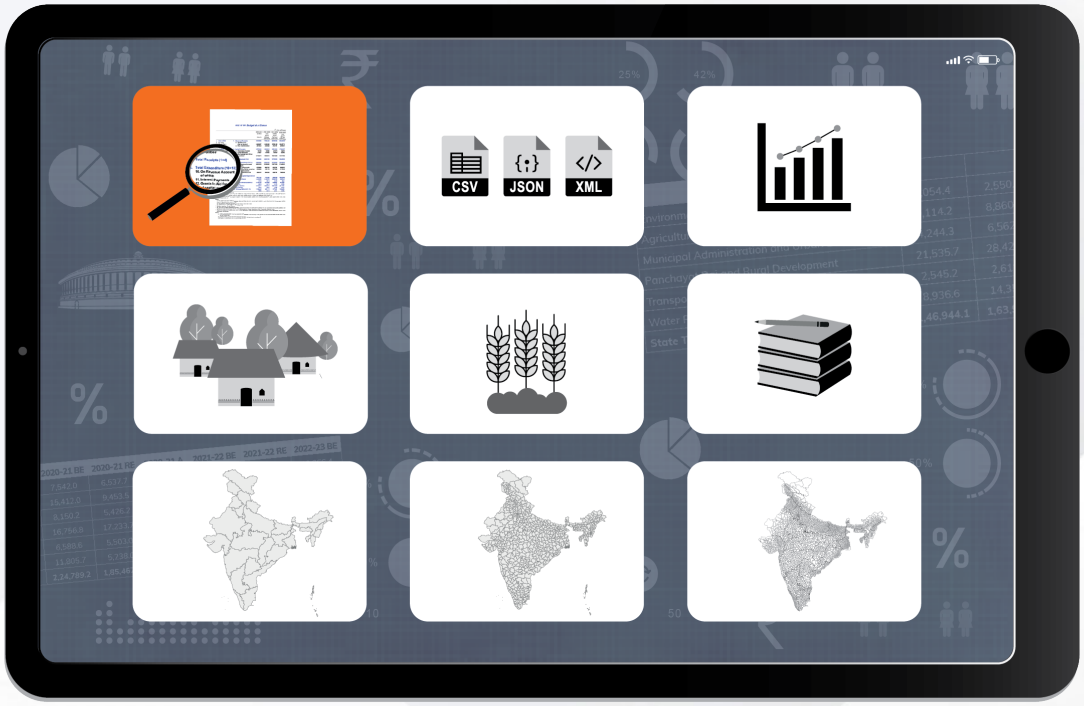
A Note on the Methodology

Mapping Administrative Units into Assembly and Parliamentary Constituencies for Select States in India

October 2022



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I. Rationale

The importance of data-driven governance both at the national and subnational level has found wide acknowledgement in recent decades. The generation and monitoring of data on various aspects of policy and development is usually organised according to administrative units at different levels. But the electoral boundaries (i.e. the boundaries of Assembly Constituencies - ACs and Parliamentary Constituencies - PCs) do not match neatly with administrative boundaries (i.e. Blocks and Districts) in many cases. As a result, there has been a dearth of AC-wise and PC-wise data, which has constrained the ability of elected representatives to assess how well their Constituencies are being served. This lacuna has also affected the effectiveness of the District Development Coordination and Monitoring Committees (DISHA Committees) set up a few years ago by the Union Ministry of Rural Development for enabling Members of Parliament to oversee the implementation of a host of development schemes in their Constituencies.

Access to Constituency-wise data can enable the elected representatives to engage a lot more effectively with the processes of policy design, expenditure priority setting and monitoring of implementation. It can also strengthen public oversight and participation in governance. This is particularly relevant for strengthening public financial management in the socio-economic sectors, where there is a need for improving allocative efficiency, utilisation of public resources, quality of services delivered and the development outcomes.

However, the absence of a comprehensive and up-to-date database which maps the administrative units into the electoral boundaries (constituencies) severely restricts the efforts in this direction. The last Delimitation Commission's Report (2008) used different administrative units for different States for defining the electoral boundaries. Moreover, there have been changes in the total numbers, names and categorisations of administrative units, especially in case of Rural Local Bodies and Urban Local Bodies, post the Delimitation Commission 2008 orders. Therefore, mapping the administrative units into the constituencies becomes even more difficult.

Against such a backdrop, CBGA, in collaboration with its technology partner CivicDataLab, has carried out an in-depth analytical exercise over the last three years to map fiscal data for a number of development schemes to the ACs and PCs in six selected States. The overarching objective of this initiative is to explore how fiscal information available to the citizens and their elected representatives can be made more relevant locally in order to strengthen their oversight and participation in public financial management.

The said exercise entails mapping administrative units of a State into its Assembly Constituencies (ACs) and Parliamentary Constituencies (PCs). The objective of this exercise is to bring coherence between administrative and electoral boundaries, towards facilitating public engagement with fiscal governance issues at the grassroots level. The rationale for carrying out such an exercise is based on the following:

(i) Public availability of granular fiscal information on various development schemes can increase engagement of the citizens and the elected representatives, and potentially improve their implementation and outcomes. The present situation is uneven across the schemes and the States;

(ii) Even in case of the development schemes for

which granular fiscal data is available publicly, it's organized by the administrative units only – namely, districts, blocks, gram panchayats (GPs) and urban local bodies (ULBs). The data is not presented by electoral constituencies, thus limiting an effective engagement of the elected representatives and the citizens;

(iii) For an effective data representation, both fiscal and outcome information need to be organized by ACs and PCs, and made available in the public domain;

(iv) However, there is no comprehensive and up-to-date database yet that maps administrative units into ACs and PCs.

