

## **Reflections on the Indian NSDI**

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*“Anyone wishing to see what is to be must consider what has been.  
All the things of this world in every era have their counterparts in ancient times”  
N. Machiavelli, “The Prince”, 1514*

### **Abstract**

The international SDI movement is transforming an ever-increasing number of countries around the world into enthusiastic converts. At the same time, the boundary between GI and Information is becoming blurred as Geoinformation disappears into the Information melting pot. It may be the right time now to reminisce and to go back to the roots, to the much broader and older “Information Infrastructure” movement, whose rhetoric inspired SDI development. This article can be thought of as a modest archeological dig that stops at the first layer of excavation, i.e. the Information Infrastructure heritage of SDI, in order to draw some hopefully relevant conclusions for the Indian NSDI.

We quote extensively and comment on some of the ideas expressed in various SDI fora by GI experts such as Richard Groot, David Rhind, Ian Masser, Claude Luzet and by Information Infrastructure experts such as Susan Leigh Star, Ole Hanseth, Ernest J. Wilson III and Eduardo Talero. URL References are given only for the latter group, as this group may be less known to the readership of *Geospatial Today*.

### **1. Introduction**

On February 6, 2001 the “Vision and Strategy document for the creation of an Indian National Spatial Data Infrastructure (NSDI)” was unanimously adopted in an international conference in New Delhi. Participants representing the national and international Geo-Information (GI) community lauded the boldness of the Indian NSDI vision. They also emphasized some of the difficulties of such initiatives, such as the absence of a universal NSDI blueprint to serve as a model for implementation. In a self-critical mood, David Rhind also lamented the proclivity of the GI community to a terminology that is meaningless and alienating to decision makers and citizens alike, such as NSDI and other “insider” terms. Since simpler terminology is nowhere in sight, going back to the roots of the NSDI movement –the National Information Infrastructure– may be a practical way to mainstream NSDI rhetoric.

## 2. The roots of NSDI

NSDI as a concept is firmly rooted in the broader concept of National Information Infrastructure (NII), considered in the Clinton/Gore report to encompass:

- A wide and ever-expanding range of *equipment* including cameras, scanners, keyboards, telephones, fax machines, computers, switches, compact disks, video and audio tape, cable, wire, satellites, optical fibre transmission lines, microwave nets, switches, televisions, monitors, printers, and much more.
- The *information* itself, which may be in the form of video programming, scientific or business databases, images, sound recordings, library archives, other media, etc.
- *Applications* and *software* that allow users to access, manipulate, organize, and digest the proliferating mass of information that the NII's facilities will put at their fingertips.
- The *network* standards and transmission codes that facilitate interconnection and interoperation between networks.
- The *people* who create the information, develop applications and services, construct the facilities, and train others to tap its potential.

Other NII definitions quickly followed the Clinton/Gore original. In the first Global Information Infrastructure Conference in 1996 at Harvard University, Ernest J. Wilson III talks of NII as “this inchoate, multidimensional phenomenon, a turbulent and controversial mix of public policy, corporate strategies, hardware and software that shapes the way consumers use information and communications”. He mentions a variety of different definitions proposed by others, such as “NII is an extremely heterogeneous collection of local and regional information infrastructures and long haul networks, whose component parts will be developed at different rates and organised in different ways”<sup>1</sup>.

The founding fathers (and mothers) of NSDI repeatedly found inspiration in the NII rhetoric especially in the early NSDI days. After all, "there is no such thing as the immaculate *perception*", as the art historian Ernst Gombrich says. We simply can't think of things that we haven't got some model for already in our head. Most of the time when somebody creates something new they have built it from pieces of things they've seen before<sup>2</sup>.

Many authors have commented on SDIs, local, national, regional or global, but no real – accepted consensus exists on what is an SDI, writes Claude Luzet. Currently we have soft– and hard–, process– and product–, access– and progress–oriented definitions of SDI. This is not surprising. Disagreement is common in academia. Contrary to popular belief, scientific and academic disciplines do not constitute a high degree of consensus. On the contrary, one might define a knowledge field as a “commitment to engage in disagreements” as Susan Leigh Star reminds us<sup>3</sup>. But what is the essence of SDI?

## **2. The essence of SDI**

Richard Groot's position can be summarised as follows: The essence of the SDI concept is that there is no master architect. There cannot be a single organization responsible for designing and implementing some kind of SDI blueprint, especially at the national (NSDI) level. Instead, we can imagine an almost organic web of partnerships and relationships evolving purposefully within a given jurisdiction. It will sometimes be pushed by technology, sometimes pulled by market requirements. But at some point there will be a sufficient inter-connectedness of databases, a level of access to the data and use of the data, as well as the maturing interest of stakeholders, to participate and invest in the partnerships required for a nascent NSDI to be recognized.

The top-down approach will entail defining strategic goals, assessing priorities, developing implementation plans, and obtaining core funding. It will require some kind of institutional framework (lead agencies, steering committees, working groups for standards, etc., and monitoring arrangements). Examples of outputs which may be expected from the top-down approach are defining the fundamental geospatial data sets, building the clearinghouses, establishing metadata standards and access protocols, and resolving the information policy issues. Core funding for geospatial database development and networking, as well as for subsequent maintenance and upgrading, will also be key to defining the initial directions and priorities. This funding will invariably result from a combination of direct public investment and revenues derived from the sale of information products and services. While the debate continues over whether one should charge for public information, the reality is that some combination of direct investment and charging for products and services will be required.

