"*As you journey through life take a minute every now and then to give a thought for the other fellow. He could be plotting something*."

-Hagar the Horrible

CHAPTER 6

Conclusions and Further Thoughts

Implications of this Thesis

The archaeologist's obligation to data is as important as any other ethical consideration: equal to protecting sites, engaging the public (especially members of descendant communities), and reporting on one's work in a timely manner. However, the collection, organization, and subsequent management of digital data has not warranted serious comment in the academic literature of archaeology. Recent texts that focus on the methods of archaeological work fail to mention the how-to's of archaeological surveying. I addressed this absence with a historical review of surveying instruments and methods in chapter three. The absence of detailed surveying discussions is less of a problem than the absence of discussion about data structure and organization for archaeology, since dated works do exist to discuss the role of surveying instruments in archaeology. Students and researchers, many of whom are newly familiarized with the use and arrangement of GIS, are left to puzzle out ways of organizing their data.

This thesis has proposed one way to organize archaeological data, drawing upon the geodatabase structure developed by ESRI as part of its ArcGIS software. I have developed an organizational scheme to address a reoccurring problem in work, both mine and others. This problem centers on organizing GIS data in an efficient manner that allows seamless integration with other data, whether collected independently or as part of

ongoing archaeological investigations (such as the West Point Foundry and Svalbard projects that MTU is currently involved in). I believe the solution presented here, of a geodatabase using specifically arranged Feature Data Sets and Feature Classes, presents a usable model for future work. I plan to use it in the future and to re-visit my New Zealand data sets and organize them using this new scheme.

Of course, this particular method, discussed in the previous chapters, is not the only way to organize archaeological data. The use of CAD and other programs incompatible with common GIS software such as ArcGIS or Idrisi means that not everyone will be able to immediately implement this type of model. However, there is a general idea that runs as undercurrent throughout this entire document, that is, the importance of planning ahead, something often neglected in GIS archaeological work. I have suggested one way to organize GIS data generated as a result of archaeological investigations, but would be interested in learning how others have done it differently. I think that someone will have to take the first, tentative steps of publishing an article specifically on how they structured their GIS data before others will feel comfortable doing so.

I feel apprehension about publishing the exact structure that I used to create my GIS because of an established tradition of topics that students and researchers publish within as part of the archaeological literature dealing with GIS. These subjects center on the use of the software as outlined by Aldenderfer and Fisher. However, until someone begins writing articles that specifically address actual GIS data structuring, a true dialogue on the importance and structure of digital data for archaeology will not begin. In order to generate the type of discussion called for throughout this document, I plan to

translate part of this thesis (especially the data structuring portion) into a number of articles and conference posters so that a genuine conversation can finally begin.

A discussion of data structuring in archaeology is important because it helps to ensure that work undertaken by one archaeologist can be used by other researchers. The example of the 2002 West Point Foundry mapping project is a case in point. The mapping work carried out as part of this project, without a conscious attempt at crafting a 'living document', a poorly structured GIS that is difficult to add to and use is the result. The same can be said of my 2002-2003 GIS work conducted in the Otago Region of New Zealand. In both circumstances the ability of future researchers to quickly and effectively use the data has been compromised by the structure of the data. This problem, which I suspect is growing, could largely be avoided if a handful of articles clearly presented ways to organize GIS data for archaeologists. In other words, I believe that I can take the lessons learned as part of this thesis and write a series of articles, submitted to a variety of publications, that help future archaeologists – student or otherwise – effectively organize their GIS data in formats that remain viable and integratable for a long time after their creation.

Making Use of the 2004 Svalbard GIS

For future researchers to use the data which forms the 2004 Svalbard GIS, they require basic instruction in the use of ESRI's ArcGIS software. There are a number of ways to gain the necessary skill required to use this software and the geodatabase. Two options are explored below and are aimed at the Industrial Archaeology program at MTU; both of which center on producing a general GIS skill set in future students.

