

Coordinating Information Using Genres

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Abstract

In this paper, we demonstrate how a community may use genres for coordinating information. Genres help coordinate information related to resources, place and time since members in the community have enacted genres in the past and have expectations of the socially recognized information that genres bring. Using the HICSS website, we illustrate that genres are used for coordinating information addressing aspects of coordination mechanisms such as divisibility, concurrency, accessibility and timing that help people improve the coordination of work processes. We model these aspects using the Process Handbook, a process knowledge repository developed at MIT, and suggest that system designers and users may benefit from an explicit recognition of the coordination provided by using genres and by exploration of similar coordination through the use of this repository.

1. Introduction

We need to see the way documents have served not simply to write, but also to underwrite social interactions; not simply to communicate, but also to coordinate social practices

[John Seely Brown, and Paul Duguid, The Social Life of Document [6]]

According to an Internet domain survey in January 2000 [24], there are approximately 72 million hosts from over 240 countries connected to the Internet. It is becoming trite to say that the growth of the Internet has had an enormous impact on communication. It has diminished the importance of geographic dispersion in establishing electronic communities. Allowing electronic participation from around the globe has a concomitant complexity of having different cultural norms for communication from different communities mixed together. As Brown and Duguid mention “In passing communities, documents play an important role, bringing people from different groups together to negotiate and coordinate common practice” [6]. Documents play a central role for global communication, and digital documents used via the Internet enable us to integrate a

wider variety of communicative actions than paper documents. For example, the web pages of Center for Coordination Science at MIT [26] offer information about research status, demonstrate a prototype of software, offer reference links, discuss topics related to a project, allow searching for information, allow sending of comments and so on.

The more diverse the community that performs communicative actions, the more important it is to facilitate communicative actions and coordinate information involved with their communication, because different people have different expectations and anticipations for their communicative actions due to their experience with the norms and conventions of the communities to which they belong.

Genres, which are socially recognized patterns for communicative actions [19], provide one of the sources of norms and conventions for communication. Genres of communication have existed through history, and include such examples as a *business letter* or *thank you note*. A genre, such as *thank you note* has certain socially expected attributes that may differ within different cultures. For example, in one culture, *thank you notes* for wedding gifts should be sent within six weeks; in others, within a year might be acceptable; in others, no thank you notes are expected at all. The rise of the Internet has had an impact on the evolution of certain genres. In this paper, we address genres in the 33rd HICSS web pages and how the Internet has enabled a different way of utilizing these genres.

Current research on Internet based genres has primarily focussed on new functionality [17, 18] and relationship with existing paper-based genres [7, 8]. While we address that also, we extend this to address how new genres may be developed by using Coordination Theory [11]. We also concentrate on the purpose of communication and show how a Genre Taxonomy [22] can be used to help in finding alternatives. This work extends that of Charley Osborn [16] to emphasize genres.

In the next section, we will discuss genres and their role in coordinating information. In Section 3, we discuss coordination theory and a tool called the Process Handbook. In Section 4, we bring these two theories together. In Section 5 we illustrate this combined theory using the HICSS web site as an illustrative example.

2. Genre and Coordinating Information

2.1. Genre Theories

Genres as a concept have a long tradition in rhetorical and literary analysis [1]. Recently, researchers in cultural, rhetorical and design studies have begun using it to refer to a *typified social action* [2, 3, 7, 9, 13]. Orlikowski and Yates applied this notion of genres to organizational communications such as business letters, memos, face-to-face meetings, reports, announcements and so on. They defined genres as “socially recognized types of communicative action habitually enacted by members of a community to realize particular communicative and collaborative purposes” [19 pp.299], and identify genres by their socially recognized purpose and by their shared common characteristics of form.

The purpose of a genre is not an individual’s private motive for communication, but a purpose which participants in a community socially recognize and invoke in a typical situation, such as proposing a project, informing and directing in an official announcement, and deciding how to resolve a problem. Form refers to three aspects of observable communication: medium, such as pen and paper and electronic mail; structural features, such as document format; and linguistic features, such as informality, humor and technical language.

Recently, many researchers have focussed on genres in electronic communication [e.g. 10, 18] and relationships between genres such as genre repertoire [14], a genre system [15, 20, 21] and a genre ecology [9]. In this paper we mainly focussed on genres as part of a genre system. A genre system is sequence of communicative actions. A digital document such as a web page is frequently a constituent of a genre system because of its hyperlink structure, which tends to group certain pages together for a single purpose.

We used the example of the web pages for the 33rd HICSS which include many genres such as the *call for papers* genre, the *conference brochures* genre, the *author instruction* genre, the *conference registration form* genre, and so on. Each of these genres carries socially recognized purposes and characteristics of form. For example, a ‘call for papers’ is understood to include information about the topics of acceptable papers, form that the papers must take, to whom to send the papers and by when, etc. The purpose is to gather papers for the intent of presentation and/or publication at the conference. All of this information is conveyed by the phrase ‘call for papers.’

2.2. Coordinating information using genre

When the members in a community enact genres and/or genre systems, they bring expectations of communicative purpose, content, form, participants, time and place. [15] Orlikowski and Yates claim “a genre system¹ can structure and choreograph multi-party interactions within and across organization.” [15 p.6] In our terms, genres are used to ensure that the right information is provided at the right place at the right time with trust. In this context, ‘right’ is that which is socially accepted and ‘trust’ is in accordance with socially recognized purpose, participants, communication sequence and form.

