# SUCCESSFUL WEB APPLICATIONS BY DESIGN: A CASE STUDY

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The successful development and deployment of any website begins and ends with a well conceived application design. A number of years ago something called RAD, an epithet meaning Rapid Application Development, reared its ugly head and with it application design was dismissed as *passé* – something old COBOL programmers did which was totally un-necessary and an obvious waste of time. At least until the Department of Health and Human Services attempted to roll out HealthCare.gov on October 1, 2013. Apparently, legions of post-adolescent IT wizards, and their hastily crowd-sourced methodology, produced a national health care website that, according to some sources, "just a few hundred users flat-lined" during beta testing. What, they actually took the time, resources and effort to test the site before it went into operation? No wonder the government is subject to criticisms of waste and inefficiency.

The birth trauma of HealthCare.gov should give us cause to consider the possibility that a well-conceived design indeed remains *the* prerequisite for successful application operation and maintenance. No matter how many hackers are cutting code, and how many boxes of pizza and cans of coke are consumed, applications will fail if they are not well thought out before the code hits the screen. The work of a good application designer is no different than that of any architect – it rests on an understanding of the complementarity of form and function, and the importance of simplicity, integrity and aesthetics as parameters governing the design process.

Reflecting this caveat, the California History Forum is currently being developed as an online meeting ground for a community of users interested in California's history, people and the culturally diverse threads that weave them together. The new Forum website is currently being built on two existing sites that have to this point independently focused on historical and genealogical user interests. The functional goal of the new site is to integrate the two previously separate websites into a single application platform that jointly serves historians, genealogists, and the broader community of individuals interested in California's past and the people who formed it. With these objectives in view the Forum site's design has followed an integrative path that seeks to find commonality of form and function in the two previously distinct disciplinary domains of history and genealogy.

Resting in the genealogy domain, the first of the two original websites, named TimeLine, was developed by the author as a personal family tree. Its architecture is based on conventional list-based data structures and, although written in PHP, the supporting code reflects conventional LISP-like processing functions. Contrary to current IT mythology, these techniques were not developed a decade ago on some twelve-year-old's Apple computer. To the contrary, LISP emerged in the late 1950s, mostly through the efforts of John McCarthy and Steven Russell, and was first characterized as a compiler language that was written in itself. Based on mathematically arcane Polish notation, LISP programs were originally developed to support time-dependent applications such as the critical path scheduling issues inhering in the U.S. Navy's Polaris submarine weapon systems project.

Given this background, TimeLine applies list processing techniques, and a critical path design methodology, to the management of genealogical information. The critical path design model also facilitates the processing of genealogy data by equating patrilineal, matrilineal and mixed generational descent lines with a single critical path that can be traversed through any given family tree. The practical consequences of these variable descent lines is important to

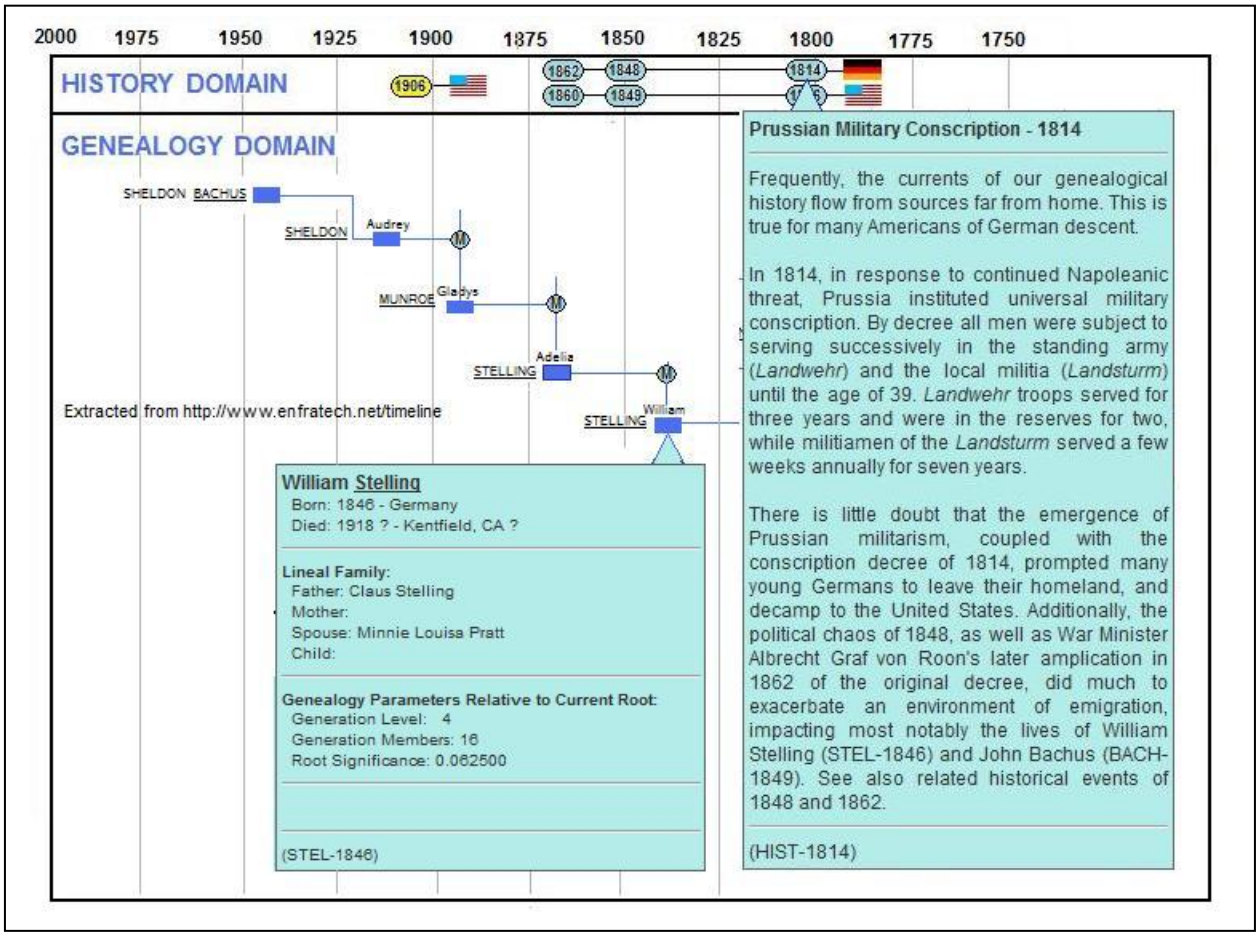
genealogists who must certify an applicant's eligibility for membership in organizations that use heredity lines as criteria for membership – e.g., the Sons of the American Revolution, as well as other groups that typically focus on narrower lines of family generational descent. Likewise, mixed lineal descent pathing functions are central to building and traversing family trees of individuals whose backgrounds reflect the vagaries of non-patrilineal cultural traditions – e.g., West African, Jewish and other traditional cultures.

