship spaces is a virtual space (promoted by the media) that allows users to transmit their authorship, whether for sharing purpose (collective space), or only for private registration. However we emphasize that not every virtual space is an authorship space, since we can only imagine spaces with static information or activities that do not promote authorship.

Computational Support

In a macroscopic view of MOrFEu's components, Figure 1 highlights the main native components for editing and configuration virtual spaces. The center encapsulates all logic elements of the system that, in the other hand, are structured as objects following the paradigm of Object Oriented Programming. This component aims to provide interfaces for creating, configuring and organization virtual spaces, as well as the ability to manage individual and collective authorship productions.

Figure 1. *General view from MOrFEu main components.[13]*

In order to establish vast connection with other components, the core provides some interfaces to enable interaction with other tools, which are called "Editors". Through the Editors it is possible to describe/configure virtual spaces, to enable the management of the workflow of cooperative activities and and is also possible to edit individual productions.

As illustrated on Figure 1, the Vehicle Communication Editor (VCom Editor) is a core component of undependable structure, beixsdng able to use the available interface to create virtual spaces and to determine the flow of cooperative work (workflow), which will be held in this same space. The interface that is offered by the core is parameterized by a metadata (schema) which is based on the following standard XSD / XML [1]. [13]

The Template Editor is responsible for the VCom presentation, holding responsibilities such as layout, style and affordability. Through the editor disposition, you can change how the content is displayed on the Web Browser. As the architecture provides a separation between the layers to distribute the responsibilities of the components, in a more modular and independent way, the presentation and formatting Technologies become independent from the business tools.

The acronym UPI stands for Intellectual Production Unit which is responsible for the content of the authorship. Its edition is supported by the UPI Editor who allows the composition of texts using the Hypertext Markup Language (HTML). Therefore, each UPI is described through the use of HTML, however, the UPI Editor provides a favorable interface which will be discussed below.

It is in the core of Morpheus that all processing happens. Considering its layered software architecture [13] the business layer is emphasized and as well as its main elements. The partial model of the class diagram (UML) of the business layer is represented on Figure 2 which calls attention to the relationship between the elements Step, Post, UPI and User, as a strategy to meet the availability requirements evoked on this study.
The Step element provides a structure capable enough to fulfill the sequence of activities to be performed. This element might be related to a reading or writing activity. Writing activities developed on virtual spaces always give rise to a Posting event originated in the Post Element.

The Post is the element responsible for artifacts (UPIS) generated during the execution of cooperative activities, making them become visible in serving areas, being always associated to a

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[1] XSD (XML Schema Definition), describes the structure of an XML document. XML Schema is a language based on XM model, , a Post is associated to only a unidirectional UPI relationship . Through aggregation a very same UPI may be used by several Post. Therefore it is possible to republish the same authorship on an area of placement without changing its consistency , which means, it is not necessary to copy / paste the same production to share it with others on Morpheus virtual spaces. The structure of these elements allows a much more greater consistency in published authorships, since the same UPI is published on more than one area of Authorship (VCom), its changes will be displayed in these same spaces. L format used to define validation rules (schemas) on documents in XML format

specific step. However this element is not the one responsible for the content of the authorship but the UPI element.