As shown in Figure 1, in enacting a genre process, members identify genre rules from their prior genre experiences and select a proper genre. This is usually done implicitly, but occasionally may be explicit (“Should I send a business letter or an email?”). They usually reproduce a genre, but sometimes elaborate, replace or undercut it either inadvertently or deliberately in order to adapt to a change of situation. A sender of communication usually chooses or modifies a genre from within his or her genre experience; recipients invoke a similar recurrent situation and identify the genre or genre variant. If the sender and recipient endorse the same genre, the genre coordinates information exchanged in the communicative action, because participants come to recognize the information from the social context implicitly.

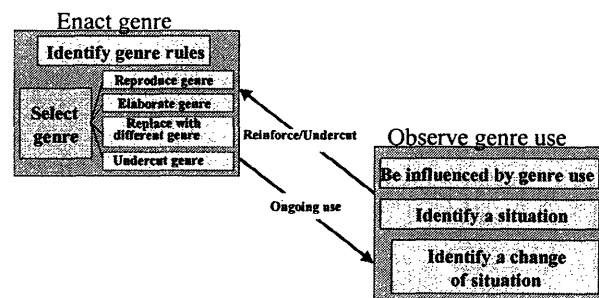


Figure 1. Process cycle of genre over use

3. Coordination theory and the Process Handbook

In this section we briefly introduce Coordination Theory and a knowledge repository developed at the Center for Coordination Science at MIT. More information can be found at [25].

3.1. Coordination theory

¹ A single genre can also structure and choreograph multi-party interactions within and across organization, because a genre as well as a genre system has expectations. For detail, see [22].

Malone and Crowston propose a coordination theory, where coordination is defined as managing dependencies among activities. They propose three types of elementary dependencies: flow, fit and sharing (figure 2²). A flow dependency arises whenever an activity produces a resource or resources which are used by another activity. Fit dependency occurs whenever multiple activities contribute to the production of a resource. Sharing dependency occurs whenever the same resources are used by multiple activities.

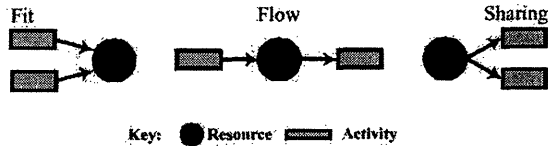


Figure 2. Flow, Fit and sharing dependencies

Processes called coordination mechanisms manage the relationships represented by dependencies. A flow dependency has coordination mechanisms, which ensure the provision of the right resource at the right place and right time. For example, a process to provide resources *just in time* is a coordination mechanism that manages a flow dependency. Another coordination mechanism would be to *build a stock* of inventory in advance.

3.2. The Process Handbook

The Process Handbook [11, 25] has been under development at the Center for Coordination Science at MIT for over seven years. The goal of the Process Handbook project is to develop a process repository which contains a generic framework for classifying business processes, including selected examples of "best practices," case studies, and other process descriptions, with integrated tools for viewing, retrieving and authoring process knowledge.

The Process Handbook has two key concepts: process inheritance, and the distinction between processes and the dependencies among them using the coordination theory above.

There are two hierarchies that represent process inheritance in the Process Handbook. One is a decomposition hierarchy, a "has-a" relationship network between activities (i.e., X has a Y), in which an activity in Process Handbook is broken down into its subactivities. The other is a specialization hierarchy, an "is-a" relationship network between activities (i.e., X is a Y), in which an activity inherits the attributes from its parent activities. This specialization hierarchy is similar to object oriented programming, but it is specialized in terms not of

objects (nouns) but processes (verbs). Figure 3 shows a sample specialization and decomposition hierarchy among three different sales activities in the Process Handbook.

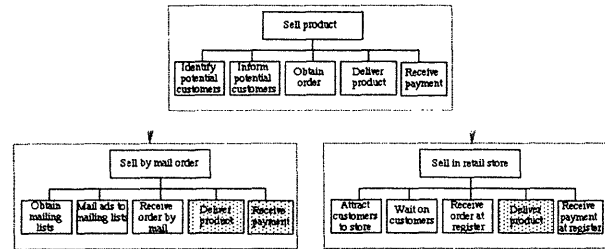


Figure 3. An example of inheritance of process hierarchy (Changed subactivities are shadowed)

4. Coordinating information using HICSS web pages

These days, many international conferences use web pages to exchange information and to allow people who are interested in the conferences from various communities to interact. Although an international conference is often held by one community at a department or research center, it also includes and intersects many other communities such as scholars, personnel at the institution, people at the site of the conference, student volunteers and so on. Even among the scholars, there are sub-communities such as the program committee, the program chairs, the authors of papers, and participants.

HICSS is a good example to illustrate how the Internet and web pages have enabled a different way of utilizing genres. It has participants from around the world, and it includes various communities related to information technology as announced below in the general information web page [23]:

"The objective of HICSS is to provide a unique environment in which researchers and practitioners in the information, computer and system sciences can exchange ideas, techniques and applications"

4.1. Genres in 33rd HICSS web pages

We elicited genres in 33rd HICSS web pages [23] mainly by identifying the purpose of communicative actions. We identified eight genres, and a genre system below. (Table1) Each of these genres and genre system evokes an expectation in the conference community.

