

FedGIS Conference

February 24–25, 2016 | Washington, DC

Taking GIS Retrospective to the Federal Level: Comments on the Slide Presentation Outlining Seminar Roots

Dr. Barry Wellar

Seminar Organizer and Chair

Principal, Wellar Consulting Inc.

Professor Emeritus, University of Ottawa



Applied Research Seminar

***Mining U.S. Federal Agency
Materials for GIS Nuggets***

Taking GIS Retrospective to the Federal Level: Comments on the Slide Presentation Outlining Seminar Roots

In these comments I briefly explain the content and purpose of each slide used to introduce the seminar. As indicated by the title, emphasis is on seminar roots, which for the purposes of this report are comprised of thoughts, drivers, activities, and goals. I believe that the remarks are of particular value to those not in attendance at the seminar, or did not participate in discussions with me or presenters during the conference.

SLIDE 2

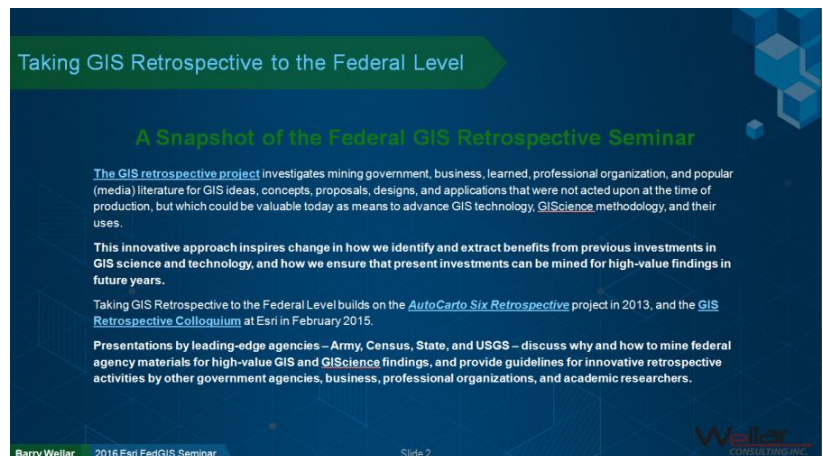
Taking GIS Retrospective to the Federal Level: A Snapshot of the Federal GIS Retrospective Seminar

Comment. The snapshot text of this slide is what it is, namely a brief statement which fits on a PPT slide and can be overviewed in about 90 seconds for some audiences, and 30 seconds for others, such as that at the 2016 Esri FedGIS Conference.

However, let us not underestimate what lies behind the snapshot. In this innovative seminar, via presentations by leading-edge U.S. federal agencies – Census Bureau, Department of Defense, Geological Survey, and Smithsonian Institution – we are “running with the big dogs” in the evolution of GIS technology and GiScience methodology and their uses.

Further, as a result of GIS retrospective work to date, we have compiled a substantial body of readings which are also leading edge in terms of tying together contributions to the past, present, and future literature on GIS technology, GiScience methodology, and their uses.

In the remainder of the commentary I provide a paragraph and occasionally several paragraphs about each slide, and include links to pertinent materials which are available online.



SLIDE 3

Taking GIS Retrospective to the Federal Level: Initial Insights from Four Core Agencies: Census, DoD, SI, and USGS

Comment. The agencies selected for this seminar have outstanding records of using GIS technology and GIScience methodology over many years for policy, program, plan, and operations purposes. In addition, the seminar benefits from the diverse and societally important mix of spatially distributed subject matter which is considered by individual agencies, and by the group of agencies collectively.



SLIDE 4

Seminar Roots: Thoughts, Drivers, Activities, Goals: Origins of the GIS Retrospective Approach

Comment. Many readers no doubt incorporated the retrospective approach in productions during their careers in academe, government, and business, and especially in situations such as expert witness cases and other activities explicitly involving precedents. However, generally speaking the retrospective aspect was likely just one of many elements of research design.



The idea of an innovative GIS and GIScience project which focuses on the retrospective approach began to take root during the production of *Foundations of Urban and Regional Information Systems and Geographic Information Systems and Science*, a book celebrating 50 years of annual conferences (1963-2012) sponsored by the Urban and Regional Information Systems Association.