The bottom-up approach will recognize the multiple local initiatives to build application-specific and enterprise-wide geospatial databases and will encourage their evolution towards a universal framework for accessing, combining and using the data through a process of proselytizing, providing incentives (especially shared financing) and imposing regulations (e.g., through standards regimes). Money talks and access to shared funding will be of special significance in advancing the NSDI agenda; but even more important will be the concrete evidence of the power and potential of an integrated infrastructure. How do Information Infrastructure advocates address this same issue?

## **3. Top down and bottom up strategies for NII**

In the first Global Information Infrastructure Conference in 1996 at Harvard University, Eduardo Talero of the World Bank presented a conceptual introduction to the broad topic of National Information Infrastructure (NII) in developing economies. He proposed a definition of NII that reflects the special concerns and priorities of this group of countries. He provided examples of NII initiatives, and described possible content and formulation approaches for NII strategies in developing economies. This section is essentially an extensive quote from his paper "National Information Infrastructure strategy for developing economies"<sup>4</sup> in the first Global Information Infrastructure Conference in 1996 at Harvard University.

Central to Talero's argument is the concept of a "*Strategic Information System*" which he defines as a nation-wide, information based social capability –including not only the technology but also the organisation, incentives, procedures and people– that has a strategic importance to the economy and enables forms and levels of economic activity central to the national development agenda. Talero proposes two partly overlapping approaches for NII strategy formulation, the top down and the bottom up approach:

***NII Strategy formulation – Steps of Top down approach***

- Identification of the strategic opportunities and needs for information and communications in the economy
- Definition of the strategic investments needed in information systems and telecommunication infrastructure to achieve the development opportunities above.
- Formulation of strategic goals and target dates for the NII. These are goals around which to rally the energies and resources of society.
- Agreement on reforms needed to eliminate constraints to widespread access to telecommunications and information services in society and to successful completion and sustainability of strategic investments.
- Assessment of the knowledge and skills required in the work force to implement the NII strategy and formulation of related education policies and institutional reforms.
- Determination of responsibilities for implementation and oversight of the NII strategy.

Talero suggests that a top-down approach to NII strategy formulation may be inappropriate, and a bottom-up approach may be adequate, when multiple strategic investment initiatives in NII are already ongoing. The bottom-up approach would aim to develop an action program that raises the profile and development impact of *already existing strategic information and telecommunication investment and reform initiatives*.

On the evolution of (close) Systems into (open) Infrastructures, Ole Hanseth argues that Information Systems may evolve into Information Infrastructures when (i) new and independent actors become involved in their development so that the development is not controlled by one actor any more; (ii) existing Information Systems are linked together and the development of the linked networks is not controlled by one actor. In fact, an Information System may be considered an Information Infrastructure when the goal is *that it shall grow to become part of and Information Infrastructure in the future*<sup>5</sup>.

***NII Strategy Formulation – Steps of Bottom Up approach***

- Assess the current strategic information systems projects in the country, their scope and importance, their budget and status, and the common constraints and difficulties they encounter. Decide which projects do not merit inclusion in the strategic portfolio.
- Redefine goals and deadlines. Seek concrete development impact and timely completion. Raise public profile and commit to public accountability. Raise quality standards. Decide on a policy and investment program to address the common needs

of the ongoing strategic projects and to ensure their timely completion and maximum economic impact.

- Agree on reforms needed to eliminate constraints to successful completion and sustainability of strategic projects above. Reforms may be similar to those formulated under the top-down approach.
- Assess the knowledge and skill gaps that threaten successful implementation of the strategic project portfolio and formulate remedial training policies.
- Determine responsibilities for implementation. Improve project leadership and organization if necessary. Negotiate oversight of the action program. Improve implementation and financing strategies. This applies not only to the strategic investment projects but also to the policy and legal reform implementation tasks that result from the action program.

#### 4. Lessons for the Indian NSDI?

The two approaches for the formulation of NII –and obviously, also NSDI– strategy are not mutually exclusive; in fact they partly overlap. Because of this overlap, we suggest that NSDI will most likely emerge from a combination of ‘top-down’ and ‘bottom-up’ strategies, the specific mix of which may vary significantly from one jurisdiction to the other. What is the right mix of strategies for India? Given that the Indian NSDI Vision and Action Plan is a master example of a top-down approach, the question might be rephrased to read: Is the development of concurrent bottom-up NSDI strategy meaningful for India?

Obviously we do not know the Indian context and conditions sufficiently well to make suggestions. However, our sense is that *a first step towards a complementary bottom-up NSDI approach* could be a concurrent assessment of existing *Strategic Geo-Information Systems* with *nation-wide* scope (such as NRDMS and NNRMS etc), *state-level* scope (such as the Bhoomi Land Records System), and even *corporate-scope* (such as the Reliance Infocom Land Base) as well as the development of strategies for their purposeful evolution and blending into the Indian NSDI.

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1 <http://www.ksg.harvard.edu/iip/GIIconf/wilpap.html>

2 [http://www.acm.org/ubiquity/interviews/v4i30\\_hargadon.html](http://www.acm.org/ubiquity/interviews/v4i30_hargadon.html)

3 <http://is.lse.ac.uk/Events/SSIT2/LeighStar.pdf>

4 <http://www.ksg.harvard.edu/iip/GIIconf/talero.html>

5 <http://heim.ifi.uio.no/~oleha/Publications/bok.3.html>