The *general conference information* genre has as its purpose to inform all participants and potential participants in HICSS about the conference. The structure of this HICSS home page, in which the top page has frame structure and categorized hyper links from the list of

² Figure 2 and Figure 3 are borrowed from 'Tools for inventing organizations: Toward a handbook of organizational processes [11]

contents, helps participants to enact the *general conference information* genre and other genres such as the *conference brochure* genre. Some genres such as the *conference registration form* genre are replicas of typical paper-based genres, and as such, participants can deduce their purposes easily. Note that the genres in 33rd HICSS web make up the *conference genre* system, which also includes the *meeting genre*, the *reviewing genre* system, the *conference paper submission genre* system, the *proceedings* genre, and so on.

Table 1. Genres and genre system of HICSS web pages

Genre	Purpose features	Web pages
General conference information genre	Announce general information to participants	apahome3.htm
Conference brochure genre	Inform about program information and solicit participation	overview.pdf, tutorials.htm, lecture.htm, plenary.htm, advise.htm
Conference paper submission genre system	Submit conference papers	Made up of the next four genres
Call for papers genre	Solicit papers and inform about necessary information such as tracks	h33cfp.htm
Author instruction genre	Guide authors how to write and submit papers	author.htm, abstract.htm, submit.htm, copyright.pdf, confreg.htm
Conference registration form genre	Register for the conference	confreg.htm
Request form genre	Request equipment	av.htm
Hotel registration form genre	Register for the hotel	hotelreg.htm, hotelreg.pdf
Travel information genre	Inform about travel information	travel.htm

The *call for papers* genre, *author instruction* genre, the *conference registration form* genre, and the *request form* genre are parts of the *conference paper submission* genre system. This system consists of genres coordinating the communicative actions expected for submitting conference papers. These genres make up a system, since there is an expected sequence. First, potential authors read the instructions and write an abstract. Second, they submit to a mini-track chair by 3/15, and write a full paper and send it to a mini-track chair by 6/1. After receiving notification from the mini-track chair of whether their paper is accepted or not, they submit a final version of their paper to IEEE by 10/1. Authors also need to

complete and send an audio-visual request form and a conference registration form by 10/1. Each genre in the conference paper submission genre system, such as the author instruction genre, the notification genre, and the paper genre, relates to the sequence above. They interlock such that the communicative action associated with one genre is a precondition of the next genre's communicative

4.2. Coordinating information using the genres in the 33rd HICSS web pages

In this subsection, we illustrate how a genre coordinates information in terms of its usefulness, place and time, using the examples of the *general conference information* genre and the *call for papers* genre.

Suppose that a senior researcher in the IT field who we'll call Tom finds the HICSS web pages and looks through them. He recognizes (though maybe only implicitly) that the web pages comprise a set of genres associated with a conference, even if he has not seen this media (web pages) used for this purpose before. Tom knows of other conferences and he can recognize genres relevant to conference information due to its purpose and form features, such as a list of related web pages.

The *general conference information* genre coordinates the flow of general conference information from the conference chairman, the conference administrator and the track administrator to all the participants of HICSS. In this genre, information about the conference contents and features relates to how useful the conference will be; important date information relates to time; and the conference venue information relates to place. When Tom considers participating in this conference, he uses the information about the conference contents and features from the general information genre to determine whether to join this research community and interchange ideas related to his research. He uses the date and conference venue information in interacting with his other activities such as planning his business trip. Tom uses the genre to coordinate his activities.

The web page of the HICSS *call for papers* includes information about tracks, important dates, and brief instructions for paper submission. From the title of the page and the contents necessary to submit papers, the members in the community recognize the call for papers genre. They recognize its purpose as soliciting papers and informing about necessary information to submit papers. The format and content of this genre usually includes information about submitting a paper such as: the kind of topics are suitable and presented in a track; how to write a paper (media, format etc.); how the submission process will work with due dates; and to whom and where a paper should be submitted.

The information above is used by a variety of people. Tom uses it in writing and submitting a paper, the mini-track chair in notifying him about receipt of the paper, reviewers in reviewing papers and the mini-track chair on acceptance of the paper. The coordination of these activities has its foundation in the information in the *call for papers* genre, because through its enactment, each participant has a personal role in the process of paper format, paper submitting process, paper submission place, and so on.

In the following subsections, we identify coordination mechanisms related to resource usability, time and place, and illustrate how web pages play these genre roles on the HICSS web pages. In Section 5, we will explore how we can analyze and improve these coordination mechanisms by looking at the relationship between work processes and genres using the Process Handbook.

4.3. Coordination aspects related to resources

As stated above, a flow dependency occurs when a resource produced by one activity is consumed by another. Coordination of this dependency depends upon certain attributes of the resource: divisibility, concurrency and reusability. Divisibility refers to how a resource can be divided without losing its utility. For example, water, money or chocolate can be divided into smaller units. Concurrency means that multiple users can use the same resource at the same time (e.g. a web page). Reusability means the same resource may be used multiple times without being consumed. In this section we describe how the genres elicited from HICSS web pages coordinate information as a resource.

