Case Notes: Turning crowdsourced information into evidence trails for collection metadata

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***Abstract*—Crowdsourcing is becoming increasingly popular in the cultural heritage sector as a way to improve, complement and extend digital collections while at the same time engaging new audiences. A key problem, particularly in crowdsourcing efforts that ask participants to contribute complex information, is how that information can feed into the collection metadata without the risk of compromising professional standards. This paper discusses how the problem was addressed in the 10 Most Wanted project and linked to the recognition and attribution of volunteer contributions. It presents Case Notes as a mechanism for curators to credit contributors and validate contributions in an integrated process that results in a persistent evidence trail for newly discovered facts about collection items. The concept proved controversial in a small-scale formative evaluation, indicating that more research is needed on the aspect of integrating crowdsourced information with professionally curated collection metadata.**

Keywords—Crowdsourcing; collections; metadata; verification; validation; data quality; user-generated content

I. INTRODUCTION

Crowdsourcing is commonly understood as the practice of outsourcing work to a large number of individuals (the crowd) via the Internet [10]. Used extensively in natural science research projects under the name of "citizen science" [6], crowdsourcing is also becoming increasingly popular in the cultural heritage sector, where it usually has a strong secondary agenda in reaching new audiences and promoting public engagement with collections [7, 17].

A key advantage of crowdsourcing is that it combines audience engagement with the production of useful outcomes. In the context of cultural heritage, this can translate into sustainable models for maintaining and extending collections by delegating some aspects of curatorial research to members of the public. Oomen and Arroyo [14] identify six specific aspects where crowdsourcing can support the digital content lifecycle in museums, three of which focus on improving and complementing collection metadata.

As crowdsourcing initiatives typically involve unpaid volunteer work, they can offer an economically viable alternative for heritage organisations to improve their collections, while at the same time involving audiences in a more meaningful way and demonstrating their relevance to the community.

A potential downside of this approach is that the public usually lacks the expert knowledge and skills of professional curators. While it has been suggested that crowdsourcing can lead to solutions superior in quality and quantity to professional efforts [3], there are widespread concerns among professionals about data quality. Some of these concerns are highlighted in Alexandra Eveleigh's [8] discussion of participatory archives:

> *"User participation initiatives in archives are haunted by a fear that a contributor might be wrong, or that descriptive data might be pulled out of archival context, and that researchers using collaboratively authored resources might somehow swallow all of this without question or substantiation." [8]*

From a curator's perspective, data quality and verification are critical to avoid compromising quality standards for the collection as a whole. Introducing invalid data would not only impact on the collection's value as a research resource but also undermine the institution's authority, which is a distinguishing aspect particularly for heritage organisations [14].

Data quality is also important from the perspective of volunteers, who want to be reassured that the outputs of their efforts are useful and academically valid. It is important

therefore that projects are clear about their quality requirements and transparent about their quality assurance processes [7].

Many projects combine several different approaches to quality assurance depending on their specific needs. Eveleigh [8] describes this as a "*metadata-processing assembly line*" involving several steps in a "*hierarchical chain of command*" to arrive at valid high-quality data, with professional quality control usually as the final step in this process. In this model, quality control is not a separate process but instead is part of the overall workflow of collecting user-generated content and integrating it into professionally curated collection metadata.

This paper discusses how quality control was integrated into the process of crediting, validating and archiving volunteer contributions in the 10 Most Wanted project. 10 Most Wanted explores a game-based approach to encouraging and sustaining volunteer engagement in complex crowdsourcing. Unlike many previous crowdsourcing projects, which typically involve simple tasks like tagging images [1, 4, 13, 16, 20] or transcribing pieces of text [5, 18], participants in 10 Most Wanted take on complex, open-ended and collaborative tasks involving tracking down and verifying missing information about collection items, in particular plastic artefacts held by the Museum of Design in Plastics[1]. As this type of task requires sustained engagement, several quantitative and qualitative reward schemes are used to keep volunteers motivated. One qualitative reward is to credits contributors by name, which has been shown to be an effective motivator in crowdsourcing [12, 19]. As recognition and attribution increase a participant's reputation not only in the immediate context of the project but also outside via the publicly available 10 Most Wanted website, they are closely linked to diligence and data quality. Case Notes, which credit contributors and document validated findings in a persistent evidence trail for newly discovered facts about collection items, put to use this link between attribution and data quality in a transparent manner open to public scrutiny.

The following sections discuss the different approaches to improving data quality in crowdsourcing projects described in the literature, explain how Case Notes are integrated with the information-flow and with curators' facilitation practices in the 10 Most Wanted project, and report on a formative evaluation of the concept. The paper concludes with a brief outlook on future research directions.