II. Background

Under Article 82 of the Constitution of India, Parliament enacts the Delimitation Commission[1] Act. The Delimitation Commission formed by the Union Government demarcates the boundaries of the PCs as per the provisions of the Act. The decentralised geographical units (543 geographical regions), represented by the Members of Parliament (MPs)[2] of the Lok Sabha, are then divided into many ACs where Members of the Legislative Assembly (MLA) are elected by the eligible voters through the election process. In India, Delimitation Commission has been constituted four times; in 1952 following the Delimitation Commission Act, 1952, in 1963, following the Delimitation Commission Act 1962, in 1973 following the Delimitation Commission Act,1972, and in 2002 following the Delimitation Commission Act, 2002.

The fundamental idea behind such an exercise is to ensure that the constituencies should roughly accommodate similar sizes of populations and that the ratio of seats allocated for every State to its total population should practically be the same throughout the country. The Indian political system has an electoral representation system where seats are allocated to the States based on: (i) the principle of 'integrity' that aims to contain an AC wholly within a district and a single PC; (ii) the principle of 'contiguity' that aims to maintain the geographical characteristics of the constituencies as compact and contiguous, and (iii) the principle of 'equi-population' which aims to maintain an equal division of population for the constituencies with a tolerance of 10 per cent deviation from the average population[3].

Each of the Delimitation Acts has not only adhered to the principles mentioned above but also frozen the population figures to a particular Census and put a moratorium on the period of initiating the next delimitation exercise. This was essential to ensure a fair representation of the States across the country. The third Delimitation Commission of 1972 had considered the population figure of the 1971 census and put a 30-year-long embargo on further delimitation exercise, while the fourth Delimitation Commission was based on the 2001 Census, and decided to freeze the time period for the next Delimitation exercise until the year 2026. The last Delimitation Commission finalised their report in 2008, where the State of Jammu and Kashmir was excluded from the exercise.

1 Delimitation means the act of determining boundaries of territorial constitutions in a country or a province having a legislative body.
2 The MPs of the Lok Sabha are elected by first-past-the-post universal adult suffrage and serve five-year terms in the lower house of Parliament (Parliament of India 2017).
3 'Redrawing the Electoral Boundaries: Debunking the Doxas of Delimitation', Samanvaya Research Series, Vol. 1, 2020, Pranab Mukherjee Foundation.

III. Recent Developments on Constituency-focused Policy Research in India

In recent years, a number of efforts have been made to aid political representatives in understanding the situation at the level of constituencies. In early 2016, a select group of MPs, along with the Swaniti Initiative and Tata Trusts, launched an initiative, *"Supporting Parliamentarians in Analysis and Research in the Constituency"* (SPARC), and assigned 20 young professionals to 20 MPs across India to assist in the implementation of PC-specific development projects (Swaniti Initiative, 2017). Another think tank, the PRS Legislative Research, has also started providing PC- specific data on legislative matters to support the MPs through its fellowship programme—called the Legislative Assistants to Members of Parliament or LAMP programme (PRS Legislative Research, 2018).

A number of studies involving constituency-wise mapping of population health, nutrition and demographic data have been carried out by researchers at the Geographic Insights Lab of the Harvard University[4]. These studies have mapped the data for around 100 development outcome indicators on health, nutrition and some of the essential household amenities across political units. This is expected to facilitate Parliamentarians in identifying the areas that need greater attention.

There are very few sources in which administrative units are mapped to the constituencies. For example, the Unified District Information System for Education (UDISE) Plus initiated in 2012-13 is one of the few databases providing such information on educational institutions mapped to the ACs. However, the absence of a comprehensive and complete database in UDISE Plus for all the newly formed administrative units (post the Delimitation Commission 2008) obstructs the formation of clear AC and PC geography files in each of the study States.

Similarly, the Local Government Directory of the Ministry of Panchayati Raj of the Government of India has been preparing such Geo-files for each of the States where all the Rural and Urban Local bodies are mapped to ACs and then PCs. However, the process is still in progress and incomplete as of now.

Several studies have attempted to map the available data on development indicators to constituencies (Alam, 2010; Gulzar and Pasquale, 2017; Blossom et al., 2019; Swaminathan et al., 2019 and 2020). Most of these have used methods of data mapping that are top-down rather than bottom-up. Such studies have relied upon advanced GIS mapping techniques to superimpose administrative and legislative boundary maps.

As one of the early attempts to deconstruct the development evidence from India, based on its political boundaries, Saad Gulzar and Benjamin Pasquale (2015) analysed the implementation of MGNREGS. Using the village-level data, they tried to establish a comparison between the areas supervised by a single political alignment and those that are governed by multiple political representatives with the assumption that service delivery functions are significantly influenced by political affiliation. The paper also documented how service delivery was found to be better when politicians can internalise the electoral benefits of their effort towards motivating bureaucrats.

In other words, when administrative boundaries (like Districts / Blocks) are wholly contained within constituencies (PCs/ACs), elected representatives enjoy the full return on their efforts towards motivating bureaucrats, but when the administrative areas fall in more than one constituency, the returns of the elected representative's effort towards motivating bureaucrats is shared by all the elected

4 https://www.newindianexpress.com/cities/delhi/2019/apr/22/constituency-wise-data-to-help-identify-lagging-areas-1967442.html

representatives. As a result, in the case of the latter, the elected representatives face a free-rider problem where each of the elected representatives would possibly expect the other elected representative to make an effort to motivate the bureaucrats (Grossman and Pierskalla, 2014; Pierskalla, 2016). The haphazard overlapping of the electoral and administrative boundaries not only creates challenges for smooth implementation of government schemes but also restricts the opportunity to study how elected representatives influence the service delivery process. Therefore, their research aims to understand the poor and uneven implementation of development programmes in India and to provide a spatially precise, village-level political economy dataset for the country.