The intangible nature of information makes it easy to use concurrently or reuse. Dividing information addresses the level of granularity. In the *call for papers* genre, information about each track is divided into mini-tracks, using the hyper-link functionality of the web. If Tom has experience in submitting a paper to a conference, Tom could anticipate some of the processes in submitting papers. Tom might expect that the conference is divided into tracks, and search for a suitable track to which to submit the manuscript by looking through the track information. In this method, the decision about which paper is being submitted to which mini-track is divided by Tom into the appropriate mini-track before submission. Another method might be if HICSS had a system in which the chair gathered all manuscripts and then he or she chooses suitable tracks for the manuscripts, dividing the submissions after submission. If this were the case, less information about mini-tracks would be necessary. Choosing whether to divide a resource before or after moving is a basic coordination mechanism decision.

The hyper-link structure (genre form) of the *call for papers* page allows authors to selectively look at only the

information relative to the mini-track to which they wish to submit. It also helps the track chairs check that papers are submitted to only one mini-track.

As information is much easier to transport than physical resources, there is a wider choice of coordination mechanisms for concurrency and reusability. One of the reasons to use web pages for the *general conference information* genre is that it is available to all the people who connect via the Internet concurrently. However, in order to encourage regular participants to participate in the conference, the conference chair might send both the same information and additionally tailor other information just for them such as adding greetings, using other media, such as a paper brochure, and individual e-mail for calling for submission of a paper.

There are two types of coordination mechanisms related to reusability: the content of information and the design of genres. For the former, in order to coordinate paper submission processes among a mini-track chair, paper reviewers and authors, important dates such as due of abstract submission are represented repeatedly in the *general conference information* genre, the *call for papers* genre and the *author instruction* genres. For the latter case, the forms of HICSS 33rd web pages seem to be copied from those of previous conferences. It allows previous participants to reuse the information present in previous HICSS web pages. It also facilitates the speed of developing the process in that the planners of the conference can replicate the planning process and designers of the web pages can easily coordinate their processes. As one of the forms of the *hotel registration* form genre is an Adobe Acrobat format, it seems a reuse of the genre from the paper medium. This type of replication from paper media to digital media also relates to the reusability coordination mechanism above. Members in a community can enact the genre easily due to same look, and designers can elaborate genre rapidly by simply digitizing.

Genres are used to ensure the right information is gathered and used in the work processes.

4.4. Coordination aspects related to time

The temporal aspect of coordination relates to the timing and sequence of activities. Participants in a genre or genre system have expectations about time such as a deadline or due date. The *call for papers* genre lists the important dates, and provides the coordination mechanisms related to processes of submission of abstracts, manuscripts and final papers explicitly. The genre could also provide an implicit timing coordination mechanism. For example, Tom could try to negotiate the deadline of manuscript submission with a mini-track chair, by looking at the duration between the due date of manuscript submission and that of final paper submission

and comparing that to a typical paper submission process with which he has had prior experience. He is using his genre experience to negotiate a change.

As genres in a genre system interlock, participants in the genre system have expectations about the sequence of activities related to the constituent genres. As illustrated in Section 4.1, the participants could have expectations about the sequence of paper submission processes from prior experience with the *conference paper submission* genre system. Tom enacts the genre system and recognizes implicitly the paper submission processes of HICSS through identifying the differences with his typical paper submission processes. One effective way to manage the sequence of processes using a genre system is to design the system such that each constituent genre applies to an activity in the sequence, and related genres are interlocked by a prerequisite requirement. For example, considering the genres in the 33rd HICSS web pages, a designer can design it such that the hotel registration form genre and conference registration form genre are activated only after a date when participants can register. Indeed, this is how it was designed: until March 20th, 2000, people could only look at the call for papers genre for the 34th HICSS and not register.

As is evident from the above examples, web-based genres and genre systems tend to change forms and contents frequently, because it is easier to create variants electronically than with paper forms. When designing a genre or genre system, it is worth considering that a participant in the community might be confused if the genre system's constituents have changed between accesses. Also, he or she might not recognize a variant of a genre system if they have enacted a similar, but different genre system in the past and they assume that all of the constituents are the same as the previous one. A participant might access a genre system more than once. As an example using the *call for papers* genre, consider the implications of using chronological changes of a genre for coordination. Suppose that the genre had changed three times by the end of the conference:

First, the genre had preliminary information: a list of tracks and mini-tracks, which were a copy of the last conference. Second, the genre had the entire set of information about tracks and mini-tracks such as chairs, important dates, track and mini-track summaries. Third, a mini-track chair was changed in the genre.

Tom had originally planned to submit a paper to the digital document mini-track. He prepared a manuscript applicable to the mini-track, but when he saw the second version of the genre, he found that there was no digital document mini-track this year. He modified the manuscript to be suitable for an alternative mini-track, but failed to send it to the right mini-track chair, because he only saw the second version of the genre and was not aware that the chair changed in the third version.

Genre systems can ensure that the information is available at the right time, in the right sequence.

4.5. Coordination aspects related to place

Place means having the needed resource in the right place for use. It entails two approaches to coordination mechanisms: how to deliver a resource to the activity that will use it or control access to the resource at the place where it is produced.