While discussions with a number of people about the design of the *Foundations* book were helpful in developing GIS retrospective concepts, exchanges with the late W.L. (Bill) Garrison

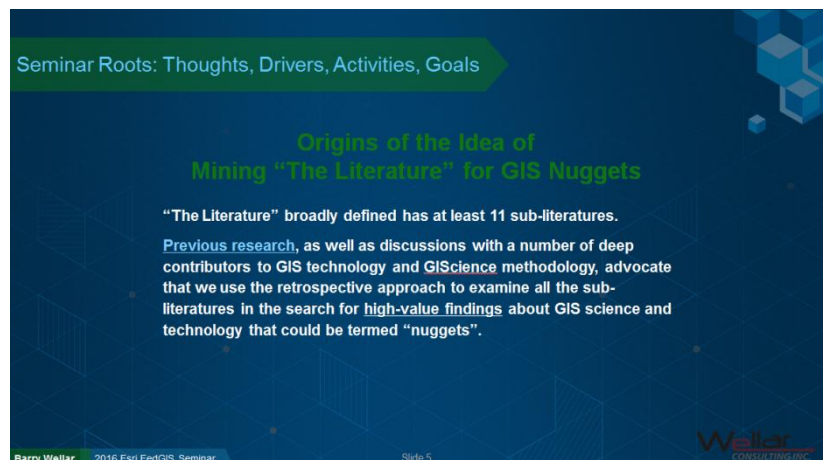
(UC-Berkeley) were most instructive regarding the factors at play in the evolution of GIS technology and GIScience methodology.

Our communications covered many topics, including: contributions of original research and derivative research to the unfolding of scientific inquiry; relationships between curiosity-driven (or pure) and client-driven (or applied) research; options and alternatives left behind or set aside when policy, program, planning, and research decisions are made; and, the often unquestioned or easy acceptance of purportedly new ideas which are not new at all but have actually been around for years. Prof. Garrison's offer to provide counsel was instrumental in the decision to test drive the GIS retrospective idea.

SLIDE 5

Seminar Roots: Thoughts, Drivers, Activities, Goals: Origins of the Idea of Mining "The Literature" for GIS Nuggets

Comment. In 2005 I participated in the Symposium on Projecting Geography in the Public Domain in Canada. The symposium was sponsored by Royal Canadian Geographical Society, Canadian Association of Geographers, Canadian Council on Geographic Education, and Ontario Association of Geographers, and my commissioned assignment was to prepare the report on *Geography and the Media*.



The long story short is that to put the media (a.k.a. popular literature) in context, I identified eleven different bodies of literature which could be pertinent sources of publications on geographic matters – Learned; Popular (Media); Legal; Regulatory Agency; Oversight Agency; Professional; Public Interest; Special Interest or Vested Interest; Corporate/Institutional-Public; Corporate/Institutional-Private; and, Other Productions.

While there could well be more bodies of literature, the eleven bodies identified during the Geography and the Media project are sufficient to make a key point. That is, when it comes to the education, training, research, operations, management, and other aspects of developing and using GIS science and technology, there is potentially a very diverse and large 'literature' which has been accumulating over the past 50 or so years.

And, in a similar vein, there is potentially a very diverse and very large “literature” which has been accumulating over the past 50 or so years on the logical constructs of GIScience inquiry, namely, catalogues-cataloguing, hypotheses-hypothesizing, and theories-theorizing, which in turn serve two primary objectives of scientific research: add to geographic data, information, and knowledge, and add to ways of continuing to add to geographic data, information, and knowledge on spatial patterns, distributions, flows, processes, interactions, dynamics, etc.

The idea of mining this literature for GIS nuggets probably stems from my upbringing in Northern Ontario (hardrock mining country), and then graduate school when I spent four years (two years at the masters level, two years at the PhD level) in a seemingly non-stop examination of books, dissertations, journal articles, manuscripts, conference proceedings, and most any other form of publication that I encountered through course readings, literature searches, referrals, etc. As some readers may recall or are currently in the process of experiencing, establishing that one’s research is in fact “original” can be a daunting task.