Turning to the historical domain, the new California History Forum web platform draws equally on a second website earlier developed to support the cataloging and presenting of regional history associated with Marin County, California, and more specifically, the 125 year history of one of the area's local high schools. Although not as immediately apparent, the processing of historical information is readily accommodated by an application architecture which is similarly based on a list structured design model. For example, on the genealogical side and looking at the TimeLine website, it will be observed that several family lines have their roots in 19th century Prussia. Specifically, Johann Bachus and Wilhelm Stelling left their homeland and immigrated as very young men to small German communities in, respectively, frontier Kansas and San Francisco in the early 1860s. In both cases they left their parents behind to join relatives who had already arrived in the United States. Why would two young men both not yet twenty years old leave their families for the uncertainties of an unknown future in a foreign land?

Anecdotally, as the descendents of Johann and Wilhelm merged into a single family, it would be joked upon across the holiday dinner table that everybody present probably owed their existence to a couple of draft dodgers. The simple fact of the matter was that most likely Johann Bachus and Wilhelm Stelling left their homeland to avoid Prussian military conscription. And this is where the domains of history and genealogy merge. In 1814, in response to continued Napoleonic threat, Prussia instituted universal military conscription. By decree all men were subject to serving successively in the standing army (*Landwehr*) and the local militia (*Landsturm*) until the age of 39. *Landwehr* troops served for three years and were in the reserves for two, while militiamen of the *Landsturm* served a few weeks annually for seven years. There is little doubt that the emergence of Prussian militarism, coupled with the conscription decree of 1814, later prompted many young Germans to leave their homeland, and decamp to the United States. This was especially true the more military service was viewed as a means to quell peasant unrest, and less as an aristocratic privilege. Likewise, the political chaos of 1848, and subsequently Bismarck's amplification in 1862 of the original conscription decree, did much to exacerbate an environment of emigration. It was this historical environment, and the socio-political exigencies it produced, that led two young Prussians to leave their homeland, and who would later be remembered by their descendents in California simply as Bill Stelling and John Bachus.

Viewed in this context the flow of history -- marked by the Prussian conscription decree of 1814, the revolutions of 1848, and Bismarck's ascendancy to the Presidency of Prussia in 1862 -- constitutes a series of time related events that impacted the lives and descendents of a large number of Prussian men. In this sense, and from the perspective of application design, historical and genealogical lines are morphologically equivalent in that they can be viewed as largely identical list data structures. Given this structural similarity, each list item contains both *real data* and *meta-data* elements. Real data items constitute the informational substance of applications such as the California History Forum – for example, information such "Wilhelm Stelling was born in Hanover in 1846 and was the son of Claus Stelling who was born in that city on October 10, 1803. The reference to Wilhelm's father, Claus, connotes the presence of meta-data elements called *predecessor item pointers*, which in this case point one generation back to an item containing information about Wilhelm's father. Each list item also contains

*successor item pointers* which, in this illustration, if followed forward subsequently through four family generations, terminate with the author of this article. Without much conceptual difficulty one can see how a list-based approach to the organization of genealogical information is directly transferrable to designing storage and processing resources for an online application similarly dealing with historical data. As an illustration, an historical data list item containing real world information about the German revolutions of 1848 would also have predecessor and successor meta-data elements pointing respectively backward to the Prussian conscription act of 1814, and forward to the appointment of Bismarck as Prussia's President in 1862. When the structural similarities between historical and genealogical list-based data are integrated into a single application design, a unified graphic display of this information is possible as shown below:




Currently, the California History Forum is a work in progress. Application platform objectives -- the integration of historical and genealogical data resources that will meet the cross-cultural informational needs of a broad user community – are being met. Success has been possible, however, only because time was taken from the outset to define carefully the platform's design parameters. Because a common list processing methodology was chosen to support the application's architecture, coding workload has been kept to minimum. Single stand-alone processing routines and data objects now provide a wide range of variegated historical and genealogical functions. In this sense overall function and form have been integrated into an emerging web platform that reflects the importance of reasoned application design.