Participants in a genre have expectations about place. When participants enact genres using the Internet media, there are coordination mechanisms for both online and physical locations. If the participants are widespread around the world, there are usually coordination mechanisms specified as to how to deliver the information. The *call for papers* genre has descriptions about where and how authors should submit manuscript as shown below:

Many Minitracks accept electronic submissions (usually in Word or PDF). Contact the Minitrack Chair in advance for electronic submission instructions.

So, the *call for papers* genre coordinates activities of submitting manuscripts and questions and answers in terms of media and its address.

One of the form features of a genre is its typical medium, which allows for different means of moving the information to the right place. For example, much of the information required is able to be sent electronically, either by email or form entry. However, at the HICSS site, one cannot input data via a web page on the *hotel registration form* genre, which requires the participant to print it out, write information by pen, and send it via fax. If the genre is changed or elaborated to allow the use of CGI (Common Gateway Interface) format, the elaborated form of genre can coordinate registration processes between participants and a hotel electronically. However, though the *hotel registration form* genre as it exists retains input data on sender's side, the elaborated online form genre itself cannot retain input data automatically, and the sender needs additional processes for retaining his or her registration data. In order to confirm the data, the hotel staff can use an email version of the notification genre. A genre system elaborated from the *paper submission* genre system could include a genre for manuscript submission via the web using CGI, also elaborating the genre by which reviewers request papers to review to electronically access the manuscript database. Looking at coordination needs to manage a 'fit' dependency using electronic genres will allow for there to be a check that ensures that each paper is reviewed by only one reviewer. As for sequence, the electronic database could also track status as each reviewer finishes the review. The mini-track chair could see all the review results and each reviewer could see only his or her review result

Genres ensure that information is in the right place or is able to be accessed appropriately.

5. Coordination model

In this section we look at the relationship between work processes and the genres used to coordinate information flow, in and sharing regarding the HICSS conference. This analysis yielded some insights and implications for further research.

We classified the genres elicited from the HICSS web pages and the coordination aspects of the genres using a Genre Taxonomy [22]. We also modeled the work processes related to the genres. This Genre Taxonomy is a section of the Process Handbook, and it represents the elements of both genres and genre systems in terms of purpose, contents, participants, timing of use, place of communicative action, and form including media, structuring devices and linguistic elements. The Genre Taxonomy includes both widely recognized genres and specific genres, and the genres elicited from the HICSS web pages were added as specific genres. In this section, we illustrate how each genre elicited in the 33rd HICSS web pages is represented in the Genre Taxonomy and how it related to other genres. Second, we illustrate how genre coordination shown in previous section is represented in the Genre Taxonomy. Then, we illustrate the relationship between work processes related to HICSS conference and genres as an example of the *conference paper submission*

genre system.

5.1. Classification of genres in the 33rd HICSS web pages

In order to represent purposes of genres, the Genre Taxonomy uses eight purpose categories such as ‘Inform,’ request, decide, and respond. A genre from a specific case study such as a genre in the 33rd HICSS genres is frequently a specialization of a widely recognized genre. For an example, the *general information* genre is a specialization of the *official announcement* genre. Figure 4 shows how genres in the 33rd HICSS web pages are categorized in the purpose categories. Each genre in the 33rd HICSS web pages is a specialization of a widely recognized genre such that *the general information* genre is a specialization of the *official announcement* genre. Note that the *call for papers* genre is a specialization of ‘Inform’ and ‘Request’ activities, because of its dual purposes to inform about track information and solicit papers.

The advantage of this categorization is that a specific specialization of a widely recognized genre will allow for easy consideration of similar genres.

Figure 5 shows the type of information the Process Handbook can show for the *call for paper* genre. As the description fields can include links to web pages, the content is represented using this function.

