

## **Increasing Quality of User-generated Content: Design Theory, Instantiation and Evaluation**

### **SUMMARY**

#### ***Need***

User-generated content (UGC) (e.g., social media, crowdsourcing) expands the scope of information available to organizations to support decision making in many domains, including business, science, health and governance. However, information quality (IQ) is a critical challenge for UGC. Our project was motivated by an IQ dilemma in an ecology-based citizen science project NLNature ([www.nlnature.com](http://www.nlnature.com)): scientists require highly granular (species level) identification, which most potential contributors are unable to provide. Our goal was to improve the accuracy and completeness of information collected in the project by designing data collection based on an information contributor, rather than the traditional information consumer, perspective.

#### ***Iterative Design-Build-Validate-Evaluate Activities***

We identified the practice of capturing data in terms of fixed classes (species in an ecological context) as creating a mismatch between consumer requirements and contributor abilities. We conducted three laboratory experiments to validate this claim. Based on our findings, we proposed instance-based principles for modeling UGC and implemented them in a redesigned NL Nature. The artifact was iteratively evaluated in field and laboratory experiments.

#### ***Feasibility and Value of the IT System/Artefact***

NL Nature maps biodiversity using sightings of plants and animals provided by contributors for use in scientific research (e.g., monitoring of endangered species). We redesigned NL Nature to support instance-based data collection. We used field experimentation (randomly assigning users to traditional and the proposed instance-based versions) to evaluate the proposed principles. The results demonstrate that an IS designed based on the proposed principles results in higher IQ (accuracy and completeness) than an IS designed based on traditional class-based approaches.

#### ***Design Science Insights and Contributions to Information Systems and Beyond***

Following theoretical-conceptual development and evaluation, we established design guidelines for practitioners to follow when developing IS that harness UGC. As many UGC applications occur in the domains of marketing, healthcare, science, and public policy, this work exports IS theories beyond the IS domain. The project has generated discoveries in biology.<sup>1</sup>

This research is the first to investigate the relationship between conceptual modeling, information systems design, and information quality and to consider IQ as an outcome of conceptual modeling decisions.

The methodological challenges of instantiating design principles into concrete systems during the project led to the introduction of two novel IS design science concepts: “design theory indeterminacy” (currently under review at *Management Information Systems Quarterly*) and “instantiation validity” (pending submission to *Management Information Systems Quarterly*).

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<sup>1</sup> Fielden, Miles A., et al. "Aedes japonicus japonicus (Diptera: Culicidae) arrives at the most easterly point in North America." *Canadian Entomologist* (2015): 1-4.

### ***Authors' Affiliations***

The project is led and driven by university-based faculty and students.

### **SUPPORTING DOCUMENTS**

1. Parsons, J., Lukyanenko, R., and Wiersma, Y. (2011). Easier citizen science is better. *Nature*, 471 (7336), pp. 37-37.
2. Lukyanenko, R. and Parsons, J. (Under Review). Reconciling theories with design choices in design science research. Under review at *MIS Quarterly*.
3. Lukyanenko, R., Parsons, J., and Wiersma, Y. (2014). The IQ of the Crowd: Understanding and Improving Information Quality in Structured User-generated Content. *Information Systems Research*. 25 (4) pp. 669-689.
4. Lukyanenko, R. and Parsons J. (Under Review). Design Principles for Conceptual Modeling of User-generated Content. Under review at *Journal of the Association for Information Systems*. This paper codifies principles developed in our work "Implementing Lightweight Conceptual Modeling for User-Generated Content", which received the "Best Prototype" award at WITS 2013.
5. Lukyanenko, R., Parsons, J., and Wiersma, Y. (2014). The Impact of Conceptual Modeling on Dataset Completeness: A Field Experiment. *ICIS 2014. International Conference on Information Systems*, 19 pp. An extended version is being prepared for submission to *MISQ*.