II. Background

While data quality is often mentioned as a potential hurdle for the adoption of crowdsourcing mechanisms, project reports rarely discuss the problem in great detail. Many reports do, however, describe implementation details in crowdsourcing projects that are clearly aimed at reducing error rates, encouraging quality contributions and verifying submitted information in various ways.

Measures suggested in the literature to improve data quality in crowdsourcing projects can be broadly grouped into four approaches:

1. Make the task easier

   Holley [9] suggests that increasing the quality of the materials volunteers work with makes errors less likely. This is a specific form of the more general concept of making the task easier, which is a key idea at the root of crowdsourcing: breaking down complex problems into small, simple tasks that do not require any specialist knowledge.

2. Train and inform volunteers

   Cohn [6] suggests training volunteers in order to give them a better understanding of professional standards and practices. A more lightweight approach might be to just inform participants of the organisation's needs: Kidd [11] describes how citizen journalists during the Arab Spring met the requirements of broadcasters by using establishing shots to verify their positions and timings.

3. Crowdsource quality control

   Raddick et al. [15] describe how user-generated classifications of galaxies in the GalaxyZoo project are "*written into a database and compared with the findings of other volunteers*". This approach can also be made explicit: Brooklyn Museum's Freeze Tag game [2] involves players in the clean-up of user-generated tags created in another crowdsourcing game.

4. Professional quality control

   Eveleigh [8] points out that curators play the role of gatekeepers when user-generated content is integrated into collections. While professional quality control has led in some cases to allegations of censorship, most users accept the organisation's decisions as guided by professional expertise [8].

While the first approach, making the task easier, is problematic in 10 Most Wanted, where a key research question is whether crowdsourcing is an effective mechanism to outsource complex, open-ended curatorial tasks to the public, the project combines several of the other approaches discussed above to increase the quality of contributions and ensure that evidence for findings meets professional standards. It trains volunteers by providing guidance and research tips written by curators on where to look for information, how to reference materials and how to document personal testimonies. As part of its facilitation process it encourages participants on social media channels to critically assess and verify each other's findings. The main responsibility of quality control rests, however, with professional curators, who screen contributions on social media channels and piece together key information from validated contributions into an investigative narrative (case notes) that evidences newly discovered facts about an collection items.

The next section gives an overview of the information flow in 10 Most Wanted and discusses how Case Notes, besides providing a persistent evidence trail for findings, help to address a range of other aspects in the project.

[1] Museum of Design in Plastics http://modip.ac.uk

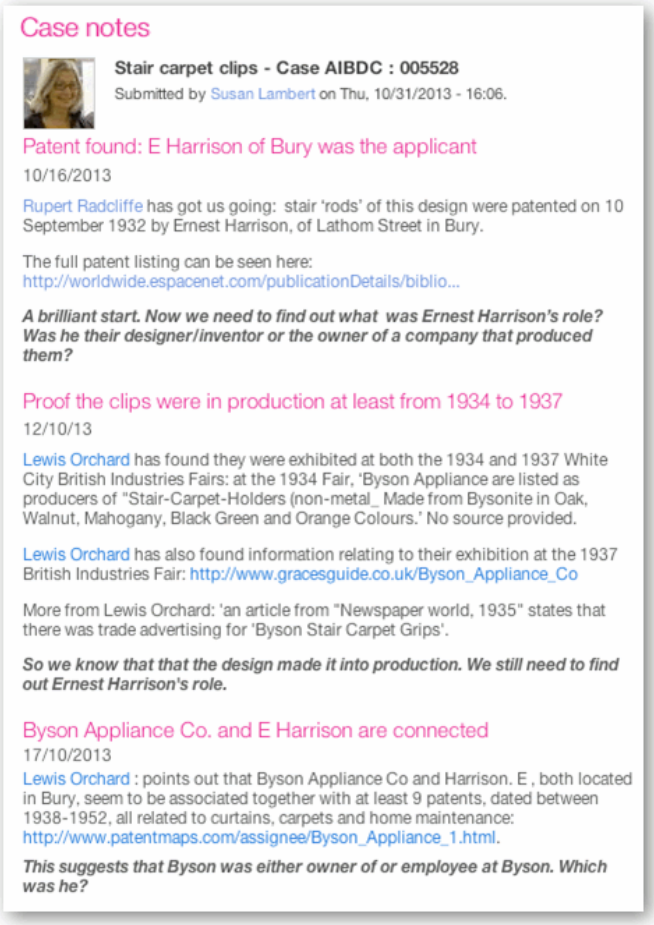

Fig. 1. Screenshot from the 10 Most Wanted website of Case Notes for an on-going investigation seeking to identify the designer and manufacturing dates for a specific kind of Art Deco stair clips. The Case Notes show the Case Officer (curator) facilitating the investigation and parts of the narrative documenting findings and crediting individual contributors

