

# Revolutionizing the Numismatic Reference

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Like it or not, the computer age is upon us, and there is no avoiding it as a numismatist. Auction bidding in many venues (e.g., Heritage and eBay) is performed online. Countless numismatic discussion groups and websites permeate the electronic ether.

In the face of all this progress, should numismatic references remain the staid, simple page-turners of yore? Does a computerized reference simply mean copying the text of the reference to a computer-readable CD/DVD? I say to both questions, emphatically, "No!" A properly designed computerized numismatic reference is *much* more than a book simply rendered onto a CD/DVD.

This article draws on my experience working on a computerized reference for U.S. Shield Nickels (the Shield Nickel Viewer, or SNV) to illustrate the features of a computerized numismatic reference that is designed to use the inherent advantages of the technology. That I chose to create a Shield Nickel reference reflects my collecting bent; the techniques discussed should be applicable to any numismatic reference.

There is an undeniable pleasure in holding that big reference book in your lap and thumbing through it. Although this pleasure can't be replaced, the loss can be ameliorated by the new pleasures inherent in a reference work that takes full and appropriate advantage of available technology.

## STATIC VS. DYNAMIC

A printed reference book is a static, unchanging object. Every time you peruse it, it presents exactly the same information to you in exactly the same way.

Numismatics is not a static pursuit. New research, changing marketplaces, and reinterpretation of existing data make the information of numismatics dynamic. Above all else, a computerized numismatic reference should reflect the dynamic nature of the underlying information.

The computer, with data stored in a changeable, somewhat ephemeral method, is extremely well-suited to respond rapidly to changes in a dynamic environment.

Other sections of this article point out specific ways in which a computerized reference can be dynamic. *But the underlying principle of dynamism is, I believe, the single most important advantage of any properly designed computerized reference.* Any computerized reference that fails to be dynamic has failed in its most basic mission—to replace a printed reference book in a way that offers unique advantages that the book cannot offer.

#### PRODUCTION COSTS

There are multiple drivers to the cost of a physical book:

- How large an audience is there? How many copies will be sold? Can the price of the book be amortized over a large audience?
- How much information is provided in the book? More information means a larger book and a higher cost.
- How many people have a finger in the pie (e.g., author, publisher, printing house, retailer)?
- How much does it cost to ship a purchased book to end user? Even at media mail rates, this is usually about \$4.

All of these costs of a printed book must be balanced in a way that makes the project economically feasible. This may be especially difficult for numismatic references; they are unlikely to appear on any national bestseller list! Furthermore, these cost drivers push printed numismatic reference books to be fairly general, so as to attract as wide an audience as possible.

In contrast, here are the cost drivers for a computerized reference:

- Purchase of a CD/DVD burner. This is a one-time cost of about \$100.
- Purchase of blank recordable media (\$0.10 to \$3.00 each, depending on the media used).
- The cost to ship a single CD/DVD in a padded mailer is about \$1.00.

A computerized reference work is an extremely efficient way for a numismatic author to self-publish. Very short runs of the reference can be

produced—copies can be produced to order, avoiding the need to maintain unsold inventory—this means that the reference can be highly specialized, without regard to what would sell in a mass market. A dedicated numismatist who wants to share his expertise and narrowly focused research is enabled to do so. Nobody else needs to be compensated. In the event that a particular computerized reference were to become very popular, then it would become feasible to have the CD/DVDs produced by a mastering company that stamps them in the thousands, further reducing production costs.

#### DEVELOPMENT COSTS

Most of the development costs and time for either a physical book or a computerized reference will be approximately the same. Each reference requires that the requisite material be gathered, organized, and presented as a cohesive whole.

Because a computerized reference may need custom computer programming, some additional expense and time may need to be budgeted during development. The expense and time are well worth it if it results in additional functionality in the reference. It's my opinion that this additional expense and time will typically be a small fraction of the expense and time of generating the numismatic content. By far, the largest time consumed in developing SNV was taking and editing photographs of coins.

#### NUMBER AND QUALITY OF PHOTOGRAPHS PRESENTED

Most numismatic references are about coins, and a book about coins without pictures of those coins would be like trying to enjoy an Ansel Adams exhibit only by reading about it. When you add photographs to a printed reference, the reference gets fatter. When you add high-quality color photographs (as opposed to black and white), the costs go way up.

In contrast, a computerized reference book full of high-resolution color photographs can fit on a single DVD. And adding additional photographs to that DVD adds nothing to the cost of burning and shipping it. The number of full-color high-resolution photos in SNV (about 2500) was inconceivable in a printed reference, but it currently fills a little more than half of a single DVD.

#### SIZE OF THE BOOK

As previously mentioned, cost constrains the size of a physical reference book. But if the ability to add photographs to a DVD is for all practical purposes unlimited, the ability to add additional text is even more so. A computerized reference book can contain *all* of the information that the author deems relevant. (That doesn't mean it doesn't need a good editor, though!)