The first possibility, called Plan A, might prove the most difficult to implement. It would require the development of basic GIS skills by taking an introductory GIS course offered by specialists, which would likely not be aimed at archaeologist but would provide the necessary skills. The current structure of courses required for a Masters of Science degree in Industrial Archaeology at MTU demands that a student enroll in a specific set of courses their first year in the program. There is no room for GIS coursework in the present situation. Plan A calls for a re-structuring of this course load. Specifically, the current class structure, organized into two courses of four credits and a one one-hour independent research course does not fit the broader course structure in other departments at MTU. If the two four hour credit courses (Industrial Archaeology and Pro-Seminars I & II in the Fall – Heritage Management and Pro-Seminars III & IV in the Spring) be restructured into three-hour credit courses, leaving open an option of taking another course in the Fall and Spring semesters. This plan allows a student to take one or more GIS courses during their first year, providing the necessary GIS skills required for projects that IA students participate in. Since the current structure of MTU graduate assistantships cover nine credit hours each semester, and the majority of MTU courses are three-credit hours, shifting the structure of the IA program courses to a three-credit hour system could prove advantageous.

The second possibility, Plan B, would be easier to implement than Plan A and might be considered immediately. This plan takes advantage of the current IA graduate course structure and the one-credit independent study course that most students enroll in during their first year. Plan B draws upon ESRI's Virtual Campus (campus.esri.com), which is a collection of online tutorials created to teach new users of ArcGIS the basic

skills needed to use the software. Each online course typically requires twenty or thirty hours of time, although a dedicated student can often finish in less time. Plan B would require a student to enroll in an online course and use the grades from the online quizzes as his semester grade for the independent study, with the supervision of a faculty member. In addition, the semester grade could involve a final project, where a student would use the data organization scheme presented here. This model is based on my experience at the University of Otago, where I enrolled in two online courses and completed a GIS project for a final grade in a graduate level surveying course. There are two online courses that would provide a new student (new to the use of GIS) with the necessary knowledge required to make use of the 2004 Svalbard Geodatabase model. These courses are called "Introduction to ArcGIS 9.0" and "Introduction to Working with Geodatabases." These courses are subsidized by the site license currently held through the Forestry Department at MTU or would cost approximately $100 if paid for by the Social Sciences Department.

Plan A and Plan B both provide a new student with the knowledge required to use the 2004 Svalbard GIS and associated geodatabase. Moreover, they also provide the necessary skills to create new geodatabases and GIS projects, a boon to the IA program in general. Plan B can be implemented anywhere by anyone and doesn't even require an academic setting. A new CRM employee who wants to improve existing GIS skills or develop new ones can enroll in the ESRI Virtual Campus by simply paying the one-time fee, which grants access to the online content for one year from the date purchased. In fact, Plan B means that someone without prior GIS abilities could conceivably spend less than two work weeks (assuming eight hours a day, five days per week) and gain the

knowledge needed to make use of the 2004 Svalbard Geodatabase. The possibility of someone achieving necessary competence in GIS and using this geodatabase opens a wide-range of possible future projects (discussed previously).

Closing Remarks

The uses of the 2004 Svalbard GIS are limited by the imagination and the data collected previously. If this data is corrupt or difficult to access, the ability of future researchers to successfully frame new questions is jeopardized. By seeking ways to structure data that remain useful and updatable, I have endeavored to increase the possibilities of future work. I take my ethical obligations towards the archaeological record very seriously and believe that methods of data generation and management used by archaeologists are an important part of the discipline.

I realize that suggesting new ways in which to do something, new classifications and organizational schemes, can be unpopular. Of course, archaeologists may not always agree on specific methods, but the dialectic that develops is important to moving forward. I have identified a problem in this thesis: that some archaeological data sets are created in such a way that future use is limited. I provided one answer to this problem: the use of a specific data organization scheme making use of a geodatabase. Is my way the only way? Do I know of a better way? No, not yet. However, it was my intention to stimulate thinking on this subject with this thesis. I look forward to a lively discussion on the issue of data structuring in archaeological contexts, a discussion I hope to partially initiate.