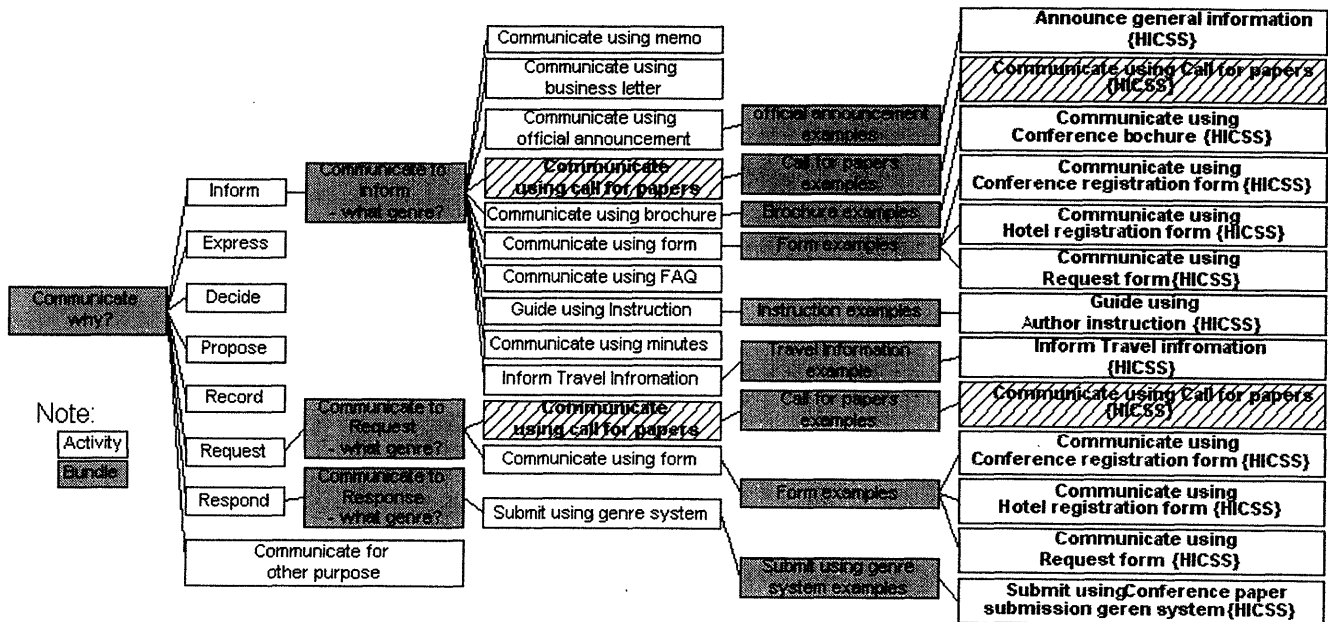


Figure 4. Genres in the 33rd HICSS web pages in purpose categories of the Genre Taxonomy

This activity is reserved to portray the genres of the 33rd HICSS web pages. The entries here were prepared by Takeshi Yoshioka, a visiting scientist from Fuji Xerox at CCS.

The *call for papers* genre is used primarily to Inform/Track and mini-track information, important date information and author instruction, and Request/Solicit conference papers.

This genre coordinates information using web frame structure. For an example, track-information is divided by a web page of each track.

See detail on the web pages of http://www.hicss.hawaii.edu/hicss_33/overview.pdf, [tutorials.htm](#), [lecture.htm](#), [plenary.htm](#), [advise.htm](#)

Figure 5. The description of the *call for papers* genre

5.2. Classification of genre coordination aspects

For representing genre coordination mechanisms, such as divisibility of information, we add activities named 'Manage information using genres,' 'Manage time using genres,' and 'Manage place using genres,' under the 'Coordinate using genres' activity. We also add coordination aspects in regards to information, time and place as an activity under each coordination activity, such that 'Manage information divisibility using genres' activity is under 'Manage place using genre' activity. Figure 6 shows an excerpt of the specialization hierarchy under the 'Coordinate Information using genres' activity.

In Figure 6, we show three types of coordination mechanisms that address three aspects of information as a resource: divisibility, concurrency and reusability. For example, there are two coordination mechanisms shown in this figure that address information reusability: 'Exchange Info using multiple genres with same content & different media' (with an example of the 'Communicate using web-based and paper-based brochure' activity), and 'Exchange same Info by multiple web-base genre' (with the 'Inform important date. on multiple genres {HICSS}' activity). The multiple genres in this example are the *call for papers* genre and the *general information* genre which both use the same dates.

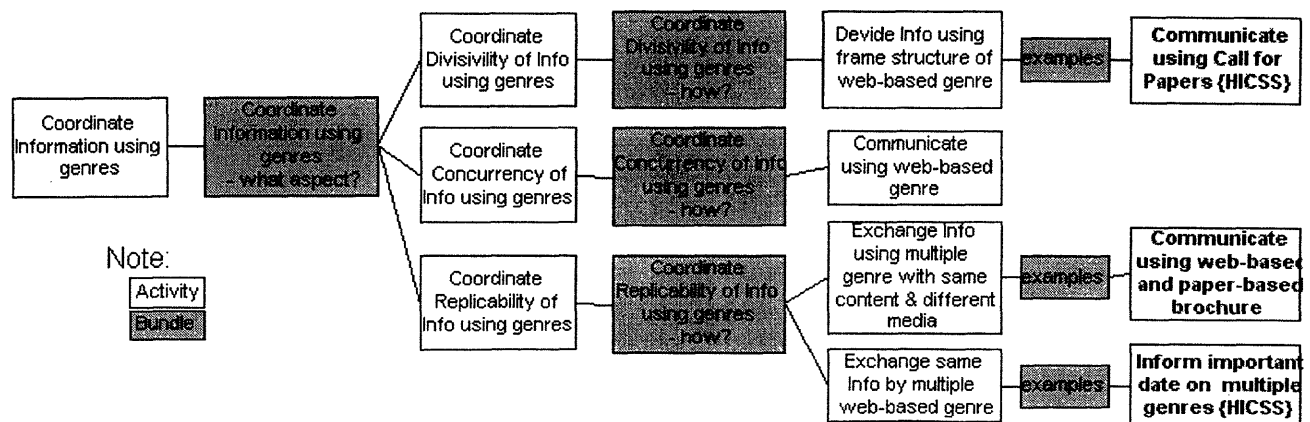


Figure 6. Model of coordination mechanisms using genres

5.3. Relationship between HICSS work processes and genres

There exists a strong relationship between work processes and communication, because communication is one of the important activities in and among organizations. As genres are reflections of socially recognized rules, norms and conventions, enactment of genres is a key for effective communication. As illustrated in Section 4, genres can provide coordination at various points in a work process. In this subsection, we use the model of the relationship above to illustrate how it can be used for innovation of new coordination mechanisms using genres.

