Notes for talk entitled "Rules and Tools: Reflections on a Career in Geomatics" given to the Geomatics Atlantic Conference, Fredericton, October 2010.

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1. Appreciate the invitation on the occasion of 50th anniversary of the SE/GGE Department. Haven't been much involved with the dept. for past 12-15 yrs., but have always seen myself as a surveyor, and am immensely proud of my home department.

2. Institutional history of the Department (both professional and academic). Focus on faculty and alumni and their accomplishments. Import of European research tradition; high standards and expectations. World class dept., probably best in the world between 1975 and 1990, still top ranked research dept at UNB.

3. Intellectual history: building a narrative based on those traditions, but integrating American technology, institutional perspectives from around the world (South African and New Zealand traditions, for example), rounded out by a new Canadian synthesis.

3.1 History of ideas: note experience walking around the exhibit hall at the 2010 FIG Conference in Sydney. Was interesting to see how the ideas,

language and perspectives we developed are now embedded in the wares on display – might think of it as institutional DNA – but the history and context long since forgotten. Inevitably, the archictects and authors of this history, albeit perhaps more quickly than expected, have arrived at the title of "anonymous".

4. It is this theme I'm particularly interested in, and want to begin to sketch out in this brief presentation, within the framework of the evolution of the modern geomatics narrative in Atlantic Canada.

Important in its own right but also as a contribution to understanding and addressing perhaps the most important challenge facing Atlantic Canada: the need to build and sustain a culture of innovation and entrepreneurship in a time of deep change.

4.1 Caveats: surveying perspective (recognize influence of forestry, computer science and other perspectives). And NB perspective, within what was, at crucial points, a genuinely Maritime (and to a lesser extent) Atlantic Canadian narrative.

5. Reflections on the immediate post-war period. Surveying organizations a relic of an honourable but increasingly distant past. Remnants of the

“Interior” role in depts. of lands and surveys, land and forests, etc.

Saturday visits to the old Crown Land Office to pick up my dad - the dickension feel of the place

5.1 The end of the long tail of the 2nd modern era of western exploration (mapping of the continent); from the voyagers to MacKenzie and Thompson to the great continental surveys of the mid 19th century - Palliser and the British North America Exploring Expedition, John Stoughton and the birth of the DLS , Sandford Fleming and the railway surveys for the CPR.

5.2 Embedded a distinct set of values, traditions and customs. The place of technology within this world view (the staff compass and chain; the curtas and brunswicka calculators).

Era dramatically and qiuckly coming to an end - although the deep transformation just beginning no more understood then, then the similar changes underway now.

6. Transformation shaped in part by public policy (postwar reconstruction plans) and by immense pent up demands. The boomers arrive.

subsequent thirty year explosion ...unparalleled in our history ... building the modern institutions and infrastructure underpinning a market-based economy. Emergence of the middle class society and the development as well of the modern social institutions based upon inclusion and fairness. The modern miracle.

6.1 Role of surveying and mapping agencies in support of this agenda. New beginnings in the 50s responding to new needs and new technologies, and driven by a new breed of leadership.

6.2 Responding to pent up demands and new needs: modern forest management, rural electrification, national highway system, urban infrastructure and especially land development (the VLA, CMHC) for the vets and their families.

6.3 The leadership and legacy of the "greatest generation." A new breed of surveyor (artillery, airforce, etc. background). Contrast for example with survey and engineering officers and their impact on federal organizations provides interesting alternative. The conservatism and elitism of geodetic and topo surveys reflected the military survey tradition.

6.4 And their counterparts in government and the private sector – shared experiences, understanding

of the importance of geography. Farley Mowet's autobiography example.

7. Technology of course came to play a crucial role, first as an enabler to the vision, later in defining and direction of that vision.

With a couple of important exceptions (e.g. photogrammetry) the core technologies for the new narrative all evolved out of the war: radar and electronics, space sciences and computers.

7.1 Radar was most visible in the immediate postwar era and had the most dramatic impact (a student in the era of Shoran and edm). Surveyors and their students as nerds: MRA2 and 3; Geodimeter Model 4 (that and the HP35/45)

7.2 The iconic role of space age in the 60s and the emergence of sateliite navigation and remote sensing technologies.

7.3 computers started slowly: computing tools (LGP 30 story) ... note analytical photogrammetry and computing story dating from the very early 1950s. ... much more profound vision taking hold by the early to mid 1960s ... 1968 databank conference. ..

Personal note: 1969 the year I graduated: landing on the moon and the beginnings of DARPA funded net.

8. Another component of the story, also emerging from WW2, systems theory and the integration of innovative management practices and technology advances into systems for developing and managing large, complex and dynamic systems. Story of great success (landing on the moon) and great failure (Vietnam and quote about the failure of the best and brightest brought together by McNamara)

8.1 This is the world I entered as a grad student. Initially dismissed in my home department, led to LIM, the multipurpose cadastre and NSDI.

9. Emergence of a new intellectual and professional framework

10. The Institutional impact of all of this began with, and was deeply informed by the NB Control Surveys initiative. EDM made it possible; satelite positioning made it irrelevant. Yet, the core ideas that came out of the control survey program, including integrated survey areas and the databank ideas of the late 60s provided the context, the worldview, the technical DNA if you will, that informed the MPC and SDI concepts.

10.1 Subsequent bold public policy and technical vision based upon public entrepreneurship, technical innovations and major advances in technology. NB and the Maritimes as world leaders: APSAMP to LRIS to GIC to SNB. Driven by a combination of well-defined needs and leadership. Story of energy and creativity, focus and discipline, high esprit de corps, and bed rock commitment to a public ethos.

