

you need to have two things. First, there has to be a carefully designed methodology, administered in a consistent manner from one interview to the next. Second, there has to be a thorough written account of that methodology. That account consists of definitions of the parameters and detailed descriptions of the conventions adopted. Theoretically, a different set of data collectors should be able to re-interview the same people and end up with a similar set of maps. In other words, reliability has to do with predictability of outcome.

The methodology is the project's set of instructions. It is important not only to help prove that your data are reliable, but also to demonstrate they are valid. Reliability, validity, and accuracy are words used interchangeably by most people, but social science uses each of them in different ways. There are complex interrelationships among the three concepts, but these overlaps need not concern us.

2 Validity

Do your maps say what you claim they say?

Validity refers to the meaning of your maps. Do they mean what they are supposed to? Do they say what you claim they say?

This might sound confusing, so here is an example. Imagine you are looking at one of a community's finished composite maps, the one depicting big game kill sites. The title reads: "Jackfish Indian Band Kill Sites of Big Game Animals Used for Community Consumption." The Jackfish people are known to eat a lot of moose meat, but you are still surprised to see 2,000 moose sites on their map. It is also known that their men do a lot of guiding for American trophy hunters.

You decide to check the methodology report, and discover that the interview guide's moose question does not instruct participants to mark only those kill sites for which animals were used to feed community members. You then listen to segments from a small number of tapes to hear how interviewers handled the moose question. Not surprisingly, they did not specify what the interview guide had not instructed them to. How many of the 2,000 moose sites provided meat for village residents, and how many are sites where Jackfish guiding parties met with success but the meat ended up filling tourists' freezers? This particular kill site (the one on tiny Yost Island), does it really belong on this composite, given the title of the map? If a question like this cannot be easily answered, the data have poor validity. The meaning and significance of the map is open to too much interpretation.

Maybe the picture gets even worse. When you listened to the sample of tapes you found that the interviewers used different key words when asking the moose question. One would ask for places where moose were “shot,” while another asked for sites where they were “hunted.” A third data collector tended to use the word “get,” while the fourth asked participants where they had “looked for” moose. Sometimes the same interviewer would switch back and forth in his choice of key words, even during the same mapping session. The list of key words can be expanded: shot, hunted, gotten, looked for, killed, shot and killed, retrieved, harvested, and so on. Each of these has different or ambiguous meanings. Now validity is in serious question. For instance, moose that were shot but not retrieved do not belong on the Jackfish big game map as it is titled. Nor do moose that were looked for but never seen, shot, and retrieved. Just what does the composite mean?

To avoid this ambiguity the interviewer must be clear about the nature of the data that are being sought. A well-constructed interview guide that uses carefully selected definitions and key words, and data collectors who consistently convey those definitions to participants and use those key words, will ensure good validity.

3 Accuracy

Are the features on your maps located with enough precision to meet your project’s objectives?

Accuracy has to do with the precision with which mapped sites are indicated. How precise is the location on the map where Jim Thusky saw the remains of old Jason Monabu’s cabin? Does the spot marked on the map truly represent the location of that cabin on the earth’s surface? Assume that Jim got it exactly right when he showed the interviewer where to make the point. If the base map used for data collection is 1:250,000 scale, the ink dot representing the datum point can easily cover a quarter kilometre on the ground. If the base map used is 1:50,000, the ink point covers about 50 metres, and the datum is thus more accurate. Accuracy is also related to things like the participant’s ability to read or interpret maps, his ability to see well, and his willingness to be careful when indicating sites.

If you wanted to verify accuracy, you could compare where Jim indicated Jason’s cabin to where other participants independently located it. This is called triangulation, and it offers a basis to make the best possible judgment about where the likely location of the feature is, without additional expenditure of research budget. You could also do what is called



Two members of the Lutsël̀kè Band look for caribou on the tundra east of Yellowknife, Northwest Territories. Some land use and occupancy studies map the areas over which hunters scan the landscape for animals. When using binoculars, as in the photograph above, people can see great distances, which raises questions about exactly what is being documented when you map where hunters have “looked for” big game. This is an issue of validity, and it points to the importance of selecting the key words for your interview guide very carefully, and also of using them consistently when interviewing.



Dale Smith and Henry Smith of Pinehouse hold up the snowshoe hare they have just retrieved from snares. Many kinds of small game are important sources of protein for First Nation communities, and harvest sites are often recorded during mapping projects.

ground-truthing, and take the base map and a global positioning system (GPS), and go with Jim to the actual site.

Maybe you discover that Jim has not been precise and the mapped point is a kilometre away from the actual location. This would not necessarily be a problem, depending on what kind of feature is involved and whether the exact location is required to meet the objective of the mapping project. For instance, if the data are intended for curricula development, the lack of precision would not likely be troublesome. However, if the data are needed for operational planning, which involves operations like logging and depends on detailed data at a scale of 1:20,000, there is a problem. A caterpillar operator building a haul road, and using a map displaying data that are in error by as much as a kilometre, can do damage as he decides where to construct the road. If the feature is indeed an ancestor's cabin site or a burial ground, and the purpose of the mapping is to preserve it, then that amount of error is unacceptable because it can result in the site being destroyed. The same degree of accuracy, however, would not be problematic for a big game kill site, since the accuracy of the individual point is not the issue, but rather the pattern shown by the collection of points.