A similar study by Das and Maiorano (2019) also analyses the situation of the MGNREGS for the State of Andhra Pradesh from the lens of distributive politics and attempts to unpack the strategies that the ruling parties might have adopted when distributing benefits under the programme. Here, it is important to mention that Andhra Pradesh represents an interesting field area as the village-level governments (the Gram Panchayats) have largely remained excluded from implementation implying a powerful role of the higher-level politicians in shaping the overall scheme of implementation.

Other than studies focusing on MGNREGS or health indicators, there are very few studies that have investigated other aspects of development at the level of constituencies. One such is the *MLA Constituency Status Report on Education* by the India Governs Research Institute (led by Veena Ramanna), where the primary question asked was: have things changed for the better across the MLA constituencies over the years? The main objective of the study was to comprehend the progress that has been made in education across MLA constituencies and to identify the areas/constituencies that have received the maximum/minimum amount of grants and where utilisation has been the most successful/unsuccessful. In this report, major aspects selected for the analysis (across MLA Constituencies and ruling parties) included, among others, are the following: party wise and MLA constituency-wise share of the money received for both school development purpose and Teaching Learning Material (TLM), identifying the areas that have received the highest and lowest amount of such grants and the share of the grant received per child (MLA constituency-wise).

Out of the few studies that have tried to estimate data for various development indicators at the geopolitical level, the prominent ones are presented in Annexure Table 1.

As noted above, several studies have mapped socio-economic output/outcome indicators at the level of PCs and/or ACs by using top-down approaches. These approaches typically use advanced GIS mapping techniques to superimpose administrative and legislative boundary maps, which also serves the purpose of their analysis quite well.

However, a *bottom-up* or *purist* approach towards aligning the administrative units into legislative boundaries (such as the one used by India Governs Research Institute) would be strongly advisable for mapping fiscal data (i.e. data on expenditure in schemes) to ACs and PCs because of the following reasons:

- Data on expenditure incurred in the schemes have different characteristics than data on population, health and nutrition and other such development outcome indicators. This is because expenditure in a scheme depends to a large extent on the nature of services delivered or interventions made through the scheme.

- The nature of services delivered or interventions made in a scheme may differ a lot across rural and urban areas within the same Assembly Constituency. For instance, some schemes are focused on rural areas, while a few schemes are meant solely for urban areas. However, across the six States selected for our exercise of mapping, the proportion of completely rural ACs in the total number of ACs in the State varies from 1.7 per cent in Maharashtra to 50.6 per cent

in Jharkhand, and the proportion of completely urban ACs in the total number of ACs in the State varies from 1.6 per cent in Bihar to 24.7 per cent in Maharashtra. Most ACs across these States, therefore, have a mix of rural and urban areas. Hence, GIS based approximations of district-level data on expenditure in schemes may not be very helpful with the mapping of data on expenditure in schemes to ACs in a State.

→ Also, if the government authorities in any State or District really wish to collate constituency-wise figures for expenditure in a scheme, they will be able to do so for each of the 12 schemes we have selected for the analysis (even though the process in the government too will be cumbersome and time-consuming because of the data challenges involved). Hence, for the sake of credibility of the constituency-wise figures of expenditure in schemes to be generated in our exercise, it is advisable to generate actual figures instead of approximations as far as possible.

The current study, therefore, uses a *bottom-up* approach to aligning administrative and legislative boundaries.

IV. A Bottom-Up or Purist Approach towards Mapping Administrative Units into Constituencies

We have developed a bottom-up or purist methodology to generate a State-wise mapping of administrative units to the ACs and PCs in the respective States. This essentially involves analysing and reviewing different sources of information and cross-checking one source with another to ensure the maximum possible accuracy of the alignments. For this purpose, we have selected Bihar, Chhattisgarh, Jharkhand, Maharashtra, Odisha, and Uttar Pradesh as the study States. It is worth noting here that we have covered 39 per cent of total PCs and 30 per cent of the total ACs in the country. Similarly, we have covered 31 per cent of districts out of the total 755 districts and 34 per cent of the total blocks in India. With respect to coverage of RLBs and ULBs from all India, the share of the sample covered in our mapping exercise is 47 and 37 per cent respectively. (See Figure 1).

Figure 1: Geographic Coverage of the Work: Electoral and Administrative Units of the Selected States

	Electoral Units		Administrative Units			
State	PCs	ACs	Districts	Blocks	RLBs	ULBs
Bihar	40	243	38	534	8,549	283
Chhattisgarh	11	90	28	146	11,736	170
Jharkhand	14	81	24	264	4,512	51
Maharashtra	48	288	36	352	28,840	401
Odisha	21	147	30	314	6,849	120
Uttar Pradesh	80	403	75	824	59,945	750
Total Sample Size	**214**	**1,252**	**231**	**2,434**	**120,431**	**1,775**
All India	**543**	**4,121**	**763**	**7,227**	**255,337**	**4,804**
Share of the Sample Size in All India (in %)	39	30	30	34	47	37

Notes: PCs: Parliamentary Constituencies, ACs: Assembly Constituencies, RLBs: Rural Local Bodies (Gram Panchayats or GPs), ULBs: Urban Local Bodies
Source: Compiled by CBGA from the web portal of Local Government Directory, Government of India

Sources of Data / Information

We have used various government sources, as presented in Figure 2, for developing and constructing Geo-files for the selected States.

