Using Information Composition to Represent Connections Among Events Across Time and Place

Rhema Linder
Interface Ecology Lab
Texas A&M University
College Station, Texas
rhema@ecologylab.net

Andruid Kerne
Interface Ecology Lab
Texas A&M University
College Station, Texas
andruid@ecologylab.net

CHI'12, May 5–10, 2012, Austin, Texas, USA.

Abstract
We present information composition as a medium for reflecting on events across space and time, combining social media and personal interpretive annotation. Social media sites contain a wealth of information rich in quality, but they are often information islands. Aggregating these experiences tempered with metadata and personal annotation enables readers to reflect on events from personal and cultural perspectives. We present Gulf Coast hurricanes Katrina, Rita, and Ike as an aggregate of personal impressions from Flickr, using an information composition to curate heritage memory.

Author Keywords
information composition; reflection-in-action; distributed experience; social media

ACM Classification Keywords
H.5.m [Information interfaces and presentation (e.g., HCI)]: Miscellaneous.

Introduction
Technologies play a fundamental role in the sociotechnical construction of individual and collective memory [12]. Collecting individual impressions is easy, but connecting impressions across time and place to understand and build complex mental models of important, personal, and

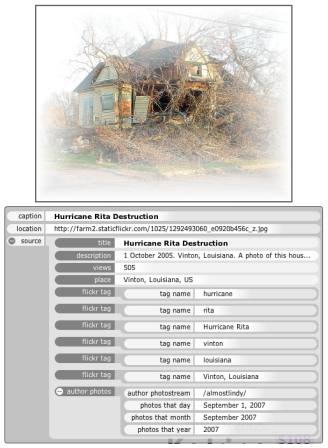

Figure 1: Extracted metadata of a Flickr photo containing useful links and structured information revealed in context over the clipping, showing metadata details on demand.

cultural perspectives is less directly supported. Natural disasters are historically and personally important [8] events that, in modern times, are recorded in social media as disconnected individual experiences.

Finding relationships and common occurrences between events is a scientific and human endeavor. Bergson explains humans as starting in an infant state, neither self-aware nor aware of external surroundings, except for a stream of images constituting sensory input that remains disassociated and useless until he or she can learn to remember and perceive [4].

We, as people living in the most recorded world, can peer into the experiences of many people who leave impressions about themselves in social media. This, in itself, gives us an ability to possess more sensory data than we can use, but does not increase our ability to perceive more about cultural memories. Information composition is a medium that affords aggregating these impressions from social media.

Information Composition

Information composition is a lightly constrained medium influenced by design and art for representing things and ideas using an expressive spatial arrangement and compositing of image and text clippings with rich metadata. Each clipping is a conjunction of visual representation and metadata linkback. Manipulating each clipping's scale, compositing level, color, and position into an aggregate enables an author to represent complex relationships about things and ideas implicitly and explicitly [6, 13]. As a whole, it affords big picture ideation and reflection; constituent clippings function indexically, visualizing metadata when brushed over with the mouse (*see Figure 1*) and functioning as hyperlinks to their source documents. The whole is greater than the sum of its parts, yet, at the same time, includes all of its parts.

We created a tool for authoring information compositions called InfoComposer. *InfoComposer* is an open source creativity support tool that helps users ideate, collect, and reflect on things and ideas [2]. Users can use InfoComposer to collect text and images from a browser though drag and drop, which automatically extracts source specific (e.g. Flickr, Wikipedia, ACM) metadata [7] from the source of clippings, presenting a visualization of the structured metadata as a user on brushes over it with the cursor.

Suppose Kara creates an information composition. She starts with an empty composition space where she drags in clippings from a web browser and authors personal annotations. She starts with some preconceived notions about the themes, information sources, and end product she wants to create. While collecting information, she reflects on the metadata, nature, and quality of the clippings in her composition. She gathers similar clippings into groups and juxtaposes clippings to show contrast. She manipulates clippings, adds annotations, and thinks about how her actions interact with what her composition means as a whole. Moving her mouse over a clipping instantly reveals its metadata, showing the source of the clipping and related documents (see *Figure 1*). Shifting her actions and attention cyclicly between ideation, design, exploration, and reflection helps Kara create and formulate a narrative of her own thoughts. As she manipulates her clippings and annotations into an understandable cohesive whole, she produces two products: the *formulation and framing of her thought* and also the *product of the information composition* itself.