Accuracy is related to scale of mapping, which is determined by the main objective for doing the research in the first place. Even if the community wants data for operational planning, in most cases it is nonsensical to think that an inventory of cultural sites can be mapped at 1:20,000 scale. Many communities' territories easily cover 40x1:50,000 map sheets, which is the equivalent of 250x1:20,000 sheets. The sheer awkwardness of working with a set of 250 maps for data collection purposes, and its effect on response burden, are reasons to abandon the notion. In addition, there is so much detail and often so few recognizable reference points on a 1:20,000 sheet that the participants sometimes have difficulty locating themselves. It is important to be realistic about the strengths and limitations of the various map scales for data collection purposes. The community should decide which scale best suits its needs.

Often the best scale is 1:50,000 because the resultant map composites are detailed enough to use as a reference tool for many planning and management purposes, while still providing the information needed for claims processes. You can refer to the composites whenever the need arises to obtain more complete data for any area or feature, or to improve the accuracy of existing data. A mapped inventory of cultural sites, collected at 1:50,000 scale, can be effective for operational planning when used in consultation with elders during on-site visits and in conjunction with GPS corrections. An advantage of collecting your data at 1:50,000 (and not at the operational planning scale of 1:20,000) is that it encourages government

and industry to consult with your community. Outsiders are more likely to acknowledge that real live First Nation people are an ongoing and necessary complement to the imperfect and always incomplete set of reference maps.

Having a process in which the mapped data are ground-truthed a few at a time, on an ongoing basis, is advantageous for another reason. Ground-truthing large numbers of sites is very expensive and can cripple research budgets if you are not careful. The community should carefully define its priorities, and use as much as possible of the available funds to interview key elders before deaths result in more permanent loss of traditional knowledge. Sometimes immediate ground-truthing of a site is warranted because the participant may, in extreme cases, be the only person alive who knows about the site, and there is uncertainty as to its location. It is important for your community, and not the funding agency, to define how much verification of accuracy is needed, and when.

4 Representativeness

Are the mapped data that participants provided characteristic of the community the participants belong to?

Representativeness refers to whether the data speak for the population the maps claim to represent. To what extent are the data provided by the participants characteristic of the population the participants belong to? A number of things have to be looked at when answering this question. How were individuals selected when compiling the list of people to be interviewed? What were the criteria for defining that study population? Are those criteria consistent with the primary objective of the project? How many members of the study population were interviewed, and what percentage does that number represent? Did participants provide complete, high quality data?

If the participant selection criteria are valid in terms of the project's objective, then two simple statistics, the number of participants and the coverage rate, provide a good sense of representativeness. For instance, if 160 individuals complete map biographies, then participation is 160. If the study population is 200 persons, then the coverage rate is 160 over 200, or 80 per cent, which suggests good representativeness. Coverage of 10 per cent would suggest it is poor.

Whether the objective of the use and occupancy study warrants widespread participation of all adults or a sizeable subset of adults, the idea is generally the same: 70 or 80 per cent coverage suggests good representativeness. However, if the study is dependent on a small number



The harvest locations of big game species, both terrestrial and marine, are usually recorded during land use and occupancy mapping studies. In the photograph above a young Algonquin girl takes a close look at a moose that has just been shot on a beach near Rapid Lake, Quebec. Below, Inuit men haul ashore a bearded seal near Kangiqtugaapik (Clyde River) on Baffin Island, Nunavut.



of participants, sometimes called key informants, then it is important to have complete coverage of that group because the absence of even one informant's data can result in weak representativeness.

To give a simplified example, pretend the Blue Heron Band designed a mapping project to document the extent of its small game harvesting. Its final composite shows 575 places where band members have snared snowshoe hare, and you want to know whether the map represents the pattern and extent of band members' rabbit kill sites. To determine this you would look at the methodology report's description of how persons were selected to be interviewed. First, you would determine what the population group is. If hare is a basic food and all adults are known to be active snarers, the study population might consist of all adults, men and women, in which case the study is like a survey. If, on the other hand, there are only a few women who specialize in rabbit snaring, and are known to harvest huge amounts for distribution to other band members, the study population might consist of only this handful of key informants.

In either case, you would then look at the report's account of coverage rate. If it were only 10 per cent you would suspect that representativeness is poor. This is because if more study population members were to be interviewed, and their hare data added to the composite, changes in pattern would emerge. Some of the gaps would fill in and some of the edges of data distribution would expand outward. However, in the the survey of all adults, if coverage was 75 per cent, chances are that you could keep doing interviews, adding data, and not see resultant changes in overall pattern. At that point you have good representativeness. On the other hand, if the study population was only a small number of women, you might need 90 or 100 per cent coverage before the interviewing of an additional person would have no major effect on the distribution of mapped sites.

5 Consensus

Do the users of your maps agree that they are useful for the intended purposes?

Consensus is not really an inherent characteristic of data. But you can measure it, and it does reflect the degree to which your maps are reliable, valid, accurate, and representative. Suppose you table your maps, maybe at a co-management meeting where a number of different agencies and user groups are negotiating. If those people take a close look at the maps and at the companion methodology report and find them to be good quality, the composites themselves are likely to achieve consensus.

Excellent research is supposed to provoke controversy in some fields of inquiry, but not in this one. Land use and occupancy mapping has been around in Canada for a long time. The basic methodology is well developed and research product has been used in many different contexts, including co-management negotiations and courts. If your maps do not achieve consensus regarding their usefulness, it is probably because they are of questionable quality.