First, we prepared the listing of the administrative units and the alignment to the constituencies by primarily referring to the report of the Delimitation Commission (2008). However, since the time of the last Delimitation Commission (2008), several changes in administrative boundaries have taken place, like, the addition of new districts, blocks and local bodies etc. Therefore, the following sources were also referred to for completing the task:

- Local Government Directory (LGD) of the Ministry of Panchayat Raj (MoPR), Government of India;
- Web portal of Gram Panchayat Development Plan (GPDP), Government of India;
- MISs and Databases of select Central Schemes (viz. MGNREGS, PMAY-G and SBM-G for rural local bodies and National Social Assistance Programme - NSAP for urban local bodies);
- Websites of the Urban Development and Administration departments of the States; and
- Websites of the Urban Livelihood Missions of the States.

Second, we cross-checked the information collated with the additional and updated information from the following sources:

- The website of Chief Electoral Officer (CEO) for each of the selected States;
- District websites of the selected States;
- Unified District Information System for Education (UDISE) plus database; and
- Newspaper articles/reports on the creation of new administrative units in States.

Third, we overlaid the administrative and electoral boundary maps using Geographic Information Systems (GIS) techniques through rastar maps that superimpose different boundaries. This was done to enhance the validation of our alignments.

Fourth, we also referred to some private sources of information. We referred to those to ascertain the accuracy of aligning administrative boundaries into constituencies for a few cases on which we had doubts. We referred to data sets of Indiastat's State Assembly Publications for the purpose, especially for some of the GPs in Chhattisgarh and Uttar Pradesh.

Fifth, we also extensively consulted (through telephonic and physical meetings) with teachers, anganwadi workers, political representatives and Government officials at the Block level for cases that were unresolved even after referring to the multiple sources of information mentioned earlier.

A consolidated summary of various data sources referred to and the kind of information obtained for the purpose is presented in Figure 2.

Figure 2: Information Availability across Various Official Data Sources

Source of Information	Type of Information Available
1. Delimitation Commission Report (2008)	State-wise details of the coverage of ACs and PCs as defined by the last Delimitation Order
2. Local Government Directory (LGD)- Ministry of Rural Development and Ministry of Panchayati Raj, Government of India, available at: https://lgdirectory.gov.in/	State-wise information on the local bodies (both rural and urban) aligned to constituencies; it provides partial information only.

3. Gram Panchayat Development Plan (GPDP), Ministry of Rural Development & Panchayati Raj, Government of India, available at: https://gpdp.nic.in/getSelection.html	Details of State-wise information on the rural local bodies (State – District - Block – Gram Panchayat).
4. MISs / Databases of Schemes (MGNREGS, PMAY-G, SBM-G and NSAP)	State-wise latest information on the local bodies (both rural and urban local bodies). There are variations in the lists of local bodies across these sources too.
5. Websites of the Urban Housing / Administration and Development Departments of the respective States	State-wise information on the Urban Local Bodies (State – District – Names and Types of ULBs – Number of Wards)
6. Website of the Chief Electoral Officer (CEO) of each of the selected States	Lists of Assembly and Parliamentary Constituencies across districts, Lists of Booth Level Offices (BLOs), Maps of the constituencies (availability varies across States)
7. Websites of the Districts of the respective States	Information on local bodies and constituencies within respective districts, Police Stations, Revenue Circles and Tehsils within respective districts
8. Unified District Information System for Education (UDISE) plus database	Information pertaining to Villages, Blocks, and Schools corresponding to Assembly Constituencies is provided in this source; but the information varies widely across States and is incomplete.
9. GIS Mapping using Boundary Shapefiles (administrative and political) from the State GIS portal, Bharat Maps by NIC/DeitY.	Information pertaining to the geographical positioning of constituencies and administrative units

Methods

We aligned the lowest level of administrative units into Assembly Constituencies (both in rural and urban areas) for the six selected States following the steps mentioned below.

Step 1: Thoroughly reviewed the Delimitation Commission Report (2008) for preliminary mapping of administrative units into ACs and PCs

One of the very first steps of mapping administrative units into constituencies is to develop an understanding of how constituency boundaries have been defined through various Delimitation Commissions set up at different points in time since Independence. The boundaries of both Parliamentary and Assembly constituencies are determined by India's Delimitation Commission. These boundaries have been drawn and redrawn through the Delimitation Acts of 1952, 1963, and 1973 following each decennial Census, before a halt in 1977. Boundaries were again redrawn by order of the Delimitation Act of 2002, which began in 2004 by the Delimitation Commission and was completed and implemented in 2008 (Alam, 2010). The Delimitation Commission adjusts the boundaries of PCs and ACs to account for the change in population growth. As directed by the Census of India [Article 81(b)], the Delimitation Commission's primary objective is to divide the territory into constituencies with equal populations (within States) (Alam, 2010).

The broad findings from the Delimitation Commission Order 2002 can be summed up in terms of different similarities as well as differences present across the study States as below:

- The information on the name of the PC, AC, and the districts falling under/spreading across different PCs / ACs are available for all six States. Therefore, it is possible to identify the number

of ACs / PCs spreading over the entire district, the number of ACs / PCs spreading over a single district or part of a district but not representing the entire district, and the number of ACs / PCs spreading over more than one district.

- The territorial division used for AC delimitation is different for different States. For States like Odisha, Bihar, and Jharkhand, GPs have been considered as the lowest geographical unit to be used for the delimitation of the constituencies. For others, Revenue Circles / Kanungo Circles / Patwari Circles and Police Stations have been used to determine the constituency boundary.

Since not all the States have similar territorial divisions which were used for delimiting the boundaries and there were several specifications to address in terms of the lowest geographical unit available in the first place, a thorough review and analysis of the Delimitation Commission Report (2008) was necessary to document the basis of the formation of ACs and then PCs across the six study States. This is also a necessary and crucial step to further streamlining and updating the mapping exercise and to aligning administrative units into ACs and PCs boundaries. A detailed account of such information is presented in Figure 3.