For those not familiar with the mining process of extracting a small but valuable amount of gold, silver, uranium, and other precious metals from a much larger amount of ore, perhaps reference to the principle of “total due diligence” might convey what I have in mind regarding value-added findings.

SLIDE 6

Seminar Roots: Thoughts, Drivers, Activities, Goals: Mining Federal Agencies for GIS Nuggets

Comment. As a personal case in point which ties in with the seminar, during my graduate school years of literature mining or doing due diligence almost 50 years ago, my tasks included the quest for findings which contributed to the GIS and GIScience research that I was engaged in on projects funded by U.S. federal agencies such as USGS, NASA, DHEW, and NCHRP.

And, as a spin-off, I was subsequently engaged in research on projects funded by agencies such as OMB, DHUD, Census, NSF, and the Army Corps of Engineers.



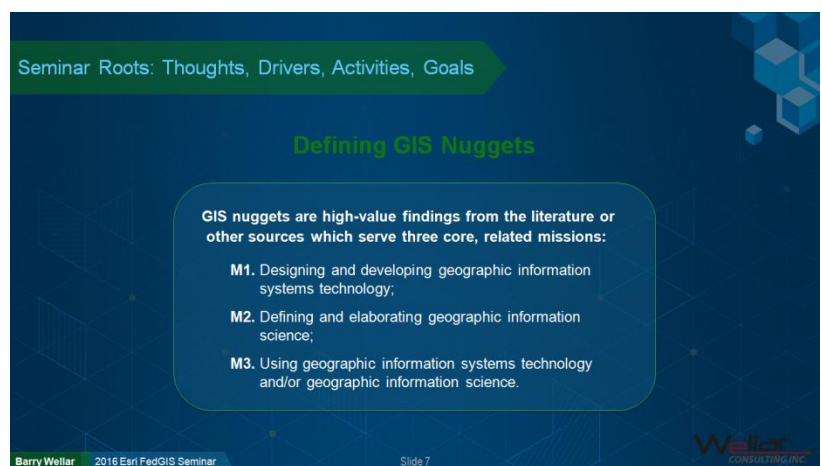
In all cases I was obliged to take into account pertinent data, information, and knowledge that had already been published, on paper, and now I am involved in asking some of these same federal agencies about their thoughts on mining their own literature.

At the risk of stating the obvious, major contributors to both the GIS technology literature and the GIScience methodology literature over the past 50 or so years are U.S. federal agencies. It therefore follows that if we are going to mine the GIS technology and GIScience literature for “nuggets”, a preeminent place to start is with these agencies.

SLIDE 7

Seminar Roots: Thoughts, Drivers, Activities, Goals: Defining GIS Nuggets

Comment. As for the term nuggets, in the GIS retrospective project nuggets are findings but, as indicated in the slide titled Defining GIS Nuggets, and the comments above, these findings are not of your everyday or trivial variety. Rather, these findings are deemed to be nuggets because of the level of value-added that they bring to significantly advancing thoughts and actions involving GIS science and technology, and their uses.



The findings presented in Table 1 are among the kinds of findings that came to mind when developing the idea of mining the literature for GIS (and GIScience) nuggets.

Table 1. A Selection of the Kinds of “Findings” that Could Arise as a Result of Mining the Literature for GIS Nuggets

1. Finding GIS lessons already learned which inform about things yet to be done.
2. Finding GIS lessons learned which inform about things that should not be done.
3. Finding useful GIS applications developed previously.
4. Finding that GIS applications thought to have been developed were not developed.
5. Finding that a GIS application already exists for a current need.
6. Finding that a GIS application does not exist for a current need.
7. Finding GIS maxims that are pertinent now.
8. Finding GIS maxims that are not pertinent now.
9. Finding that a GIS maxim was adopted by some but not by others.
10. Finding a GIS advisory that was not adopted.