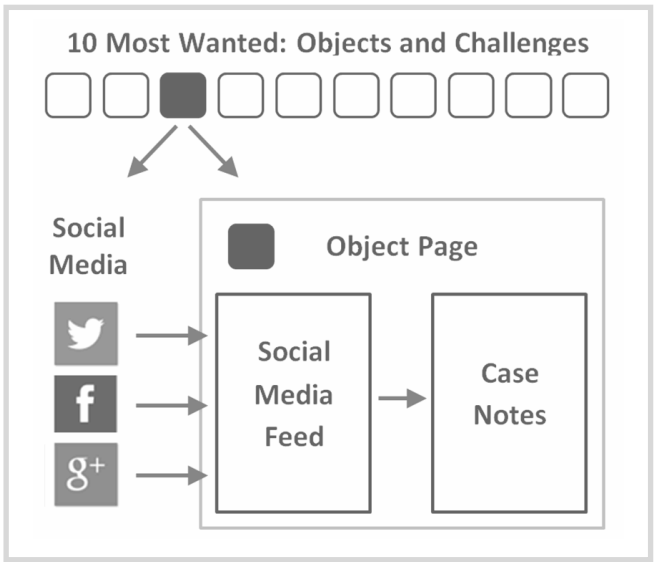

Fig. 2. Information flow from social media channels to curated case notes evidencing facts about collection items

III. Case Notes

Case Notes are presented on each object page on the 10 Most Wanted website (Fig. 1). Object pages explain what information is sought about an object, provide contact details for the Case Officer (curator) facilitating the search and show social media feeds covering the ongoing investigation for the object. Curators monitor these social media feeds and select key contributions for integration into the Case Notes presented next to the feeds on the same page, where they are attributed to the contributor and related to the aspect under investigation.

The information drawn together in Case Notes is the product of a complex process involving the advertisement of objects and related challenges (cases) on the 10 Most Wanted website, the promotion, investigation and eventual solution of cases taking part on the project's social network channels, and the aggregation and curation of contributions into persistent and publicly accessible evidence trails for discovered facts (Fig. 2).

Besides their overarching purpose to document and validate crowdsourced information for integration with professionally curated collection metadata, case notes address several other crowdsourcing related aspects in the project:

- They provide an up-to-date summary of the on-going investigation enabling participants to check for progress in specific cases without the need to search and connect individual social media posts on various channels, and they give visitors exploring the website and overview of the player activities and their results.
- They record key discoveries in the museum's own domain, reducing dependency on social networks and making the project less reliant on their data storage and access practices, which might change in the future.
- They summarise and validate evidence from volunteer contributions in a museum context by relating information to specific questions about collection items and constructing an objective narrative of findings.
- They provide a platform to publicly credit contributors for their work and thereby help to sustain motivation.

Case notes provide a well-defined check point where curators assess the quality of contributions and construct an investigative narrative to documents findings in a way that meets professional standards. They are archived in a Solved Cases section on the 10 Most Wanted website when all missing information about an object is found and can be linked to from the collection metadata in order to provide a publicly accessible evidence trail.

IV. Evaluation

Case notes have been used in 10 Most Wanted for over twelve months to date, evidencing a wide range of newly discovered facts about collection items in a total of 15 solved cases. The process of maintaining case notes is well integrated into the workflow of facilitating on-going investigations on social networks and meets the requirements of curators involved in the project.

The concept was formatively evaluated in a small-scale survey involving 11 cultural heritage professionals working with collections. The survey results show that while most respondents agree that 10 Most Wanted is a useful approach to engage people in new ways with collections, the developed mechanism for validating and documenting contributions in the form of Case Notes is controversial among professionals, with three out of eleven respondents being not sure about or disagreeing with the statement "*I feel comfortable about the way 10 Most Wanted converts user-generated information into formal documentation*". While this is in line with the survey responses to the more general statement "*I feel comfortable about crowdsourcing the documentation of collection artefacts*", which four out of eleven respondents were not sure about or disagreed with, it suggests that Case Notes did not sufficiently address concerns about this aspect among professionals.

While these formative evaluation results are not representative due to the small sample size and are limited by the depth of questioning, they indicate that more research is needed on the aspect of validating crowdsourced information and integrating it with professionally curated collections.

V. Summary and Conclusions

This paper discussed data quality as a key problem in crowdsourcing efforts where participants contribute complex information. It has presented case notes as a central mechanism in 10 Most Wanted to validate and integrate contributed information into evidence trails, while also addressing a range of other aspects relevant in a crowdsourcing context. Case notes are being used successfully in the 10 Most Wanted project, but there were some concerns about the concept in a small-scale formative evaluation. The results suggest that a more detailed evaluation is required to assess the validity of the concept and its acceptance among professionals.

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