Figure 3: Administrative Units used to define Assembly Constituency boundaries as per (the Delimitation Order of) the last Delimitation Commission, 2008

	Sources of Information (with Notes)	Territorial Division used for AC Delimitation	Lowest unit Mentioned
Chhattisgarh	Schedule V for the Delimitation Commission's Report 2008, Page No. 42 (Delimitation of Parliamentary and Assembly Constituencies Order, 15th February 2004).	Tehsil wise	Revenue Inspector Circle / Police Station
Bihar	Schedule VI, Page No. 74 (Any reference to a territorial division shall be taken as on the 15th day of February 2004. Any reference to Ward of Municipal Corporations, Gaya and Patna shall be taken as per Census-2001 Data).	Block wise	Gram Panchayat, Municipality (M), Ward and Census Towns (CT)
Jharkhand	Schedule XIII, Page No. 166 (The list has been developed as per the details given in Bihar Re-organization Act, 2000 as continued vide Section 10 B of the Delimitation Act, 2002 as amended).	Police Station wise (within different sub-divisions of a district)	Gram Panchayat, Municipality, Notified Area Councils (NACs), and Census Wards
Maharashtra	Schedule – XVII, Page No. 253 (In respect of Assembly Constituencies in Municipal areas other than Greater Mumbai Municipal Corporation and Thane Municipal Corporation, a Ward means Municipal Election Ward, as it existed at the time of the Census 2001).	Tehsil wise	Some of the Revenue Circles within Tehsils and Villages, Municipal Corporations, and Municipal Council (MC) [Wards and Enumeration Blocks are mentioned for Assembly Constituencies in Thane Municipal Corporation area, Mumbai City and Mumbai Suburban Districts]
Odisha	Schedule XXII. Page No. 319 (In reference to the territorial division as on the 15th day of February 2004).	CD Block wise	Gram Panchayat, Municipality (M), Outgrowth (OG), Ward and Census Towns (CT)
Uttar Pradesh	Schedule – XXVIII, Page No. 458 (In reference to the territorial division as on the 15th day of February, 2004).	Tehsil wise	Kanungo Circle, Patwari Circle, Municipality and Wards

Source: Constructed from the Delimitation Commission Report (2008)

Step 2: Preparation of a Base Listing of RLBs / ULBs aligned to ACs / PCs

In the second step, all the districts, blocks, police stations, as well the lowest available unit of RLBs and the ULBs were listed, taking reference from the Delimitation Commission Report, 2008 to prepare the base document. Such listings of administrative/ geographical units across the constituencies for the six selected States were prepared to understand the structure of the territorial arrangement across ACs as well as PCs.

For example, once the base document was prepared, it was clear that for the state of Odisha a complete list of gram panchayats under different blocks within different districts is needed next to be integrated into the listing. On the other hand, for Uttar Pradesh, a detailed understanding of the blocks across the different districts is needed first as Tehsils are being used to define the constituency boundary instead of the blocks. Here, another example can also be drawn from Chhattisgarh where the Report was only partially helpful as it primarily lists out the Revenue Inspector Circles within the Tehsils.

The preliminary analysis encompassed a detailed account of the PCs, ACs, Districts, and Blocks falling under or spreading across different PCs / ACs (Figure 4b and 4c) and the rural and urban categories of the constituencies (Figure 4a).

Figure 4a: Completely Urban and Completely Rural Constituencies across States

Number of ACs / PCs

	Completely Urban ACs	Completely Rural ACs	Completely Urban PCs
Bihar	4	50	0
Chhattisgarh	8	6	0
Jharkhand	3	41	0
Maharashtra	71	5	8
Odisha	4	48	0
Uttar Pradesh	22	33	2
Total	**112**	**183**	**10**

Share from the Total Number of ACs /PCs (in %)

	Completely Urban ACs	Completely Rural ACs	Completely Urban PCs
Bihar	1.6	20.6	0.0
Chhattisgarh	8.9	6.7	0.0
Jharkhand	3.7	50.6	0.0
Maharashtra	24.7	1.7	16.7
Odisha	2.7	32.7	0.0
Uttar Pradesh	5.5	8.2	2.5
Total	**8.9**	**14.6**	**4.7**

Note: States arranged in alphabetical order.
Source: Compiled by CBGA

Figure 4b: Territorial Arrangements across Assembly Constituencies

Number of ACs

	ACs falling completely within one District	ACs spreading over Two Districts	ACs spreading over Three Districts
Bihar	242	1	0
Chhattisgarh	84	5	1
Jharkhand	66	14	1
Maharashtra	286	2	0
Odisha	147	0	0
Uttar Pradesh	392	11	0
Total	**1,217**	**33**	**2**

Share from the Total Number of ACs (in %)

	ACs falling completely within one District	ACs spreading over Two Districts	ACs spreading over Three Districts
Bihar	99.59	0.41	0.00
Chhattisgarh	93.33	5.56	1.11
Jharkhand	81.48	17.28	1.23
Maharashtra	99.31	0.69	0.00
Odisha	100.00	0.00	0.00
Uttar Pradesh	97.27	2.73	0.00
Total	**97.2**	**2.64**	**0.16**

Note: States arranged in alphabetical order.
Source: Compiled by CBGA

Figure 4c: Territorial Arrangements across Parliamentary Constituencies

Number of PCs

	PCs spreading over the entire District	PCs spreading over a Single District, but not representing the entire District	PCs spreading over Two Districts	PCs spreading over Three or more Districts
Bihar	5	14	15	6
Chhattisgarh	1	3	4	3
Jharkhand	1	0	4	9
Maharashtra	2	26	17	3
Odisha	2	3	11	5
Uttar Pradesh	10	29	33	8
Total	**21**	**75**	**84**	**34**

Share from the Total Number of PCs (in %)

