

# Proposed Facets of a Serendipitous Digital Environment

**Lori McCay-Peet**  
Dalhousie University  
Halifax, Nova Scotia, Canada  
[mccay@dal.ca](mailto:mccay@dal.ca)

**Elaine G. Toms**  
University of Sheffield  
Sheffield, United Kingdom  
[e.toms@sheffield.ac.uk](mailto:e.toms@sheffield.ac.uk)

---

## Abstract

Serendipity is broadly defined as an unexpected and valuable experience prompted by an individual's interactions with ideas, information, objects, and phenomena; in digital worlds the challenge to date has been developing environments capable of facilitating serendipity. In this poster we present the early stages of the development of a means to measure whether digital environments such as social media sites and digital libraries have the potential to facilitate serendipity. Drawing from prior research and the initial results of an expert review, we outline the preliminary facets of a serendipitous digital environment (SDE) that will be used to develop a scalar instrument. This research will provide both a source for design elements to guide the development of digital environments that support serendipity and a tool for developers and researchers to assess the serendipitous nature of digital environments.

*Keywords:* human-computer interaction, serendipity, scale development, evaluation

---

## Introduction

Serendipity provides enjoyment and wonder as well as interesting new directions and revelations for individuals that reverberate in their work and personal lives (McCay-Peet & Toms, forthcoming). Serendipity is often defined using terms such as unexpected, accident, chance, and luck and is used to denote: 1) a faculty or aptitude; or 2) a phenomenon or event (Merton & Barber, 2004). We define serendipity as *an unexpected experience prompted by an individual's valuable interaction with ideas, information, objects or phenomena*. Based on this definition, information-rich, hyperlinked environments appear ideal for serendipitous experience. While some support this positive perspective (Thurman & Schifferes, 2012), others have expressed concern that the personalization of web content narrows the diversity of information and ideas we encounter (Zuckerman, 2011). These differing viewpoints underscore that digital environments are not neutral. A search engine designed for accuracy, for example, may not provide an environment as conducive to serendipity as a system that supports browsing, or makes semi-relevant results visible to the user.

But how can we ascertain how well specific digital environments support serendipity? While researchers could simply ask users, for example, "Does this social media site facilitate serendipity?", a single question is insufficient to capture a multi-dimensional phenomenon (DeVellis, 2003). The approach we take is the development of a scale that assesses whether the environment has the critical elements to facilitate serendipity. Applying this well-documented approach (see DeVellis; MacKenzie, Podsakoff, & Podsakoff, 2011) the following initial steps were taken

---

Acknowledgements: Special thanks to the international set of researchers who participated in the expert review to date: Lennart Björneborn, Jannica Heinström, Stephann Makri, and Borchuluun Yadamsuren. Initial research was supported by grants to Toms from SSHRC, CFI, and the Canada Research Chairs Program while she was at Dalhousie University, Halifax, Nova Scotia, Canada and the work continues to be supported by a NCE GRAND project. McCay-Peet was awarded a SSHRC Doctoral Scholarship to support the research.

McCay-Peet, L., & Toms, E.G. (2013). Proposed facets of a serendipitous digital environment. *iConference 2013 Proceedings* (pp. 688-691). doi:10.9776/13318

Copyright is held by the author/owner(s).

1. explore features of the environment that research suggests are associated with serendipity;
2. examine features through a *digital lens*, identifying facets of a serendipitous digital environment (SDE);
3. develop multiple items for a scalar questionnaire that captures the conceptual space of a SDE; and
4. assess the content validity of the facets and items.

### Prior Research

Prior research suggests that some people may be more likely to experience *information encountering* than others (Erdelez, 1999) and personality traits such as extraversion may influence how often individuals experience *incidental information acquisition* (Heinström, 2006). Likewise, some environments, such as *information grounds*, are conducive to *opportunistic discovery of information* (Pálsdóttir, 2011). Björneborn identified ten *serendipity dimensions*, or features of the physical library space that prompt divergent behaviour; for example, unhampered access, diversity, and explorability. Based on Björneborn's dimensions, a preliminary scale was developed to explore these dimensions in a digital environment (McCay-Peet & Toms, 2011). Participants (N=123) browsed an experimental information system and responded to a 20-item scalar questionnaire. Five factors that characterized a SDE were identified through exploratory factor analysis: *enabled connections*, *introduced the unexpected*, *presented variety*, *triggered divergence*, and *induced curiosity*. As these findings were based solely on Björneborn's research in one physical setting, that work needed to be replicated for digital environments, and validated. We undertook to do that assessment and the following section explores the characteristics of a potentially serendipitous digital environment. This is the first stage of the scale development process – the conceptualization of the construct (MacKenzie, et al, 2011).