#### UPDATING WITH NEW MATERIAL

A computerized reference must be designed from the ground up to provide a way to easily incorporate new material. The new material can be corrections to existing material, or it can be completely new content. Regardless, the properly designed computerized reference incorporates new material in a way that is invisible to the end user—it is merged seamlessly with the existing material. But if the user wants to see what's new, the computerized reference should allow him to do that as well.

It is true that updates or addenda can be distributed for a printed reference book. But unless that book undergoes a complete reprinting, the new data is not seamlessly integrated with the existing book.

#### USER CONTRIBUTIONS, OR MAIL PHOTOS NOT COINS

For many numismatic reference works, authors have to rely on the generosity of others to photograph holdings. The author who can own everything he or she would want to document is a very rare bird. Many collectors are understandably reluctant to commit their rare coins to the vagaries of the post office. Insurance is little compensation for an irreplaceable coin. In my own work I set down standards for photography, and collectors who owned digital cameras were able (with some training) to submit photographs to me by email.

While some collectors still wound up mailing coins to me, several collectors were able to take their own photographs and submit them. Taking and contributing photographs was fun for these collectors, and of course their contributions are recognized by name.

#### SEARCHING AND INTERACTIVITY

A printed reference book does not interact with its reader. The information is presented in the way that the author intended, and it is not

Shield Nickel Viewer v3.4 422 records (422 visible)

File Select Special Filters Help

Filter  
AutoFilter  
AutoFilter Out  
Filter This One  
Remove Last Filter  
Remove All Filters  
Show Coin  
Show Pics  
User Pics  
User Data

Year	Prf	Obverse	Reverse	Modifier	DDO	DDR	RPD	MPD	OVD	ML	Attributions	Comments
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-0000	Typical 1866 normal die
1866	a:	Notched arrow	With rays	None	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-1000 F-22 FS-001	SW Major Note circular die polish lines b...
1866	a:	Notched arrow	With rays	None	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-1001 F-23	DS Minor
1866	a:	Notched arrow	With rays	None	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-1002	SE Minor
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3000 F-08 FS-001	1866 northeast   Early die stage, no die cr...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3000.5 F-08 FS-001	1866 northeast   Later die stage, die crac...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3001 F-10 FS-001	1866 southeast   Earlier die stage only sh...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3001.3 F-10 FS-001	1866 southeast   Later die stage, cracks ...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3001.4 F-10 FS-001	1866 southeast   Later die stage, cracks ...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3002	1866 southeast   Later die stage, cracks ...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3003 F-16 FS-001.3	1866 south
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3004 F-10.01	1866 east (more visible on earlier die sta...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3005 F-12	1866 south   Coin from Clarence Gilstad
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3006 F-13 FS-001.4	1866 north   Coin from the Sunnywood C...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3007 F-09	1866 south   Coin from J. V. Jones
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3007.5 F-09	1866 south   Late die stage shows extre...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3008 F-14	1866 north   Coin from J. V. Jones
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3009 F-12.01	Second 6 southwest   Coin from J. V. Jon...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3010 F-15	1866 northeast   Coin from J. V. Jones
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3011 F-19	Second 6 south   Apparent doubling K14-...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3012	866 north   Photos by Ken Hill
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3013	866 southwest very strong   The repunch...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3014 F-17	866 southwest very strong   Later die stag...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-3013.5	866 southwest very strong   Repunching visible only within...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-4000 F-01 MPD-001	Curve of a 6 just above denticles between...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-4001	Curve of a 6 just above denticles between...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-4002 F-01.01	Top of a 1 seen in the space between the...
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-6000	
1866	a:	Notched arrow	With rays	None	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	S1-6001 F-25	Coin from Clarence Gilstad

Figure 1. This is a screen-capture image of the main screen presented by SNV. The center portion is a partial (scrollable) listing of Shield Nickel varieties covered by the database. On the left side are some buttons that aid the user in searching the database.

easy to peruse information in an order other than that in which it was published.

A properly designed computerized reference is an interactive experience for the user. At a minimum, the ability to search the text of the reference for keywords is a vital requirement. But I believe that the computerized reference should do much more. It should allow the user to reorganize the presentation of the data to suit his or her needs. A simple example will make this clear.

Let's hypothesize a reference book for a particular series that focuses on varieties available in the series (e.g., doubled dies, repunched dates, repunched mintmarks, overdates). The typical printed reference book covering a particular coin series will be organized by year, and then might group within a year by the type of variety. Suppose you want to see all of the overdates available in the series. In a printed book, this would probably mean searching the entire book and putting sticky notes on those pages of interest. For a properly designed computerized reference, there would be a command "Show me all the overdates", and use of that command would eliminate all of the non-overdates from view. Searching can also help the user answer questions that a traditional reference book might not cover easily, like "How many doubled dies have been catalogued?"

Interactivity should also allow the end user to successively refine searches. Each time the end user narrows down a search according to a certain criterion, each coin in the program's database that does not fit that criterion is removed from view. The goal should be to allow the end user to narrow the search to a few candidate coins, through which he or she would then make manual comparisons to the target coins. The program should provide sets of criteria that are uniquely designed to meet the needs of the specific reference, which will be driven by the needs of the coin series that the reference covers (that is, the kinds of criteria appropriate for a Shield Nickel reference are going to be very different from a reference on ancient Greek coins, and the computerized reference should be appropriately tailored).