As it is shown on the class diagram, the UPI class has the responsibility of being the basic structure to allocate the content of individual authorship from users. That is why we see the direct association between User and UPI and the indirect association between User and Post. According to what is seen on on the class model, , a Post is associated to only a unidirectional UPI relationship . Through aggregation a very same UPI may be used by several Post. Therefore it is possible to republish the same authorship on an area of placement without changing its consistency , which means, it is not necessary to copy / paste the same production to share it with others on Morpheus virtual spaces. The structure of these elements allows a much more greater consistency in published authorships, since the same UPI is published on more than one area of Authorship (VCom), its changes will be displayed in these same spaces.
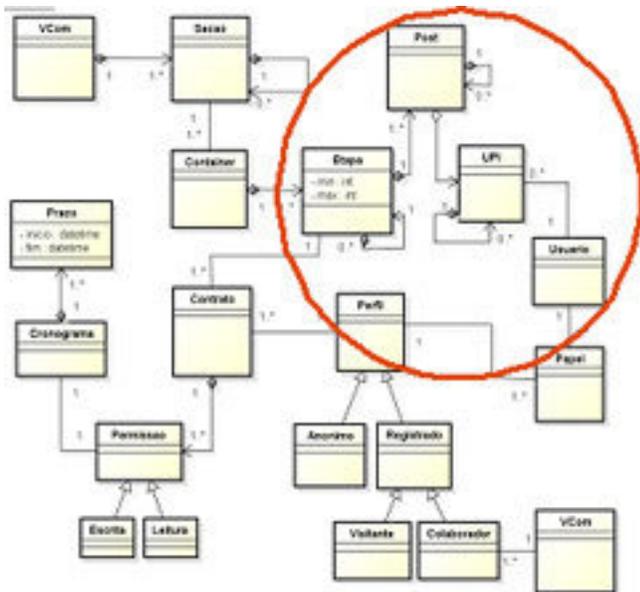

Figure 2. *Dynamic creation and publication of authorship*

The association between the Post and UPI classes through the aggregation relationship, is part of a strategy to reduce the high coupling between authoring and serving space. Being UPI the authorship itself, the post turns into a "reference" for the authorship. The unidirectional relationship allows each Post to identify the UPI used but not the other way around.

So when users perform a publication at some stage in a particular area of Authorship, only the element Post is being linked to the virtual space, referencing the authorship recorded on the element UPI. This association allows the authorship to be strongly related to the author and weakly related to space.

Due to this relationship, when deleting a space of authorship, or any portion thereof (as one of its sections or stages), posts will also be deleted. The cascade delete is due to the relationship between the composition of system classes (Step and Post). However, yields still are present and consistent in its relationship

with the author, due to the aggregation relationship between classes Post and UPI. The bond between the classes User (author) and UPI (authorship) determines that each authorship will have only one author, and that the same author may of course have many authorships. The author can still create versions of the same authorship from the changes made, is held in a UPI published or not.

Space of Authorship

The authorial production (UPI) in Morpheus has a different conception of other proposals in the literature. The strong relationship between author and authorship does not only present in the pool of his productions, but also in their management. The production of authorship is independent of space. Under our proposal, each production (UPI) may be subject to versioning and thus allow navigation on it version history. Regardless of its transmission, the authorship are available in his private library called "My UPIs."

It is understood that from the contributions of individuals in an area serving authorship, it is a document of collective authorship, by composing the individual authors, making each contributor a co-author.

UPI Production and Edition

UPI Editor, shown in Figure 3, has the ability to perform editing of authorship (hypertext) considering the aspects of building a hyperdocument. The publisher aims to support the construction of authorship using hypermediatic resources, with the possibility of viewing the body in textual edition time, common WYSIWYG editors (from the English "What You See Is What You Get"). And thus presents itself in text formatting facilities through features that facilitate also the hypertext editing and the inclusion of media such as images and animations (in various formats such as GIF and FLASH).
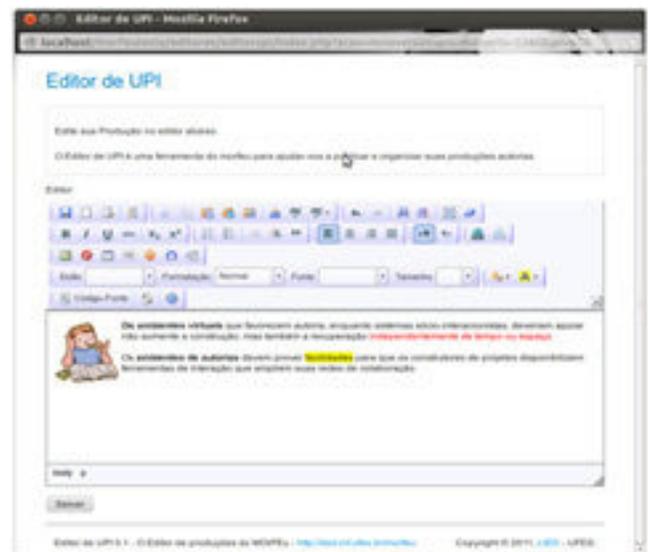