Table 1. A Selection of the Kinds of “Findings” that Could Arise as a Result of Mining the Literature for GIS Nuggets (CONTINUED)

11. Finding that a GIS advisory was not properly implemented.
12. Finding that a GIS issue debated today is not new.
13. Finding that research already exists for a GIS issue raised today.
14. Finding that a GIS problem raised today is not new.
15. Finding that answers already exist for GIS questions raised today.
16. Finding that a GIS proposal presented today is not new.
17. Finding that research already exists for a GIS proposal presented today.
18. Finding that GIS claims made today are already a matter of record.
19. Finding earlier GIS circulars that are pertinent now.
20. Finding earlier GIS images that are pertinent now.
21. Finding earlier geospatial data series that are pertinent now.
22. Finding earlier GIS performance tests that are pertinent now.
23. Finding earlier GIS studies that are pertinent now.
24. Finding earlier GIS experiences that are pertinent now.
25. Finding earlier geospatial decisions that are pertinent now.
26. Finding that procedures already exist for deriving “analytics” currently touted/promoted.
27. Finding that procedures already exist for deriving “analytics” currently in demand.
28. Finding that performance measures previously developed are more robust than those in preparation.
29. Finding that current documentation procedures permit future searches for GIS nuggets.
30. Finding that current documentation procedures inhibit future searches for GIS nuggets.

SLIDE 8

Seminar Roots: Thoughts, Drivers, Activities, Goals: *AutoCarto Six Retrospective*

Comment. After the 1983 AutoCarto Symposium, I remained in contact with many of the contributors to the technical program and to the *Proceedings* (two volumes, more than 200 authors, 110 papers, 50 abstracts, 1100 pages of text). Common features that I encountered among contributors were their

Seminar Roots: Thoughts, Drivers, Activities, Goals

AutoCarto Six Retrospective

37 authors of papers given at the 1983 International Symposium on Automated Cartography (a.k.a. "AutoCarto Six") accepted an invitation to re-visit materials written 30 years previously about GIS and GIScience.

This innovative publication demonstrates why and how GIS science and technology nuggets can be found by mining previously published materials.

Barry Weller 2016 Esri FedGIS Seminar Slide 8

Weller CONSULTING INC.

continued enthusiasm for GIS-related education, training, research, operations, applications, and management initiatives, and an inclination to reflect on the why's, how's, and implications of GIS science and technology evolution.

Following from the URISA **Foundations** experience, and numerous exchanges with GIS and GIScience colleagues, including Bill Garrison in particular, it was decided to celebrate AutoCarto Six by inviting authors to re-visit papers and abstracts written 30 years previously about numerous technical, technological, methodological, operational, political, societal, and other aspects of GIS and GIScience.

Important consequences associated with the retrospective visit to AutoCarto Six include the publication of 25 papers by 37 authors in **AutoCarto Six Retrospective**, and the decisions by Jack Dangermond, President of Esri, to provide funding to support that publication, and then a follow-on GIS retrospective colloquium at the Esri campus in Redlands, CA.

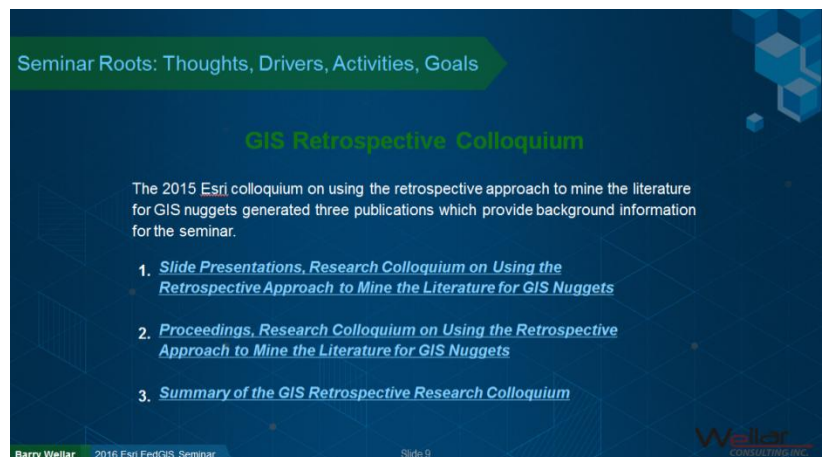
SLIDE 9

Seminar Roots: Thoughts, Drivers, Activities, Goals: **GIS Retrospective Colloquium**

Comment. Authors of colloquium papers and slide decks were asked to assume a directive research posture, and prepare written and verbal advocacy statements on behalf of a body of literature. The objective was to begin to assemble arguments which promote mining a body of literature, or component of that body of literature, for GIS nuggets. Then, using the papers and slide decks as starting points, participants in colloquium discussions were encouraged to share ideas about whether, why, and how to (retrospectively) mine the respective bodies of literature for GIS nuggets.