#### SCRIBBLING IN THE MARGINS

Many people like to annotate their printed reference books by writing notes in the margins, or perhaps by using the ubiquitous sticky notes.



**Figure 2.** This is a screen-capture image of one photograph from the SNV database. The “overlay” feature is on, showing white arrows to highlight the over-date. At top right are thumbnails of other photographs available. Grid-ding, scaling, and rotating are all tools that the end user can use to help in attributing varieties.

There is no reason for users of a computerized reference to give up that capability. A properly designed computerized reference allows users to attach private notes to the data. The fewer constraints placed on these private notes, the better. It is hard to predict what all of the end users will want to record, so a great deal of flexibility should be allowed. Some ideas include:

- Information about the end user's personal holdings
- Notes on coins viewed at coin shows
- Auction records

The concept of private notes can be extended to include the ability to import private photographs into the program's database. In that way, photographs of the end user's coins can be viewed side-by-side with photographs provided in the reference work.

#### THE DEVELOPMENT PHASE

Everybody has read a physical book, and everybody has a pretty good idea of how one is put together. Most likely, you would start by trying to list the topics of the chapters in the book, and then perhaps outline each chapter. You don't have to think too much about the user interface or the feature set of a physical book; perhaps you pick a typeface and a general style, but the user interface was established hundreds of years ago: words on paper that people read.

Developing a computerized numismatic reference takes some additional up-front thinking. As you have seen above, end users will want to use the reference in a non-linear fashion. So, you have to think more about the different ways that people will move about in the reference, and you will have to think more about the feature set your reference provides.

There is no question that the development phase of a computerized reference is more complicated than the development phase of a printed book. But it is a one-time complication. Carefully thought out, and with flexibility built in, the decisions made during development phase will carry you through all the other phases and the lifetime of the reference. Proper decisions in the development phase are what drive the advantages of the computerized reference over the printed reference, and are therefore well worth spending the extra time to develop.



## WEB-BASED VERSUS LOCAL

Let's discuss two different paradigms for a computerized numismatic reference: web-based or local. Each has advantages and disadvantages.

A web-based reference stores all of its data on a web site. Users interact with the data using a browser program (e.g., Internet Explorer, Firefox). The characteristics of a web-based reference are:

- Instant accessibility after purchase.
- No additional software is loaded on the user's computer.
- Functionality of the reference is constrained to functionality easily accessible within a browser.
- Quality of the photos is constrained by the time it takes to download them (users with slow dial-up internet connections must be accommodated).
- Updates to the data are accomplished with no user interaction (the web site gets updated).
- Security requirements are strict since the web site can be compromised by "hackers".
- Requires an active internet connection to access the reference data.

A local reference stores its data on the user's computer. Users interact with the data using a custom-designed program. The characteristics of a local reference are:

- After purchase, the user must wait for a CD/DVD to arrive in the mail.
- Software is loaded on the user's computer, and must operate properly there.
- Functionality of the reference is limited only by the imagination and software capabilities of the author.
- Quality of the photos is essentially unconstrained.
- Updates to the data will require user interaction.
- Security requirements are not as strict as in the web-based model. If the program incorporates some web-based features and the web site is compromised, each individual user's local copy of the program will still operate.
- Reference data can be accessed off-line (no active internet connection required).

A local reference can still make use of web-based resources. Program and data updates can be distributed by posting them to a web site from which users can download them.

At some time in the future, when everybody has very high-speed Internet access, the trade-offs will change. Perhaps the best compromise will be to have a custom program running locally to maximize capability, while storing the actual data of the reference online.

#### LONG-TERM EXPERIENCE WITH SNV

SNV has been available to end users for a number of years now. As I expected, the number of copies shipped has been very small. This confirms that producing SNV as a printed reference was not feasible.

The initial goal of easy upgrades and expandability has been validated. A large number of varieties have been added to the database since the initial release of SNV (the number of varieties has about doubled). The viewing program itself has undergone a few releases for inclusion of new features as a result of user feedback and the author's own experience. Field upgrades of the viewing program have all gone smoothly. Only one user-reported software bug occurred, and it was easily fixed.

I spent a lot of time thinking about the initial design of the user interface and database in the development phase because it is difficult to change once the software package is released. They have held up very well. No one can think of everything, though, and there are a couple things I might have done differently to facilitate some features that did not occur to me initially. This does emphasize the importance of thoroughly thinking through the user interface and database design during the development phase of the product.

#### SOME FINAL THOUGHTS

One direction for the future that interests me is to find a way to make SNV available on handheld computers so it can be easily carried to coin shows. This will have to wait for a more powerful generation of handheld computers to meet the storage and processing needs of SNV.

I hope that with this article that I have set down a few of the basic features any computerized numismatic reference should have, and to show how computerized references can and should differ from printed references. Perhaps I have inspired *you* to produce a computerized reference covering your specialty?