

# Exploring team sensemaking with an adaptive report generation assistant

Robert J. Houghton<sup>1</sup> and Chris Wragg<sup>2</sup>

<sup>1</sup>University of Nottingham, UK <sup>2</sup>Aleph Insights

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## THE WORK IN CONTEXT

Collaborative interpretation and understanding of complex and uncertain information is a pervasive and growing challenge across many industries and domains from defence and ‘blue light’ services to commerce and government. We carried out two studies to evaluate the Adaptive Report Generation Assistant (ARGA), a piece of collaborative software designed to aid team sensemaking by supporting coding of information inputs and visualisation of outputs. In the first study, ARGA was contrasted with pen and paper processes in laboratory trials and in a second, and more ecologically valid trial, ARGA was contrasted with the use of generic shared electronic documents by two larger teams of expert analysts. In both cases, in addition to usability analysis and evaluation of final report quality, team activity was also analysed with reference to recordings, post-hoc interviews and examination of the cognitive artefacts produced. It was found that by structuring input and interpretation phases of the activity and offering greater flexibility in the rework of both ontologies for input and visualisations of output, groups using ARGA generally produced better quality analyses through avoiding premature fixedness and confirmation bias. However, a persistent problem across all groups lay in maintaining consistent visibility of relative information quality and credibility. The findings imply that sensemaking quality can be enhanced by interventions that reduce the administrative and clerical demands of information management and representation.

## KEYWORDS

Collaborative work, ICT, macro-ergonomics

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## A brief outline of the work carried out

Two studies were carried out. The first occurred in a laboratory setting where small novice teams were asked to interpret a playful scenario rendered as social media posts, press releases, news reports and the like concerning ‘an unusual day in Nottingham’. In a between-subjects design, five groups performed this using ARGA, five groups used pen and paper. While the scenario had an underlying structure, it was not designed to converge on a singular end result reflecting the challenge in real-world sensemaking that stopping rules must be constructed interactively by the team rather than being inherent to the situation as they might be in a detective story or deductive game. Team processes were captured through the analysis of recordings, interviews, and examination of the cognitive artefacts produced. Output quality and standard usability evaluations were also considered. The second study was more ecologically valid, consisting of two credible intelligence interpretation scenarios undertaken by expert analysts. Stimuli here followed the form of typical intelligence reports and inserts. Two groups participated in a counterbalanced within-subjects design performing analysis of two scenarios with ARGA and with standard online shared documents.

### **Findings/solutions (the outcome)**

Key findings across both trials were that while the scope and tempo of analysis were broadly consistent across all groups, ARGAs tended to lead to higher quality final reports, likely by structuring the activity such that data input was separated from a later stage of global interpretation limiting scope for confirmation bias and fixedness at the point of scrutinising inputs. Similarly, the ability to manipulate visualisations and ontologies post-hoc aided teams in entertaining multiple interpretations and formed a point of focus for their discussions. In contrast, the sheer effort of managing paper representations or shared documents appeared to largely discourage much re-examination of information thus the quality of the final analysis was likely reduced as a function of clerical and administrative workload rather than limitations in interpretative judgement. A common challenge across all teams lay in maintaining visibility of relative information quality. While most teams began by prioritising judgements of perceived credibility and quality, we observed a strong tendency for this to be gradually forgotten as the cognitive load inherent in interpretation grew and teams increasingly worked with aggregated representations.

### **Impact**

The findings of the work generalise to the understanding of sensemaking in general and suggest that sensemaking can be enhanced by emphasising the separation of information gathering and interpretation phases and by aiding management of materials and representations. Persistent representation of assessed information quality and credibility and its reinsertion at the point of interpretation also emerges as a key future requirement, whether embodied in software or in team practices. The work also supports the view that in examining technologies intended to support cognitive processes, beyond the usual notions of usability evaluation and HEAT (hits, errors, accuracy, time), engagement with richer macro-cognitive notions such as sensemaking and distributed cognition are necessary to understand their operation and implications.