Two colloquium outcomes pertinent to the seminar were achieved. First, upon review of colloquium materials and associated discussions, Esri made a business decision to support a follow-on GIS retrospective project. It was mutually agreed that a seminar was a logical follow-on to the colloquium.

Second, since the colloquium was the equivalent of a small-scale pilot study, only a limited number of bodies of literature could be considered in presentations and discussions. Colloquium participants agreed that publications by U.S. federal agencies are central to the



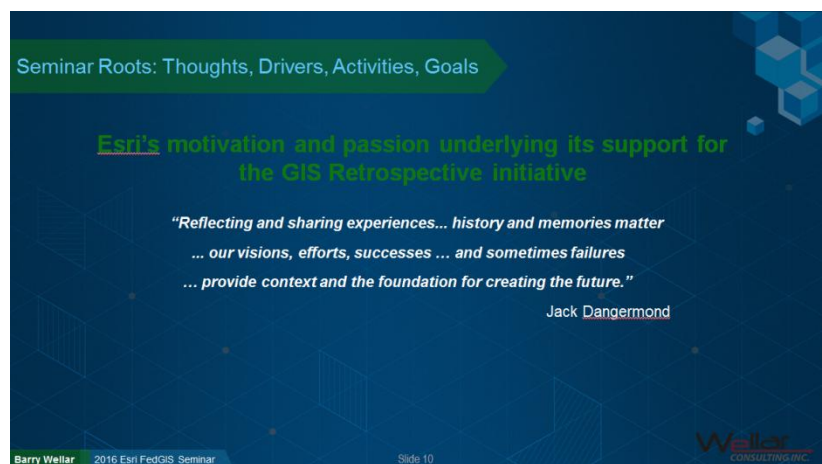
evolution of GIS technology and GIScience methodology, and their uses, and represent a prime body of documentation to be mined for GIS nuggets.

The seminar is therefore an immediate derivative of the colloquium, which underscores or highlights the value of reviewing the colloquium papers and slide decks in preparation for the seminar, and/or for putting the federal agency presentations in context.

SLIDE 10

Seminar Roots: Thoughts, Drivers, Activities, Goals: Esri's Motivation and Passion Underlying Its Support for the GIS Retrospective Initiative

Comment. Esri is a leader in GIS technology research, development, and applications, and has occupied a premier place in the GIS industry for more than four decades. As a result, Esri is a major contributor, directly and indirectly, to most if not all the eleven bodies of literature identified in the slide titled Origins of the Idea of Mining “The Literature” for GIS Nuggets.



However, Esri is not a research institute affiliated with a university or a government, nor is it a government agency, each of which tends to be regarded as more appropriate supporters of the AutoCarto Six Retrospective project, the GIS Retrospective Colloquium, and this seminar.

It is therefore appropriate to acknowledge and applaud the support by Esri, which has been instrumental in bringing together people and ideas. I believe that the seminar will reward that support by generating more ideas, engaging more people, and creating and implementing an action agenda to promote and guide using the retrospective approach to vigorously mine federal agency materials for GIS nuggets.

I therefore strongly recommend that readers have all due regard for the whole and each of the parts in the statement by Jack Dangermond.

As participants in the GIS retrospective initiative are aware, the thoughts expressed -- ***Reflecting and sharing experiences... history and memories matter... our visions, efforts, successes ... and sometimes failures ... provide context and the foundation for creating the future*** -- are pertinent to Esri's support of the *AutoCarto Six Retrospective* project, the Colloquium on Using the Retrospective Approach to Mine the Literature for GIS Nuggets, and the seminar, *Taking GIS Retrospective to the Federal Level*.