	PCs spreading over the entire District	PCs spreading over a Single District, but not representing the entire District	PCs spreading over Two Districts	PCs spreading over Three or more Districts
Bihar	12.5	35	37.5	15
Chhattisgarh	9	27	36	27
Jharkhand	7	0	29	64
Maharashtra	4	54	35	6
Odisha	10	14	52	24
Uttar Pradesh	12.5	36.25	41.25	10
Total	**10**	**35**	**39**	**16**

Note: States arranged in alphabetical order.
Source: Compiled by CBGA

Maharashtra (71) has the highest number of ACs that consist of only urban areas, followed by Uttar Pradesh (22). On number of ACs composed solely of rural areas, Bihar tops the list, followed by Odisha and Jharkhand. There are no such PCs that have only rural areas like the ACs. However, 8 PCs from Maharashtra and 2 PCs from Uttar Pradesh completely fall under Urban areas (Figure 4a). Whereas, almost 12.5 per cent PCs from both Uttar Pradesh and Bihar represent a single district each.

Most of the ACs are completely mapped over a district while very few are spreading across two districts in Bihar (1), Chhattisgarh (5), Jharkhand (14), and Uttar Pradesh (11), and one AC for each Jharkhand and Chhattisgarh are spreading over three districts (Figure 4b). Only 10 per cent of the total sample PCs are completely representing a single district, and 55 per cent PCs are spreading over two and more districts. The share of PCs, which are spread over two and more districts, is highest in Jharkhand (93 per cent) followed by Odisha (76 per cent) and Chhattisgarh (63 per cent) (Figure 4c).

Step 3: Updating and Further Refining the Initial Geo files

Following the base document prepared using the Delimitation Commission Report (2008), the next step was to congregate the geographical information: first for each of the blocks within the districts and then for the gram panchayats in the case of RLBs and the different types of ULBs within the districts. In this step, review and analysis of information presented on the websites of the Ministry of Panchayati Raj for GPDP and the LGD, Census 2011, District websites, Socio Economic and Caste Census was carried out to document additional Districts, Blocks, and GPs, especially those created post the Delimitation Commission 2008, and those were aligned to their respective constituencies.

A review of the information available on the GPDP website was helpful in listing additional RLBs and removing double entries in a few cases. For the ULBs, State-specific websites for Urban Housing Department and the Urban Administration and Development websites were referred to for enlisting newly constructed ULBs (post the Delimitation Commission Order). In this step, we also referred to the listing of RLBs available in scheme databases like MGNREGS, PMAY-G and SBM-G databases, and NSAP database for ULBs where additional local bodies were added and mismatched cases realigned correctly in completing the Geo-files.

An analysis of the listing presents a detailed account of the territorial arrangement of the local bodies falling under or spreading across different Assembly Constituencies (Figure 5 and Figure 6).

Figure 5: Territorial Arrangement of the Blocks across Constituencies

Number of Blocks

	Blocks that fall completely within one AC	Blocks split across Two ACs	Blocks split across Three or more ACs
Bihar	464	68	2
Chhattisgarh	97	44	5
Jharkhand	243	20	1
Maharashtra	269	67	16
Odisha	263	48	3
Uttar Pradesh	332	347	145
Total	1,668	590	172

Share from the Total Number of Blocks (in %)

	Blocks that fall completely within one AC	Blocks split across Two ACs	Blocks split across Three or more ACs
Bihar	87	12.7	0.3
Chhattisgarh	66	30	4
Jharkhand	92	7.6	0.4
Maharashtra	76	19	5
Odisha	84	15	1
Uttar Pradesh	40	42	18
Total	69	24	7

Note: States arranged in alphabetical order.
Source: Compiled by CBGA

Figure 6: Territorial Arrangement of the ULBs across Constituencies

Number of ULBs

	ULBs that fall completely within one AC	ULBs split across Two ACs	ULBs split across Three or more ACs
Uttar Pradesh	739	4	7
Bihar	281	1	1
Odisha	115	3	2
Maharashtra	381	9	11
Jharkhand	50	1	0
Chhattisgarh	167	1	2
Total	1,733	19	23

Share from the Total Number of ULBs (in %)

	Blocks that fall completely within one AC	Blocks split across Two ACs	Blocks split across Three or more ACs
Uttar Pradesh	98.5	0.5	1
Bihar	99.3	0.35	0.35
Odisha	95.8	2.5	1.7
Maharashtra	95	2	3
Jharkhand	98	2	0
Chhattisgarh	98.2	0.6	1.2
Total	97.6	1.1	1.3

Note: States arranged in alphabetical order.
Source: Compiled by CBGA

It was found that while the majority of the Blocks can entirely be mapped within a particular AC, there are a few which are spreading across two and more constituencies. For the States of Jharkhand, Bihar, and Odisha, more than 80 percent of the Blocks are falling completely under one AC, while this proportion is lower for Chhattisgarh (66 per cent) and the lowest for Uttar Pradesh (40 per cent). It is also to be noted that while there are a number of Blocks that are falling under two ACs, the number of the Blocks spreading across three or more ACs is very less for all the States. Drawing a comparison among the selected States, Uttar Pradesh appears to have the highest share of Blocks in both categories, i.e., 42 per cent of Blocks are reported to be split across two ACs while 18 per cent of Blocks are split across three or more ACs (Figure 5).

More than 90 per cent of the ULBs fall under a single AC while very few (an average of 2 per cent) large Municipal Corporations are noted to be split across two and more ACs. The number for the latter is the highest for Maharashtra, where 20 ULBs are split across more than one AC, and it is least (in terms of absolute numbers) for Jharkhand, where only 1 Municipal Corporation is split across two ACs. In the total sample size, almost 97.6 per cent of ULBs are completely mapped to a particular AC (Figure 6).