This iterative and reflective design and thought process

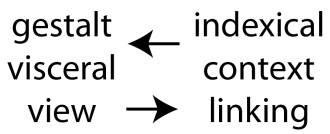

Figure 2: As a whole, the information composition medium affords visceral big picture ideation; each constituent clipping contains indexical information available though in context metadata details on demand.

exemplifies Schön calls Reflection-in-Action [10]. Each localized action that the person performs has an effect on the composition as a whole, potentially changing themes or transferring emphasis and narrative. Repeating this process constitutes a conversation with the situation and materials. Schön argues that making progress in a design begins with first naming problems (in our case themes), and then framing the context to solve them (in our case supporting documents and the clippings that represent them) [10]. Nakakoli et al. designed and tested ART, a lightly constrained two dimensional externalization for design, finding that it reduced cognitive load and facilitated reflecting on design and themes in writing tasks [9]. In contrast to ART, InfoComposer can be used to both ideate with a fluid thinking structure and produce a visually appealing, rich in metadata, final product. Tuan describes seeing as a creative process that requires a person to organize stimuli into *"flowing structures that provide signs meaningful to the purposeful organism"* [11]. The mind's eye naturally visualizes relationships between things in flowing mental structures. During authoring, InfoComposer affords creating flowing structures while reflecting-in-action. The structures that the author uses for continuous feedback are the same that a reader can use when viewing an information composition.

The form of a gestalt and visceral composition serves as a kind of map of thoughts. Turnbull finds all maps to be at least partially indexical: needing human contextual information to be considered true [3]. The metadata bound to clippings in a composition provides indexical function. In maps, humans select and interpret information to present meaningful ideas, focusing attention, and memory. By both explicitly and implicitly connecting elements, the information composition author provides the reader with an environment of stimuli for forming opinions and understandings, supporting creative seeing and exploration of the parts and whole.

Events as Collective Experiences

As social networks grow in size and content, individual impressions of experiences will continue to be created, indexed, archived, and, perhaps, revisited [12]. The connections modeled through social media are imperfect binary representations of complex relationships neither as dynamic nor as qualitative as reality.

Bergson addresses the problem of understanding the relationship between the inner and the outer by describing human experience as sensory input understood by memory. A person's ability to perceive is tightly coupled with his or her ability to remember. Infants lack the ability to understand sensory input [4] until they have repeated exposure to sensation which they use to form mental models of self and the meaning of sensory input.

The relationship between social media observation and events is like the relationship between our minds and the world as observed by our central nervous system. Our nerves send information to our brains about the world, and from infancy we gradually build an understanding about our own body and the world. At first, only rough, non-localized understandings of sensation are all that we accomplish as infants. In the same way, unstructured collections of social media can have too little signal buried under too much noise. However, even with a personalized and focused social media signal, lack of organization and contextualization of the media yields diminished perceptible meaning. Events experienced through multiple people and view points are best represented when contextualized for meaning and juxtaposed with multiple related, aligned, and oppositional impressions.

Figure 3: A selection of photos taken the same day by the same author of *Hurricane Rita Destruction*[5] found by clicking "photos that day" on extracted metadata.

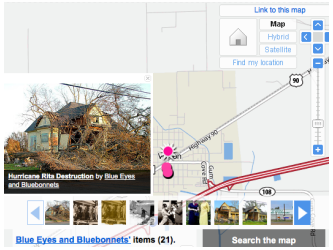

Figure 4: The location of *Hurricane Rita Destruction* found by clicking "place" on extracted metadata.

One can choose to view social media as a stream of experiences from individual viewpoints. Each of these viewpoints and contexts provide a signal. Social media impressions are particularly situated because each impression is typically tied to an individual's general online presence. Comments from friends, strangers, and groups attached to an impression enhance its social context.

Information composition is suitable for representing collections of individual experiences from social media. An information composition is less rigid and linear than a traditional narrative, but more of an aggregate and story than lists of social media impressions. Information compositions contain rich metadata on clippings, which cannot be represented by an image alone. Information composition affords the reflective exploration and representation for curation and understanding of events across space and time while allowing authors to build visualized mental models and personalized annotations.