In addition, however, the Dangermond statement is pertinent to developing and implementing a robust action agenda which includes creating opportunities, as well as taking advantage of opportunities, to mine “The Literature” for GIS science and technology nuggets.

SLIDE 11

Seminar Roots: Thoughts, Drivers, Activities, Goals: Presentation Guidelines

Comment. Suggesting guidelines to federal agencies on how to design presentations is a delicate matter. As a result, the approach taken for the seminar is to present general recommendations for consideration by agencies so that we are all pretty much on the same page, and not attempt to micro-manage content. The following recommendations are recalled to illustrate what I believe to be the kinds of terms of reference that bear repeating in future GIS retrospective seminars and related events involving federal agencies, or other entities:



- ◆ *Describe in general terms why your agency's materials should be examined for GIS nuggets.*
- ◆ *Provide examples of GIS nuggets that your agency has discovered over the years by mining what your agency had previously published.*
- ◆ *Provide examples of GIS nuggets that have been brought to the attention of the agency by others who have mined agency materials.*
- ◆ *Provide examples of nuggets that your agency has discovered over the years by mining what other agencies had previously published.*
- ◆ *Ensure that links to digital references are included in the agency reports so that published works are accessible online.*
- ◆ *Provide a reading list of publications reporting on the use of the retrospective research approach by your agency.*
- ◆ *Provide a reading list of publications reporting on the use of the retrospective research approach by your agency.*
- ◆ *Scan paper documents of importance so that they are more readily available.*

In closing this section, I want to underscore the last term of reference about scanning paper documents.

It cannot be over-emphasized that many early, fundamental contributions to the literature on GIS technology, GIScience methodology, and their uses, were paper productions. These contributions to the literature may have been relatively difficult to obtain at the time of publication, with perhaps only 500 or even just 200 copies of a conference proceedings being published, and are likely to be even more difficult to obtain today if they are only available in their original paper form.

Several significant cases in point were encountered when assembling the reading list (***Reading List: Using a Retrospective Approach to Mine the Literature for GIS and GIScience Nuggets***), leading to their being scanned by Esri Canada and Wellar Consulting for the convenience of readers. It is expected that agencies engaged in GIS retrospective activities would reap an excellent return from such a scanning service.

SLIDE 12

Seminar Roots: Thoughts, Drivers, Activities, Goals: Background Readings for the Applied Research Seminar: Mining U.S. Federal Agency Materials for GIS Nuggets.

Comment. Four bodies of literature comprise the initial reading list, which can be viewed at <http://www.wellar.ca/wellarconsulting/SeminarReadingList.pdf>.

1. Papers prepared for *AutoCarto Six Retrospective* (section A);
2. Papers and slide presentations prepared for the Research Colloquium on Using the Retrospective Approach to Mine for GIS Nuggets (section B);
3. Retrospective project papers published in the *International Journal for Applied Geospatial Research* (section C); and
4. Publications from academic, government, professional organization, and other sources to supplement the AutoCarto Six Retrospective papers, and the colloquium papers and slide presentations (section D).

For two reasons, the list of references compiled for the seminar is a modest, illustrative effort by design.

First, a comprehensive search of “the literature”, of which 11 sub-literatures are identified in a previous slide, is beyond the purview of the GIS retrospective seminar project. Hence, the reading list is presented as being illustrative



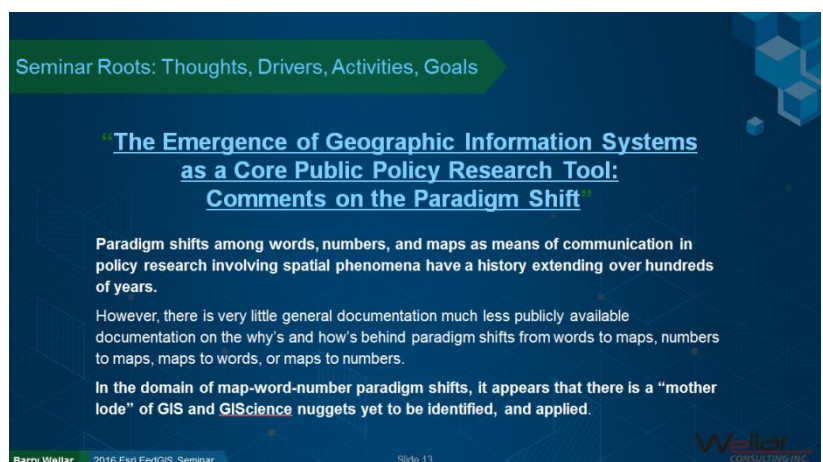
and suggestive. It is my perception that there are many worthy entries to be added to section D, which looks outside the GIS retrospective project productions to publications from academic, government, professional organization, and other sources.