Step 4: Cross-Checking with additional information

to validate and finalise the Geo-files

Following the preparation of the listing of the administrative units (Geo-files), cross-checking of the same was carried out. The sources of information for this step were the district specific websites, websites of the CEO, and UDISE Plus datasets which provide partial information on the constituencies of the respective States. These sources were specifically important for identifying the constituencies for the additional RLBs and ULBs that have been created post the Delimitation of Commission Report 2008.

However, like the previous steps, the sources for cross-checking the lists also varied across States depending upon the availability of information in the public domain. For example, in the case of Odisha, thorough cross-checking was done with the help of the constituency maps provided by the Chief Electoral Officer's website. For the State of Maharashtra, the constituency-wise list of Polling Booths has been referred to for cross-validating the information specifically for those cases where AC maps are not clearly presented on the CEO's website.

For Chhattisgarh and Uttar Pradesh, owing to the inadequate availability of information in most of the official sources, cross-checking was done with the help of GIS technology where the centroid of the GP polygons was calculated and joined with the AC polygon layer by location. Block boundaries from the State portal were used to overlay the block level information whereas the constituency boundaries were extracted from the government's multi-layered GIS platform called 'Bharat Maps.' For this task, one has to superimpose the shapefiles for district and PC boundaries to reveal the segments of districts contained within each PC. Although this exercise of overlaying boundary maps can generate a consolidated file of the constituencies listed across districts, blocks, and local bodies; this step was used only to validate the Geo-listing, while the mapping of administrative units was carried out through a bottom-up approach as explained earlier.

Lastly, a few additional steps were adopted for dealing with the doubtful cases of the local bodies that appeared split between more than one AC. Cross-checking of such cases with information obtained from Newspaper articles and direct consultation with government officials and frontline service providers who are physically present in the concerned administrative units of the States. Mostly, the school teachers, Anganwadi workers, and employees of the Block Development Offices in the field were contacted for such consultations to ascertain the correct mapping of administrative units into ACs. However, especially in the case of Uttar Pradesh (for some of the GPs) and Chhattisgarh (for Rural Local Bodies split across more than one Assembly Constituency), data for concerned constituencies was procured from Indiastat and the information provided was used to resolve the doubtful cases.

Step 5: Maintaining uniformity of the Spellings in the Names of the Local Bodies

Differences in the names of Districts, Blocks, and local bodies were very common and needed to be cross-checked to maintain uniformity. In order to prepare and validate the Geo files, this step was carried out by comparing data presented in scheme MISs, and information available on the official State websites and Election Commission websites. The district websites were helpful regarding the changes in the district and block names whereas the latest scheme databases were used primarily to update the spelling for the names of the local bodies.

Final Outputs: State-wise Geo-Files

Following the above-mentioned steps, we prepared the Geo-files as a final set of outputs that will enable researchers to understand the association between electoral and administrative divisions in the States in a coherent manner and to generate constituency-level estimates from the data otherwise available at different administrative unit levels. Once both electoral and geographical divisions were listed with the utmost accuracy possible, we principally

aimed to conjugate the two, analysing relevant information from multiple sources and arranging them in a way that can represent the association in an easily comprehensible manner.

V. Challenges faced in Constructing the Geo-files

(i) Multiple sources of data had to be referred to for preparation and validation of Geo-files: While the Delimitation Commission Report (2008) does provide detailed information on the constituencies, the administrative units used for demarcating constituencies are not uniform across States. Again, the updated information on these units is maintained by various administrative units of the Government (which varies across States) for which one must refer to multiple data sources.

(ii) Information on the administrative units used by the Delimitation Commission 2008 needed a lot of updating: The total number of local bodies has changed over the course and new GPs, Blocks and Districts have been formed since 2008. Not having updated information in a single source, the process of compilation of newer administrative units into Geo-file construction and validation was carried out manually. The piecemeal (incomplete) information or partial (fragmented) information scattered across websites and documents made it a time-consuming process.

(iii) Mismatch of name of local bodies and inconsistencies in the information presented across different official sources: Names of the administrative units (districts, blocks, local bodies) have been updated from time to time, and therefore needed to be cross-checked and validated with the most updated sources of information. In our search for comprehensive information on the creation and inclusion of these geographical divisions into the constituency boundaries, it was observed that there is some degree of inconsistency in the information provided across different official sources; this made it necessary to cross-validate the same information from multiple sources.

(iv) Changes in the names / boundaries / categorization of some local bodies over time: Other than the change in the names and spellings, the types of the local bodies have also been modified over time. For example, a few villages can congregate to make a new Gram Panchayat and GPs become towns with the increase in the size of the population. Similarly, many of the ULBs have been upgraded to higher tiers with the increase in population as well as changes can take place in the functionalities of a ULB—for instance, a Nagar Panchayat can be updated to Nagar Palika / Parishad and further to a Nagar Nigam. This particularly demanded a regular updating of the listing, verified from the different official sources of information.

(v) Some of the local bodies being split across ACs: In several cases, it was observed that Blocks and Wards of Urban Local Bodies are split across more than one ACs. For ULBs, there are cases where some wards of a Nagar Nigam are part of one constituency while the others fall under other ACs. In such a case, it was challenging to identify the constituencies to which these granular entities (villages/wards) belong to.

VI. Resolving the Challenges

To overcome the above-mentioned challenges in preparing a comprehensive listing of the constituencies for the administrative units, we adopted suitable methods and resolutions indicated below.

(i) **Cross-validation of Geo-files by referring to multiple official sources:** Mismatches in the spelling of names and types of administrative units across different sources were addressed by referring to the government websites that provide the most updated information. It was assumed that the number/names/spelling that appears similar in more than one government site is correct and appropriate for the listing.

