COMMENTARY

Draft National Geospatial Policy: a few salient observations

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The new geospatial guidelines for acquiring and producing spatial data services issued vide the Department of Science and Technology (DST) F.No.SM/25/02/2020 (Part-1) dated 15 February 2021 are appreciated unanimously by various experts, and considered a step forward towards boosting the geospatial industries in India[1]. The availability of comprehensive, highly accurate, granular and constantly updated geospatial data brings ample opportunities for the geospatial sector, including academia, industry and research, benefitting diverse sectors of the economy. The decision to maintain consistency and avoid duplication of geospatial data is a welcome step. However, it requires cooperation and unified execution of relevant ideas to bring tangible benefits to the community mentioned above.

The geospatial guidelines were followed by a Draft Geospatial Policy[2]. This note aims to put forth some facets and views of the Draft Policy, which policymakers would like to consider before finalizing the National Geospatial Policy. We have summarized the key information from different clauses of the Policy in five broad points. We have presented views in our capacity as academicians/researchers in the geospatial domain.

(1) The Draft Policy primarily emphasizes the regularization of high-quality, timely and reliable geospatial data and information, i.e. collecting, archiving, disseminating and avoiding duplication. The need for large-scale mapping of the entire country has been emphasized. The Survey of India (SoI) topographic database has been suggested to be treated as the foundation data, and shall be made available for general and specific use by citizens, businesses, academia, research, NGOs and the government.

Without considering geodetic datums, it should be noted that the national geospatial data (excluding the attributes), i.e. data with 3D coordinates attached, are collected with the reference points known as ground control points (GCPs). These GCPs are a subset of the National Topographical Database.

Geospatial data collection and preparation of maps follow the survey principle of 'whole to part'. A few decades ago, in India, the horizontal coordinates of a point on the surface of the Earth were usually referred to the Great Trigonometric Survey (GTS) station coordinates and the heights to the Indian vertical datum (IVD) defined in 1909 (ref. 3). With advancements in modern survey techniques, the required accuracy of point positions has increased several fold. To maintain consistency and avoid duplication, it is a suitable choice for the SoI topographic database to be accessible to the public. According to the Policy itself, the individuals can collect data of any highest resolution and accuracy possible. However, it is also mentioned that the spatial accuracy of the sharable topographic database shall be 1 m for horizontal and 3 m for vertical or elevation. Moreover, it is well appreciated that individuals can process any geospatial data, but there is no standard operating procedure (SOP) for data collection or processing. As such, these guidelines may not provide the consistency of the national database and hence, cannot avoid the need for duplication. Comparing the plottable error definition given by SoI and the current accuracy availability (3 m horizontal and 1 m vertical), it will be difficult to collate heterogeneous data collected by several individuals/industries by one organization. Further, this may also end up with datasets that can be of little use to contribute to the consistent mapping activity of India at a 1 : 10,000 scale (plottable error of 2.5 m). It can be particularly useful in mapping the entire country at a relatively smaller scale, but this is not the need of the hour.

Now, concerning the datums, it is worth noticing that the national consistency of high-precise geospatial data can only be managed by referring the datasets to the national horizontal and vertical datums. The Indian horizontal (National Spatial Reference Frame (NSRF)) and vertical (IVD1909, IVD2009) datums have been developed using the then available data and methods (unknown to industry, academia or researchers). These existing datums are not suitable to meet the present accuracy requirements, thus requiring the re-establishment of the geodetic datums[4]. Therefore, to meet the objectives of the Policy, it is inevitable to primarily implement the first theme of the National Foundation Data Asset Data Themes (NFDADT), i.e. the Geodetic Reference System. There is no discussion on the geodetic datums in the Draft Policy, thus requiring the attention of policymakers.

Regarding map-making, it has been mentioned that National Map Policy (NMP)-2005 will be overruled by the guidelines from DST that include map-making using self-certified acquired and produced geospatial data[5]. It is indeed an important step for high-resolution map-making in India. However, in the present scenario, with the absence of datums and SOPs, if NMP-2005 is not followed, it will only contribute to inconsistency. Hence, we suggest that at present, NMP-2005 should be followed till the time we have well-defined geodetic datums.

In the current version, the Policy is helpful for navigation-based applications that is a boost up for the geospatial industry. However, in its current form, the Draft Policy is not much beneficial to the academia, for precise scientific applications and maintaining geo-referenced land records for more than 10 years. This is due to the unaccountability of the dynamicity of the reference frame. Moreover, there should be a provision for setting up a committee that cross-verifies the accuracy of the collected geospatial datasets by numerous stakeholders. The development of the National Geospatial Frame (NGF) to be set up by SoI is for exchange of the database, but a committee for validating the accuracy and consistency of the database may also be necessary.

There is only one statement regarding the gravity data in the Policy, i.e. 'Gravity anomaly shall be 1 milli-gal'. This statement does not have any weightage in its current form. It should be noted that there are mainly two types of gravity anomalies that are of primary use to the stakeholders: Bouguer anomaly and free-air anomaly.