The *conference paper submission* genre system portrayed in Section 4 is a good example to illustrate the relationship, because track and mini-track chairs, authors and the conference staff must coordinate how to divide information about track and mini-tracks, timing of paper due dates, and place of paper submission. In that section we showed how the participants could use coordination theory and the knowledge repository to come up with better approaches such as using an electronic database for processing conference papers. Now we will show a model of these approaches.

For modeling the relationship between work processes and genres, we use dependency graphs in the Process Handbook, which represents how each activity relates to resources using dependencies in a diagram similar to a resource flow diagram. Figure 7 is the dependency graph of the *conference paper submission* genre system. It shows the sequence of the genre system, which includes the call for papers genre, the author instruction genre, paper review genre system, and the request form genre with work processes such as writing a paper and submitting a paper. The dependency named 'Info of important date' is shared by many activities such as the 'Submit full paper' activity, and the 'Decide to Accept or Reject Paper using Paper Review genre system {HICSS}' activity where the due date of paper reviewer must be

before the notification date of paper acceptance. As illustrated above, when a dependency graph shows that many activities share information in a genre, the genre coordinates information widely. In other words, if coordination for sharing information is designed using widely recognized communicative actions, it becomes easier for the users to enact the work processes using genres to coordinate their work processes. To manage widely used information, senders can use a coordination mechanism that reuses information, as shown in Figure 6. This might lead the chair to ask mini-chairs to replicate and include the author instruction on each mini-track guide. Using coordination analysis also helps identify when the resource input into an activity is the same as the output except for time and place. This might lead the person in charge of the design of the work processes to have the resource directly sent to multiple activities as with authors submitting directly to paper reviewers as illustrated in Section 4.5.

6. Implications for research and practice

In this paper, we illustrated how genres coordinate information and the aspects of genres as coordination mechanisms. We turn now to some of the implications for research and practices emerged from this study.

Web-based genres work together as a group. It is useful for researchers to model relationships among genres with work processes using a dependency diagram (or resource flow graph) such as in the Process Handbook, to make explicit the information flow among genres.

Since web-based genres can change contents and form easily due to characteristics of digital document and the Internet media, researchers need to observe genre chronological changes carefully. In our example above, we showed how changes to time sensitive information could confuse the person submitting a paper.

One of the coordination mechanisms to reduce the

chance for users to be confused is to segregate the time sensitive data from static data and clearly identify when a form or web page has changed. For example, instead of providing a connection to other media such as e-mail and phone communication, allow alternative communication methods on the web pages such as bulletin boards or chat spaces. These allow for changing the appropriate contact frequency and manner in the process with least disruption.

When users face collaborative work processes in and across organizations, there are many and various communicative actions among work processes. The Genre Taxonomy has a benefit in allowing users to improve communication methods by looking at the roles genres play for coordinating information, review the various examples and find similar cases of communicative actions. Especially in the case of intercultural communications, users may find it difficult to understand why they cannot communicate well or coordinate work process. In order to get ideas for improving their communication, we suggest that they consider a repository such as the Genre Taxonomy to find similar genres to their case. Web page designers and system designers also can gain benefits from the Genre Taxonomy. In order for target users to be able to communicate, it is useful to model their existing genres, understand social contexts around them, and then apply them to the system. For example, when members of a community communicate formally using an *official announcement* genre and there is a strong hierarchy, the designers might also consider introducing a chat system in the community. The model could also provide a clue for designers to understand what rules or norms work counter to the genres which the designers wants to introduce through comparison of successful cases and failure cases. It is worth noting that though designers anticipate that the target users enact the genres that the designers expect, the target users might enact another genre, which will undercut or deny the chosen genre.

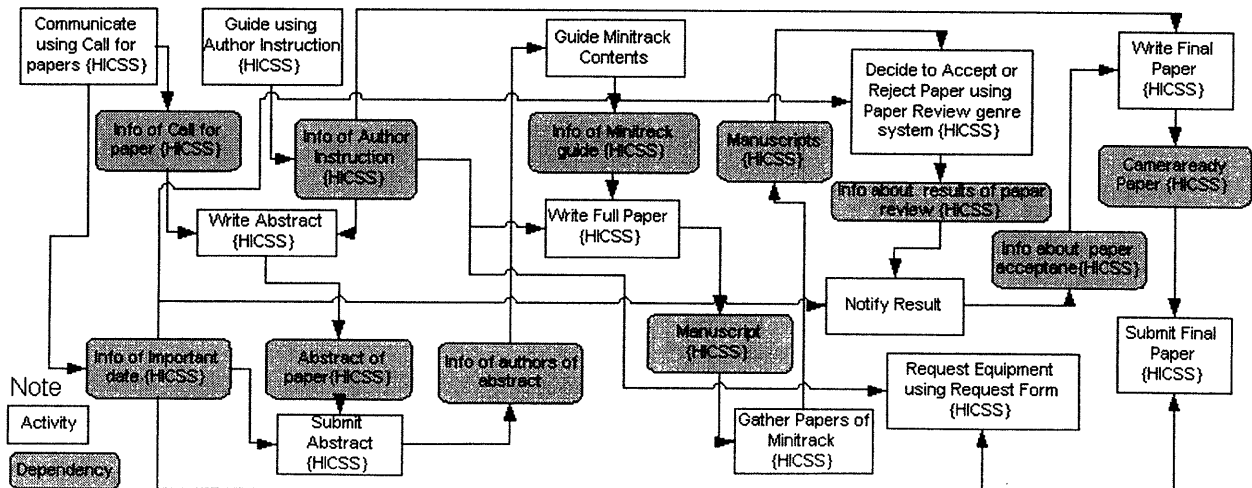


Figure 7. The Dependency diagram of the *Conference Paper Submission* genre system