Second, the seminar is more an element of a pilot study than of a pre-test or a trial run, so it is appropriate to cast a wide and engaging net when selecting references to include in a preliminary compilation. It is my expectation that the agency presentations will be instructive as to how other federal agencies could contribute references to the file of retrospective GIS science and technology publications.

SLIDE 13

Seminar Roots: Thoughts, Drivers, Activities, Goals: Friday Lunch Discussion Club (FLDC) Presentation, “*The Emergence of Geographic Information Systems as a Core Public Policy Research Tool: Comments on the Paradigm Shift*”

Comment. Since the mid-1960s, which marks my beginnings in the field of GIS science and technology, there have been numerous paradigm shifts among words, numbers, and maps by municipal, provincial/state, and federal or national governments conducting policy research involving spatial entities. (There were word-number-map paradigm shifts before the mid-1960s of course, but that is a topic for another day.)



In the FLDC presentation I identify dozens of policy research domains of a spatial nature, and I emphasize that paradigm shifts among words, numbers, and maps in the policy research process do not usually occur “willy-nilly”. Rather, and more often than not, the shifts among paradigms are justified on the basis of reasons deemed appropriate by those responsible for policy research choices and outcomes.

The FLDC presentation directly ties in with the seminar in that it points to a very significant if-then relationship. That is, if there is limited documentation on the reasons behind paradigm shifts from words to maps, numbers to maps, maps to words, or maps to numbers, then there is limited information available for policy researchers or anyone else wanting to know more about the role played by the respective paradigms in policy research situations.

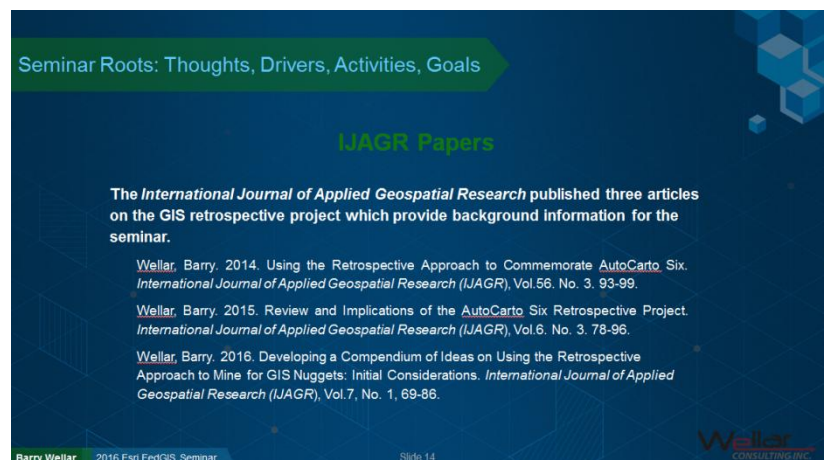
At the risk of belaboring the obvious, time is of the essence in documenting past paradigm shifts. The seminar is therefore a useful means of beginning to get a handle on the challenges and opportunities which characterize the state of mining federal agency productions for information about paradigm shifts and, potentially, about GIS nuggets.

And, the seminar is also a useful venue for contemplating the future value of documenting the reason(s) behind present-day spatial policy research paradigm shifts.