Must note the limits to this vision from the outset, especially with respect to the role of industry and more generally of the market

10.2 Public innovation largely played out by the 70s: combinations, including focus on massive social re-engineering (didn't work by the way and created huge debt levels) and the professionalization/centralization of public sector management: cult of management science - "can't manage what you can't measure". Over time much of what used to be intuitive and instinctive replaced by the rule-bound and rationalised.

10.3 Public geomatics agenda in the region came back strongly for a brief period in the 80s and 90s as part of the "knowledge society" agenda and emphasis on technology to drive an innovation agenda. Peaked in the late 90s – e.g. going live

online and the Melbourne story, golden spike for NB.

10.4 But a brief, fleeting period of renewed energy and passion couldn't be sustained Greatest generation now mostly gone; energy and sense of purpose fading Centre of economic gravity moving on. Loss of faith.

11. Role of the private sector initially largely supporting public initiatives (products and services). Formation of NBLS association in early 50s, vendors, etc.

11.1 Over time the growing importance of technology, especially IT. Emergence of Wintel environment and private sector defining standards and agendas. Vendor wars of the 80s in NB, and "the theology of topology".

Increasing challenges of public agencies to respond to the technology impreative: e.g., from computer-assisted mapping to DBMS to GIS to spatial analysis and real time data integration. Challenges of shifting paradigms – my year with EMR

11.2 Transition in the 80s. Thatcher/Reagan era, downsizing govt. – outsourcing and privitisation.

Teranet story (useful to remember how it started). Contribution to the story of "commodification".

Goodchild has noted that "by the 1970s it was apparent that it was no longer going to be sustainable to have a world in which national governments sustained geographic information." Inciteful comment at one level – certainly wasn't obvious to those running the public agencies – but betrays a lack of understanding of the deeper institutional issues at the same time.

11.3 Market-driven environment that emerged in the 90s during the dotcom era. In early days of renewed interest in geomatics and contributions to innovation by govt in 80s and 90s, important, positive contribution of private sector in support of ambitious public goals. Mostly negative impact when govt tried to develop industrial policy (NB remote sensing and Derenyi's story for example).

11.4 From first steps in business geomatics to the world of Google maps. Irony that much of the technical infrastructure for this brave new world created in a period of frenzied capitalism that featured madness and mass destruction (the fiber cable story), but in the process created a new reality.

11.5 Schumpeter and creative destruction. The age of neogeography and Google Maps.
Just 5 yrs since the release of Google Maps and Google Earth, the company may well be the world's most important mapmaker. More than 600 million people around the world have downloaded Google Earth.

12. Where to next.

13. On the home front technology of course will continue to be a driving force. If anything the pace will continue to pick up. Nano, info, and especially bio story.

13.1 Where is it all leading: futurist studies as projecting current hopes and aspirations. Intellectual popcorn….

13.2 But some trends are reasonably clear. Tapscott and Williams and their new book: *Macrowikinomics: Rebooting Business and the World* are perhaps right to argue that the web is the most radical force of our time.

In their earlier book "Wikinomics" (4 yrs ago - an eternity in internet time) they looked at its impact on particular businesses. In this new book they examine how it is shaking up some of the core

institutions of modern society: the media, universities, government and so forth.

Similarly, Kevin Kelly, founding editor of *Wired* Magazine, who, in his new book *What Technology Wants* makes the case technology as an unstoppable force of nature.

13.4 Maybe so, but what a strange world is being fashioned: a synthetic, tentative, constantly evolving reality informed primarily if not exclusively by the religion of materialism - and its ever present agent advertising.

13.5 If nothing else, this uninspired narrative is likely to be tempered by the economic, environmental, demographic and other challenges of the next decade.

13.6 I happen however to believe that there are also much deeper forces at play – something I will come back to in a moment.

14. In the meantime, what should prove more interesting for the Geomatics world will be the shift of focus will move to emerging countries, especially group of middle income nations likely to power the economic agenda for the next 20 yrs.

14.1 Focus on public institution building (friction between China and Google good example). Google's description as
"The Agnostic Cartographer: How Google's open-ended maps are embroiling the company in some of the world's touchiest geopolitical disputes".

14.2 Emerging business perspective. Economist (Aug 7/10): 9 of the world's 30 largest listed firms are emerging market companies that count the state as their dominant shareholder. Auto 21 and conventional wisdom re emerging markets versus Geeley and the purchase of Volvo.

15. In the longer term: The cultural historian Thomas Berry argues that the primary problem of the present era is that we're in between stories. Berry says the old story that bound Western culture, the story of reductionist science and redemptive religion, is breaking down. It simply no longer explains the world we are experiencing or the changes that confront us.

And the hunger for a new narrative is so palpable and so widespread.

The quest for meaning and value in a new world. The quest for inspiration.

15.1 One possible source of inspiration relates to the next frontier, back to the world of exploration and charting, the romance and traditions and values that once informed our profession: space exploration.

15.2 Back in the 50s and 60s .. space race as an extension of the cold war ...rocket engineers ... Sputnik and the Apollo Moon Landings. But for my part, always more interested in two other platforms: the Surveyor and Voyager missions.

15.3 Surveyor. The soft-landing Surveyor satellites which hit the Moon five times out of seven.

15.4 Voyager. In the summer of 1977, two small space vehicles sent on a mission to the far ends of our solar system. They have sufficient power for another ten years of operation, and that should grant them enough stamina to sail beyond the reach of the solar gases altogether.

15. 5 A period of deep change. Emergence of new values and directions. Hoping that the imagination and courage that informed western exploration will be embedded somehow.

16. In conclusion back to the SE/GGE Department. Individuals do matter, they matter a lot.

Department home to an amazing group of individuals who, despite very big egos and very different backgrounds and goals, forged a common bond. But one individual stands out – the conductor, who pulled it all together – Angus Hamilton.