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8. References

- [1] Bakhtin, M. M. "Speech Genres and Other Late Essays," (V.W. McGee, Trans.; C Emerson and M. Holquist, Eds.) University of Texas Press, Austin, 1986.
- [2] Bazerman, C. "Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science," The University of Wisconsin Press, Madison WI, 1988.
- [3] Bazerman, C. "Systems of Genres and the Enactment of Social Intentions," In A. Freedman A. and P. Medway (eds.), *Genre and the New Rhetoric*. Taylor & Francis Ltd., pp. 79-101, London, 1994.
- [4] Berkenkotter, C. and Huckin, T. N. "Genre Knowledge in Disciplinary Communication: Cognition / Culture / Power," Lawrence Erlbaum Associates, NJ, 1995.
- [5] Brown, J. S, "Borderline Issues: Social and Material Aspects of Design," *HUMAN-COMPUTER INTERACTIONS*, 9, pp. 3-36, 1994.
- [6] Brown, J. S, and Duguid, P. "The Social Life of Document," *Release 1.0*, EDventure Holdings Inc., pp. 1-18, New York, NY, Available at <http://www.parc.xerox.com/ops/members/brown/papers/sociallif.html>, 1995.
- [7] Crowston K. and Williams, M. "Reproduced and emergent genres of communication on the World-Wide Web," In *Proceedings of the 30th HICSS*, (Hawaii: January), 1997.
- [8] Crowston K. and Williams, M. "The Effects of Linking of Web Documents," In *Proceedings of the 32nd HICSS*, (Hawaii: January), 1999.
- [9] Erickson, T. "Making Sense of Computer-Mediated Communication (CMC): Conversation as Genres, CMC Systems as Genre Ecologies," In *Proceedings of the 33rd HICSS*, (Hawaii: January), 2000.
- [10] Erickson, T. "Rhyme and Punishment: The Creation and Enforcement of Conventions in an On-Line Participatory Limerick Genre," in *Proceedings of the 32nd HICSS* (Hawaii, January 1999), IEEE Press.
- [11] Malone, T.W. et al. "Tools for inventing organizations: Toward a handbook of organizational process," *Management Science*, 45, pp. 425-443, 1999.
- [12] Malone, T.W. and Crowston, K. "The interdisciplinary study of coordination," *ACM Computing Surveys*, 16 (1), 1994.
- [13] Miller, C. R. "Genre as Social Action," *Quarterly Journal of Speech*, 70, pp. 151-167.
- [14] Orlikowski, W. J. and Yates, J. "Genre Repertoire: Examining the Structuring of Communicative Practices in Organizations," *Administrative Science Quarterly*, 39, pp. 541-574, 1994.
- [15] Orlikowski, W. J. and Yates, J. "Genre Systems as Communicative Norms for Structuring Interaction in Groupware," *CCS WP205*, Available at <http://ccs.mit.edu/papers/CCSWP205/>, 1998.
- [16] Osborn, C. S. "Documents and Dependencies: Enabling Strategic Improvement through Coordination Redesign" in Wakayama, T. et al. (ed.) *Information and Process Integration in Enterprises: Rethinking Documents*, pp. 31- 54 Kluwer Academic Publishers, MA 1996.
- [17] Shepherd, M. and Watters, C. "The Functionality Attribute of Cybergenres," in *Proceedings of the 32nd HICSS*, (Hawaii: January), 1999.
- [18] Yates, S. J. and Sammar, T. R. "Digital Genres and the New Burden of Fixity," in *Proceedings of the 30th HICSS*, (Hawaii: January), 1997.
- [19] Yates, J. and Orlikowski, W. J. "Genres of Organizational Communication: A Structural Approach to Studying Communication and Media," *Academy of Management Review*, 17, pp. 299-326, 1992.
- [20] Yates, J., Orlikowski, W. J. and Rennecker, J. "Collaborative Genres for Collaboration: Genre Systems in Digital Media," in *Proceedings of the 30th Hawaii International Conference on System Sciences*, (Hawaii: January), 1997.
- [21] Yates, J. and Orlikowski, W. J. "Genre Systems: Chronos and Kairos in Communicative Interaction," Unpublished paper presented at the *Second International Symposium on Genre* (Vancouver, Canada: December), 1997.
- [22] Yoshioka, T. and Herman, G. "Genre Taxonomy: A Knowledge Repository of Communicative Action," *CCS WP209*, Available at <http://ccs.mit.edu/wp209.pdf>, 1999.
- [23] HICSS 33 web page, Available at http://www.hicss.hawaii.edu/hicss_33/apahome3.htm
- [24] Internet Software Consortium "Internet Domain Survey," Available at <http://www.isc.org/ds>, 2000
- [25] The MIT Process Handbook Project, Available at: <http://ccs.mit.edu/ph>
- [26] MIT Center for Coordination Science home page, Available at: <http://ccs.mit.edu>