Figure 3. *Editor of Intellectual Production Unit*

Conducted by the publisher, the versioning of authorship occurs transparently to the author. The versioning can occur in two ways:

by altering implicit or explicit. Every occurrence in the request editor (implied), whether or not a post conveyed, the publisher will make a version control making it the newest version in a tree of versions for each author. In explicit form, the author can select a particular UPI versioning you want. Thus, the publisher will provide a new version from the selected. Each version is considered a UPI UPI, which in turn is also likely versioning.

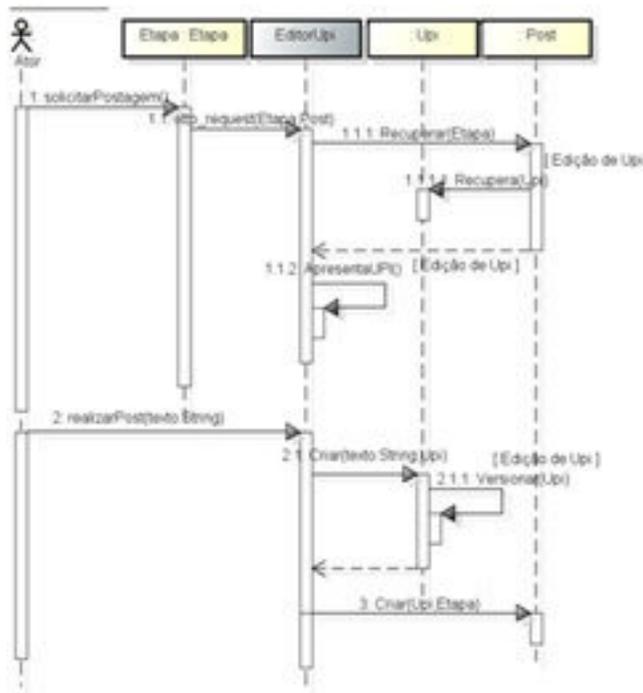Thus, a tree versions may appear in "My UPIS," the author for greater control.

Figure 4. *Diagram of sequence: Perform Post*

Figure 4 shows the behavior of the system with the Editor for UPI creation activities and "implicit versioning" of UPI via Posting a request by the user, while participating in a virtual space. The request (M.1) starts when the user (actor) drives a hyperlink referring to a particular stage, such as: "comment". In turn, the object sends an HTTP request (M.1.1) to the server soliciting the UPI Editor opening / exhibition. UPI Editor checks (M.1.1.1) if there is any Posting performed to the same step. In the event the object recovers Post (M.1.1.1.1) information from UPI, the Editor displays the UPI (M.1.1.2) and offers the option to edit it. It leads into a implicit versioning (M.2.1.1) if the user is updating (M.2) the Post. If there is no occurrence of a post previously held, which means that no UPI was created for this step, the user will edit his text and submit (M.2) his publication, and therefore a new UPI (M.2.1) will be created in a new published Post (M.3).

Spaces of collective authorship

The collective authorship is conceived through the transmitting spaces, where the cooperative construction of a document can be performed by several participants. This collaborative space provides authors as collaborators, the possibility of building a virtual document by individual copyright contributions (UPIs). Interactions of the co-authors occur in this space. The

cooperative activities are determined by a flow of steps that states the responsibilities and restrictions of each contributor. This management is performed by the author of the virtual space allowing interactivity through individual contributions.