SLIDE 14

Seminar Roots: Thoughts, Drivers, Activities, Goals: IJAGR Papers

Comment. The three papers in the *International Journal of Applied Geospatial Research* provide a comprehensive overview of the GIS retrospective project from its origins through to the time of the seminar. They are therefore pertinent readings for seminar presenters, attendees, and non-attendees who view seminar materials published online.



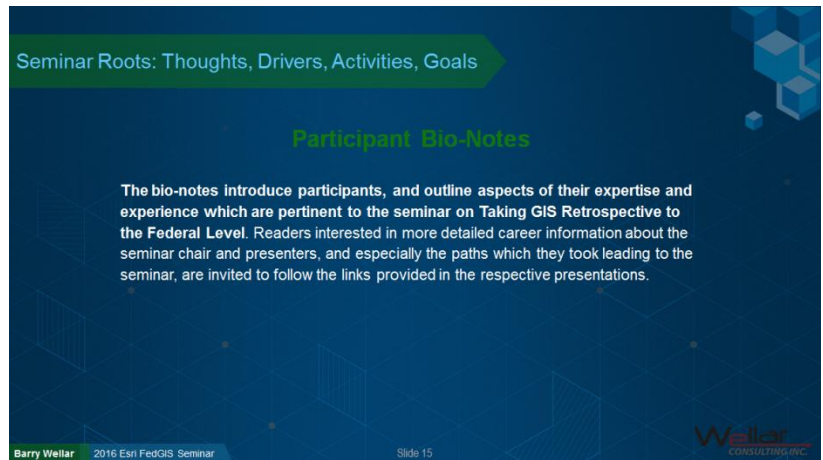
In addition to their value to the seminar, however, the fact that they are published in *IJAGR* has its advantages because of the *IJAGR* mission to

“... provide planners and policy analysts, practitioners, academicians, and others using GIS&T [geographic information science and technology] useful studies that might support decision-making activities.”

I believe that the papers published in *IJAGR* will help to broaden the base of GISPs in particular, and researchers in general who become engaged in using the GIS retrospective approach to mine materials of federal agencies (and other entities) for GIS science and technology nuggets.

SLIDE 15

Seminar Roots: Thoughts, Drivers, Activities, Goals: Barry Wellar Bio-Note



Barry Wellar, Principal, Wellar Consulting Inc., and President, Information Research Board (IRB) Inc., was retained by Esri to organize the GIS retrospective seminar. He is Professor Emeritus, University of Ottawa, a past president of the Urban and Regional Information Systems Association, and among other honours he is recipient of the Horwood Award in Information Systems, recipient of the Ullman Award in Transportation, recipient of the Anderson Medal of Honor in Applied Geography, and a member of the GIS Hall of Fame.

Dr. Wellar was Director of the 1983 AutoCarto Six Technical Program and editor of the proceedings, *Automated Cartography: International Perspectives on Achievements and Challenges*. In 2012 he edited *Foundations of Urban and Regional Information Systems and Geographic Information Systems and Science*, celebrating the 50th anniversary conference of the Urban and Regional Information Systems Association.

In 2013 he edited *AutoCarto Six Retrospective*, a 30-year commemorative volume, which was the basis of the GIS retrospective activity supported by Esri. He organized the GIS Retrospective Research Colloquium held at the Esri campus in Redlands in 2015, and is responsible for the Applied Research Seminar, *Mining U.S. Federal Agency Materials for GIS Nuggets*, 2016 Esri FedGIS Conference.

A number of his GIS science and technology presentations and documents are accessible online at various websites, including: slideshare.net, transport-action.ca, urbanneighbourhoods.ca, cag-acg.ca, wellarconsulting.ca, geomatics.uottawa.ca, and urisa.org.

SLIDE 16

Seminar Roots: Thoughts, Drivers, Activities, Goals: Acknowledgements

Comment. Successfully arranging a seminar of this nature requires receiving a considerable amount of support, with emphasis on serious buy-in by those in conversations with agencies about making a presentation, and by officials making presentations on behalf of agencies. I am most appreciative of that assistance, and I would be pleased to discuss how lessons learned during preparations for Taking GIS Retrospective to the Federal Level might be of value in the organization of a subsequent government, business, academic, or professional association GIS retrospective seminar, colloquium, or related activity.