Use Case: Gulf Coast Hurricanes

In *Figure 5*, we depict Katrina, Rita, and Ike with an information composition of individual impressions from Flickr[1]. While these hurricanes occurred in different times and places, they are similar events. Note that three tendrils, one for each hurricane, extend from the central image: a photograph of a Hurricane from space. Each tendril is separated by whitespace, connecting to the image of a hurricane in the middle. We implicitly signify the connectedness of similar damage effects and social reactions while acknowledging that each hurricane occurred separately. The circular and dynamic structure of the whole hints at the destructive force of hurricanes and softens chronological ordering.

We authored multiple layers to afford focused comparison to readers of this information composition. The reader is invited to compare and study tendril to tendril, a clipping within a tendril to that same tendril, and any other combination of aggregate and individual clipping. While times and places are heterogeneous, the clippings here share a common theme of hurricane disaster in the Gulf Coast area. We see the same story of waiting, a storm, a flood, left over disaster, and clean up efforts juxtaposed as similar events. *Shared experience*, *community*, and *cleanup* are layered together across each hurricane to implicitly state that disaster can bring people together through need. The individuals who took the photos and posted them on Flickr probably do not know each other personally, but they have a shared experience of hurricane disaster: a heritage memory.

Viewing this work lets one view the rich, structured metadata juxtaposed in context as the mouse brushes over a clipping, affording the exploration of personal context for each impression and related information. For example, the image *Hurricane Rita Destruction* has a geographical "place" link, which allows one to see other photos taken in that location (see *Figures 3 and 4*). Metadata fields often contain links to relevant web pages that include related information: the authors page, photos taken by that author that day, month, or year, and groups or sets that that picture belongs to.