Although the transmitting space has an author (the creator), the result of interactions forms a document. Each contributor becomes an author of the resulting document. Thus, each contributor is the author of his contribution, but also co-authored the resulting document. This document becomes collective from an shared authoring space.
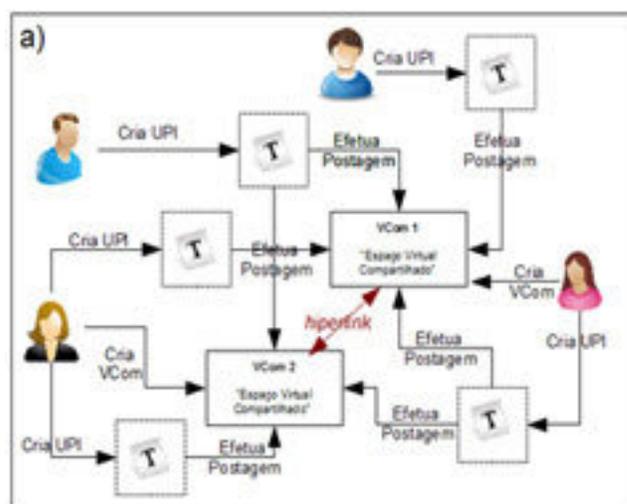

Figure 5. *Autorship Dynamic Creation*

Considering the authorship in hypertext formats, hyperlinks can be created interconnected with the authorship in different spaces or other spaces, as shown in Figure 5. Therefore the spaces of authorship become navigable in a hypertext network, subjecting the reader to a call for hyperdocuments navigation dynamically created by the processes of authorship and co-authorship.

RESULT

The proposed architecture of Morpheus enables the construction of collaborative virtual spaces that break barriers both in the creation of virtual spaces, as in the process of individual and collective production of authorship. The strategy of disaggregation between the transmitting space and the authorship permits the increase of support for requirements for maintenance of relationship of the author and authorship.

We realize that the retrieval of information, availability and consistency were supported by the strategy of decoupling between author, authorship and space of authorship, but mainly by weak relationship (aggregation) between space and authorship, represented in the model by the relation Step-Post-UPI. Through this relationship it was possible to establish the versioning of authorship, allowing a computational support for access to the history of versions of a particular production.

From Figure 5, we see that the flow of creation and publication becomes more dynamic enabling the socialization of knowledge

in different transmitting spaces. This knowledge can evolve and be registered through the versioning of authorship made by UPI editor, which is also responsible for creating and editing any production of the authors. It is also observed the possibility to republish through the posting process, a UPI in different spaces and thus preventing the duplicate process of the same production.

We realize that building a hyperdocument can be performed either by a single author, as collectively through contributions of its co-authors, using the Editor of UPI. Remembering that each Posting refers to a single authorship, which is capable of versioning, history and recovery regardless of the space where the ads runs.

The recovery of an authorship, considering its context, it is still a challenge to be projected and implemented, as its space affects other aspects regarding the management by the administrator of this spacewhich has the control of visibility making it private or public. Although individual productions can be retrieved for each author (in private libraries), the other authorships, that may establish the context, might not be available for access. Even though we already have some initial models to store the context in which the authorship is published, this is still a future work to be better analyzed, planned and implemented.

However, the relationship between the author and authorship is strengthened by the strategy adopted in favor of availability and information retrieval. Most of the critical resources is identified and supported to meet the mandatory practices for knowledge socialization ways of rescue, share and cooperate.

Closing Remarks and Future Work

We still have a long way to go when it comes to software architecture in relation to the recovery of authorship and consistency with its context. Currently this research is in progress willing to validate and test a new software module to meet this requirement. For purposes of approximation with the necessities discussed here, we believe the versioning of the space will provide some facilities both in the recovery of authorship, as in the monitoring of interactions. Turning the s collective pace into an explicit authorship explicit. That is, we want the versioning of the space created by the author through each interaction of the employees. And so, we intend to use their versions in order to preserve the context of authorship.

The association between the UPI and Post classes through the aggregation is part of a strategy to reduce the high coupling between authoring and serving space. Being UPI the authorship itself, the post becomes a "reference" for the authorship.

Finally, considering that on a collective space an authorship may represent the identity of an individual or a group. Thus we are on a initial stage, representing and identifying the space as an authorship that should hold the same software requirements elicited this work.

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