



Uncertainty in geological linework: communicating the expert's tacit model to the data user(s) by expert elicitation.

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At BGS, expert elicitation has been used to evaluate uncertainty of surveyed boundaries in several, common, geological scenarios. As a result, a 'collective' understanding of the issues surrounding each scenario has emerged. The work has provoked wider debate in three key areas: a) what can we do to resolve those scenarios where a 'consensus' of understanding cannot be achieved b) what does it mean for survey practices and subsequent use of maps in 3D models c) how do we communicate the 'collective' understanding of geological mapping (with or without consensus for specific scenarios).

Previous work elicited expert judgement for uncertainty in six contrasting mapping scenarios. In five cases it was possible to arrive at a consensus model; in a sixth case experts with different experience (length of service, academic background) took very different views of the nature of the mapping problem. The scenario concerned identification of the boundary between two contrasting tills (one derived from Triassic source materials being red in colour; the other, derived from Jurassic materials being grey in colour). Initial debate during the elicitation identified that the colour contrast should provide some degree of confidence in locating the boundary via traditional auger-traverse survey methods. However, as the elicitation progressed, it became clear that the complexities of the relationship between the two Tills were not uniformly understood across the experts and the panel could not agree a consensus regarding the spatial uncertainty of the boundary.

The elicitation process allowed a significant degree of structured knowledge-exchange between experts of differing backgrounds and was successful in identifying a measure of uncertainty for what was considered a contentious scenario. However, the findings have significant implications for a boundary-scenario that is widely mapped across the central regions of Great Britain.

We will discuss our experience of the use of elicitation methodology and the implications of our results for further work at the BGS to quantify uncertainty in 2d and 3d products. In particular we will consider the impacts of surveyor 'experience' in how the elicitation process works.