Geophysicists are not much concerned about the height system because they primarily want to remove the gravity effect of some topographical mass for better interpretation of subsurface elements. As such, they predominantly use the ellipsoidal height for gravity reductions. On the other hand, geodesists/precise surveyors who study the shape of the Earth or do the high-precise levelling require gravity to be reduced by

the orthometric height (more commonly, MSL height). The difference in the two reduction procedures can reach several milligal. For instance, for Kanpur, the difference between the two reduction processes can reach a difference of ~18 mGal. It should also be noted that we do not have any gravity datum and all the national gravity observations (e.g. GMSI 2006) are referred to International Gravity Standardisation Net 1971 (IGSN71) (ref. 6), which also has discrepancies[7]. Thus, the Policy should explain more about the gravity data. A single statement in the Policy does not suffice for gravity data users.

There is a need for at least two more themes in the NFDADT: (a) regarding the gravity datum and (b) regarding the standard data collection procedure.

(2) Several industrial applications have been identified and therefore, the need of consistent geospatial data has been highlighted. An effort for knowledge creation has also been emphasized with a suggestion to introduce geospatial education at an initial stage of the education system. Geospatial education has been linked to the availability of the indigenous remote sensing programme in more than 200 universities/institutions. The three-level pyramidal structure of the National Task Force on Geospatial Education has been provided.

As mentioned in the discussion of the first point, the current Policy is indeed a boost for the geospatial industry and several navigation-based applications as listed in the Policy. But it should also cover the requirements of the feasibility of scientific applications that require much more precise data referred to the national geodetic datums.

For over a decade, it has been observed that geospatial education has always been taken synonymous with remote sensing education. However, it should be noted that all the geospatial data are based on the topographic data, which come under the subject of surveying, and surveying itself is based on the concepts of geodesy. We can only speculate that geodesy is not being introduced at various education levels primarily due to the scarcity of geodesists in the country. Noting that the geospatial data concepts are based on the subject of geodesy, a conceptual-only curriculum of geodesy should be augmented at various educational levels. A humble beginning could be introducing coordinate systems, datums, ellipsoids, reference systems and reference frames in the curriculum, as done in various countries. This will educate the public and help maintain the consistency of the geospatial data, which is the key objective of the Policy.

The three-level pyramidal structure in its present form is advantageous for project management but not for education. This has a scope of significant refinement. Since the main aim of this note is to bring a few important aspects into possible consideration of the policymakers, discussion on the suggested refinements seems out of the scope here.

(3) The future requirement of a separate Skill Council for the Geospatial Sector has been introduced, with the current solution attaching the geospatial industry with National Skill Development Agency (NSDA) for National Skills Qualifications Framework (NSQF). A crucial point of the surveyor's registration has been introduced. Surveyor registration is a welcome step as it is also being practised in several other countries. It guarantees that an experienced surveyor collects the data. It would be helpful if it is made mandatory for the industry to hire candidates only with a surveyor's registration. The same can be monitored in some restricted on-line platforms. It would also help towards maintaining the consistency of the geospatial data. It is understandable that establishing a Skill Council for Geospatial Sector is not feasible at this point. Still, we are not sure about the adequate qualification of the NSDA personnel to steer the geospatial sector. Hence, some guidelines in this regard can also be considered under the aegis of this Policy.

(4) The important roles of lead partnering agencies for the national foundation and thematic geospatial data themes have been provided.

It has been mentioned that GDPDC will designate one or more Central or State-level partnering agencies as lead agencies. This is a crucial responsibility for the proper implementation of the Policy. It is suggested that the lead agency for each theme should be a body comprising a qualified representative from State/Central Government, industry, academia and research organizations/centres. This can be mentioned in the Policy.

(5) The negative list requires better explanation.

The words 'negative list' are mentioned only for the sensitive attribute data. Does that mean there will be no negative list for the non-attributed geospatial data? Can anyone procure or purchase geospatial data of the highest quality available? This requires little more refinement, especially when there is also a mention that 'They (partnering agencies) will participate in determining, when applicable, the content of the Negative List as prescribed by the National Data Sharing and Accessibility Policy (NDSAP) 2012 and whether the sharable data by the Agency can contribute to and become a part of the National Data Registry (NDR) of GDPDC.' As a reader, we see that this is not about attribute data only, but the negative list can be for any geospatial data, whenever required.

Also, NDSAP classifies the Geospatial Data, Products, Solutions and Services (GDPSS) into three categories, of which one is restricted-access GDPSS: 'The GDPSS under the restricted category will be accessible only through and under specific authorization'.

We assume that this does not form a part of the negative list, but data accessible with special permission. So, will the restricted data procured with special permission (and payment) have degraded accuracy? Or can the restricted data of observed accuracy be procured? This is critical since some scientific applications of national interest can be done only in collaboration with academia, which will require data of observed accuracy. The absence of such practice will hinder the growth of the scientific community for innovative research in the geospatial field. Therefore, this needs to be clarified in the Policy.

As a concluding remark, we can only hope that the policymakers will consider the identified and discussed points before finalizing the draft Geospatial Policy. The aspects discussed here are highly beneficial to academicians and researchers of the geospatial domain. Moreover, the discussion provided here is a must requirement to meet the primary aim of the Geospatial Policy, which is to improve the geospatial data consistency and avoid duplication in data collection.

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