### Conceptualization of the Construct

What makes one environment more likely to facilitate serendipity than another? In semi-structured interviews with 12 professionals and academics, we extracted 15 examples of work-related serendipity (McCay-Peet & Toms, forthcoming). We found that the conceptual space of a serendipitous environment is marked by the presentation of its content as well as the content itself. These findings, together with findings from prior research suggest five potential facets of a SDE

1. **Enables exploration:** A user's assessment of the degree to which a digital environment supports the unimpeded examination of its information, ideas or resources (e.g., McCay-Peet & Toms, forthcoming; Björneborn, 2008).
2. **Trigger-rich:** A user's assessment of the degree to which a digital environment is filled with a variety of information, ideas, or resources interesting and useful to the user (e.g., McCay-Peet & Toms, forthcoming; Björneborn, 2008; Sun, Sharples, & Makri, 2011).
3. **Enables connections:** A user's assessment of the degree to which a digital environment exposes them to combinations of information, ideas, or resources that make relationships between topics apparent. (e.g., McCay-Peet & Toms, forthcoming; Björneborn, 2008; Sun, Sharples, & Makri, 2011).
4. **Highlights triggers:** A user's assessment of the degree to which a digital environment actively points to or alerts users to interesting and useful information, ideas, or resources using visual, auditory, or tactile cues. (e.g., McCay-Peet & Toms, forthcoming; Björneborn, 2008; Campos, & Figueiredo, 2002; Rubin, Burkell, & Quan-Haase, 2011).
5. **Leads to the unexpected:** A user's assessment of the degree to which a digital environment provides fertile ground for unanticipated or surprising interactions with information, ideas, or resources. (e.g., McCay-Peet & Toms, forthcoming; Björneborn, 2008; Rubin, Burkell, & Quan-Haase, 2011).

With the initial conceptualization of the construct of a SDE complete, this study's focus is currently on the development of a measure of a SDE.

## Development of a Measure of a SDE

Based on the proposed five facets of a SDE, items that can be used to assess the “serendipitousness” of a digital environment were developed using a deductive approach (Hinkin, 1998); the definition of each of the facets guided the generation of their respective items. Rules for scale item development were followed, e.g., keep language clear and simple (DeVellis, 2003). For example, the following item was generated from the *Enables exploration* facet definition: “[The digital environment] is easy to explore”. When administering this questionnaire, researchers will be able to replace “[the digital environment]” with the specific digital environment being tested. Participants would rate their level of agreement to these items on a 5-point agreement scale. For each facet, 7-10 items were developed, for a total of 43 statements.

An international set of researchers who have conducted research in the area of serendipity and related constructs were invited to participate in this review of the facets and items. The expert review (still in progress) is designed to improve the content validity of the SDE scale. Those who responded were emailed a questionnaire containing the facets and items. They were asked to respond to the following:

- 1) Are the facets sufficient, definitions clear, and do they adequately capture a SDE?
- 2) Are the items clear and capture the gist of the facet definitions? Can you suggest other items?

While careful attention is being paid to all responses, particular weight is being given when two or more experts make similar comments. The decision to accept or reject all suggestions will ultimately be that of the scale developers (DeVellis, 2003). To date, four experts have responded, with four more expected. Preliminary results suggest that the five facets are sufficient, though minor changes are being made to improve clarity. There are currently 35 items in the revised questionnaire, 7 items per facet, but more changes to the facets and items are anticipated based on incoming reviews.

## Conclusions and Future Work

We have presented the results of the preliminary stages of scale development in the creation of a tool to assess how well digital environments serendipity. This initial stage suggests that there are five facets of a SDE: 1) *Enables exploration*, 2) *Trigger-rich*, 3) *Enables connections*, 4) *Highlights triggers* and 5) *Leads to the unexpected*. Input from expert reviewers will strengthen the content validity of the scalar questionnaire. The next steps in the scale development process will include further assessment of validity and scale evaluation and refinement (MacKenzie, et al, 2011). Once completed, this tool will be of use to researchers and practitioners who endeavor to build or augment current digital environments or to assess the efficacy of existing environments for their “serendipitousness.”

## References

- Björneborn, L. (2008). Serendipity dimensions and users' information behaviour in the physical library interface. *Inform Res*, 13(4).
- Campos, J. A., & Figueiredo, A. D. (2002). *Programming for serendipity*. In the Proceedings of the 2002 AAAI Fall Symposium.
- DeVellis, R. F. (2003). *Scale Development: Theory and Applications*. Thousand Oaks, Calif.: Sage Publications.
- Erdelez, S. (1999). Information encountering: It's more than just bumping into information. *Bulletin of the American Society for Information Science*, 25(3), 25-29.
- Heinström, J. (2006). Psychological factors behind incidental information acquisition. *Libr Inform Sci Res*, 28(4), 579-594.
- Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods*, 1(1), 104-121.
- MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, 35(2), 293-334; A1-A5.

- 
- McCay Peet, L. and Toms, E. G. [forthcoming]. Investigating serendipity: Unbundling how and why it unfolds.
- McCay-Peet, L., & Toms, E. G. (2011). Measuring the dimensions of serendipity in digital environments. *Inform Res*, 16(3).
- Merton, R. K. & Barber, E. (2004). *The Travels and Adventures of Serendipity: A Study in Sociological Semantics and the Sociology of Science*. Princeton, N.J.: Princeton University Press.
- Pálsdóttir, Á. (2011). Opportunistic discovery of information by elderly Icelanders and their relatives. *Inform Res*, 16(3).
- Rubin, V. L., Burkell, J., & Quan-Haase, A. (2011). Facets of serendipity in everyday chance encounters: a grounded theory approach to blog analysis. *Inform Res*, 16(3).
- Sun, X., Sharples, S., & Makri, S. (2011). A user-centred mobile diary study approach to understanding serendipity in information research. *Inform Res*, 16(3).
- Thurman, N. and Schifferes, S. (2012). The future of personalization at news websites. *Journalism Studies*, 1-16.
- Zuckerman, E. (2011). *Desperately seeking serendipity*. Keynote presented at CHI 2011, Vancouver, BC, Canada, May 7-12, 2011. Retrieved from <http://www.ethanzuckerman.com/blog/2011/05/12/chi-keynote-desperately-seeking-serendipity>