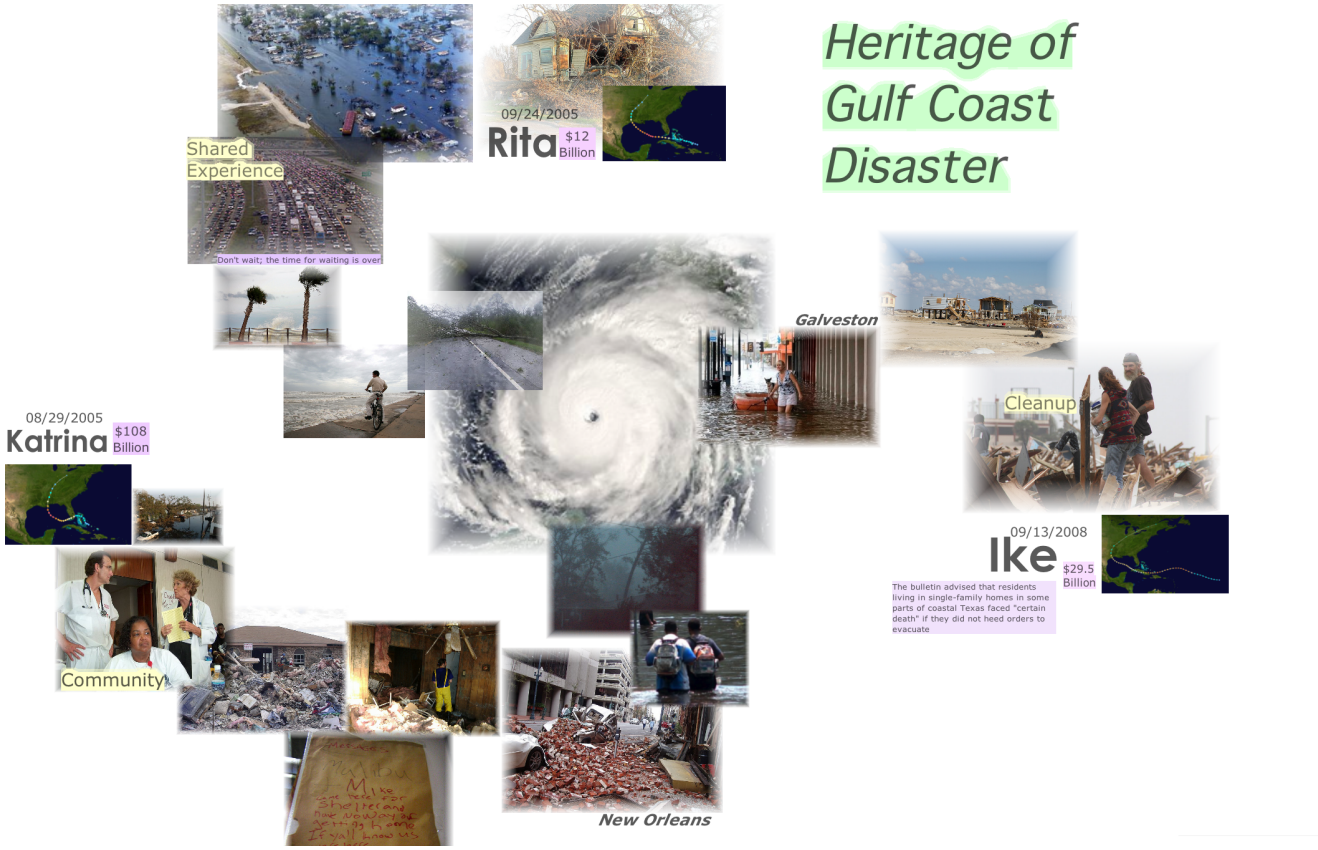

Figure 5: We present *Heritage of Gulf Coast Disaster* as an information composition as an example of representing heritage of events across space and time as experiential aggregates from multiple perspectives. To see metadata and sources for the individual clippings, please go to http://students.cs.tamu.edu/rhema/compositions/gulf.html.

Conclusion

Social media is a new sense. The information it conveys is true to the same degree that one's central nervous system conveys true information. Information composition affords comparison and contextualization needed to align, represent, and reflect on related events across time and place. The information composition medium supports reflection during authoring and viewing processes, helping users develop perspectives of heritage memories.

References

[1] Flickr - Photo Sharing. http://www.flickr.com.

[2] Info Composer Website. http://www.ecologylab.net/infocomposer.

[3] Turnbull, David, and Watson-Verran, Helen, and Deakin University. *Maps are territories, science is an atlas : a portfolio of exhibits / David Turnbull ; with a contribution by Helen Watson with the Yolngu community at Yirrkala*. Deakin University : distributed by Deakin University Press, Geelong, Vic. :, 1989.

[4] H. Bergson. *Matter and Memory*. Swan Sonnenschein, London, 1911.

[5] B. Eyes and Bluebonnets. Hurricane Rita Destruction. http://www.flickr.com/photos/almostlindy/1292493060/.

[6] A. Kerne, E. Koh, S. M. Smith, A. Webb, and B. Dworaczyk. combinformation: Mixed-initiative composition of image and text surrogates promotes information discovery. *ACM Trans. Inf. Syst.*, 27:5:1–5:45, December 2008.

[7] A. Kerne, Y. Qu, A. M. Webb, S. Damaraju, N. Lupfer, and A. Mathur. Meta-metadata: a metadata semantics language for collection representation applications. In *Proceedings of the 19th ACM international conference on Information and knowledge management*, CIKM '10, pages 1129–1138, New York, NY, USA, 2010. ACM.

[8] S. B. Liu. Grassroots heritage in the crisis context: a social media probes approach to studying heritage in a participatory age. In *Proceedings of the 28th of the international conference extended abstracts on Human factors in computing systems*, CHI EA '10, pages 2975–2978, New York, NY, USA, 2010. ACM.

[9] K. Nakakoji, Y. Yamamoto, S. Takada, and B. N. Reeves. Two-dimensional spatial positioning as a means for reflection in design. In *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*, DIS '00, pages 145–154, New York, NY, USA, 2000. ACM.

[10] D. A. Schön. *The Reflective Practitioner: How Professionals Think In Action*. Basic Books, 1 edition, Sept. 1984.

[11] Y.-f. Tuan. *Space and place : the perspective of experience / Yi-Fu Tuan*. University of Minnesota Press, Minneapolis :, 1977.

[12] N. Van House and E. F. Churchill. Technologies of memory: Key issues and critical perspectives. *Memory Studies*, 1(3):295–310, Sept. 2008.

[13] A. M. Webb and A. Kerne. Integrating implicit structure visualization with authoring promotes ideation. In *Proceedings of the 11th annual international ACM/IEEE joint conference on Digital libraries*, JCDL '11, pages 203–212, New York, NY, USA, 2011. ACM.