(ii) **Consultations with Block-level officials, frontline staff in schemes and political representatives for validation:** Cases of the local bodies for which constituencies remained unidentified were resolved with the information received from Block level government officials, frontline staff in schemes and political representatives.

(iii) **Assumption made for the very few split cases that could not be resolved:** In the event of unavailability of information after covering all possible sources on the cases of split local bodies (which were very few and only in case of U.P. and Chhattisgarh), it was assumed that the local bodies were not split across constituencies. The share of such cases was miniscule (it is less than 0.5 per cent of the total number of GPs in Uttar Pradesh and Chhattisgarh).

VII. Value Added and the Way Forward

Through this exercise, we have developed a rigorous methodology for mapping administrative units in a State into Constituencies. The present study has shown in detail how to align the lowest units of administration, viz. Rural and Urban Local Bodies, to the Assembly and Parliamentary Constituencies for six States, covering almost one-third of the total constituencies in India.

The effort of the Government of India through LGD and GPDP in providing relevant information on RLBs is praiseworthy. However, these initiatives should integrate information on administrative boundaries aligned to constituencies across States and this task needs to be completed at the earliest possible. Through the replication of this methodology, the important ongoing exercise of updating the LGD database of the Government of India can be expedited and carried out a lot more comprehensively.

We have also created complete and up-to-date Geo-files for six States that can be used for a lot of policy research and analysis. The Geo-files will enable researchers, policy analysts and policy practitioners to understand the association between electoral and administrative units in a coherent manner, and generate constituency-level actual figures or estimates from the data available at different geographical levels.

Having a robust database of administrative units aligned to electoral boundaries will also be useful prior to the next Delimitation exercise, which is due in the next couple of years from now. Upgradation of the database is pivotal to avoid errors in drawing and redrawing of the boundaries of the constituencies in such a manner to avoid fallacies as well as gerrymandering, a term that describes the deliberate construction of boundaries to influence the outcomes of elections (Verma, 2006).

It would also be imperative to promote integration of Geo-files into Scheme MIS dashboards;

efforts need to be made towards interlinking the Geo-files with the MISs / Dashboards of schemes through API integration.

Annexure 1: Recent Studies Involving Constituency-focused Policy Research—Data Sources and Methods

1. Saad Gulzar and Benjamin Pasquale (2015)

Dataset

The principal building blocks are the 2001 Census, electoral boundaries (post-Delimitation, therefore valid from 2008 to present) and MGNREGS employment data (from 2013).

- Spatial data on the State ACs, blocks, and villages from the Census, data that contains the geographic borders of all State ACs (N = 4122) and blocks (N = 6348) in India.
- 2001 Census variables related to population, socio-economic measures, government services and infrastructure, at block and village levels.
- AC-candidate level electoral records on State parliamentary elections from the Election Commission of India (2014).
- Gram Panchayat (village clusters) level data for the total number of days worked per individual, per year—general employment generation and employment generation for marginalised communities.

Basic Steps for Constructing the Maps

- Collecting village-level dataset where each observation represents a village, contained within a village cluster, a block and a political constituency.
- Collapsing these village data at the polygon level
  - Unsplit block falls in the jurisdiction of one politician and one bureaucrat- hence, represented by one polygon.
  - Split block falls in the jurisdiction of two politicians—hence, represented by two polygons
- They retained 5,460 blocks and 3,441 constituencies in 8,660 polygons.
- Created a new variable which measures the number of citizens in a polygon as a share of total voters in the constituency that they belong to.

Steps for Data processing and representation

- Downloaded and combined village-cluster unit State datasets.
- Extracted and combine data files from Census shapefiles using ArcGIS, to form a spatially referenced (longitudes and latitudes) dataset of all villages in the 2001 census. Data sourced from: InfoMap India.
- Built a village/village-cluster directory by downloading and combining individual block-level directory files from the Ministry of Drinking Water and Sanitation. Data sourced from: http://indiawater.gov.in/imisreports/nrdwpmain.aspx
- Homogenized district and State names from census and MGNREGS datasets to the Water Resource Ministry directory using a listing of all changes in district names and alternate spellings—to match census and MGNREGS

datasets more efficiently by guaranteeing a match at the district and State levels. Data sourced from: http://www.statoids.com/yin.html

- Fuzzy matches for census village names to the directory, and then MGNREGS village-cluster names to the directory. Used Stata's relink command to carry out the fuzzy match

- Add AC-candidate level electoral records to the village dataset by locating each village within an AC using the village's latitude and longitude.

- Election data was downloaded from the Election Commission of India (2014). These datasets are available at http://eci.nic.in/eci_main1/ElectionStatistics.aspx, and used the Spatial Join command in ArcGIS to carry out this procedure

2. Upasak Das and Diego Maiorano (2019)

Dataset[5]

- AC level data has been taken from the official Management Information System (MIS) for Andhra Pradesh[6] retrieved from the official MGNREGA website from the years 2009–10 to 2015–16. The MIS data has AC level information on total expenditure incurred under the programme in these years as well as the wage and material components.

- Used electoral data from the Election Commission of India website.

- For other variables, they have used data from the census 2011 and the survey of the National Sample Survey Organization (NSSO).

- Census 2011 information on the demographic information at the sub-district level (*Mandals*) of the State.

Steps for Data processing and representation

- All *Mandals* located in a single AC have been mapped to that particular AC using the Delimitation of Parliamentary and Assembly Constituencies Order, 2008.

- In a few cases, where the boundaries of the *Mandals* did not coincide perfectly with the boundaries of the AC, they have listed the villages from that *Mandal* which are situated in the AC and collected information pertaining to those villages from Census 2011 village-level data.

- Since the Delimitation document lists villages from the *Mandal* which lie in the two ACs, they were able to collect relevant information from Census 2011 village-level data. Urban ACs have been dropped from the sample.

- Constructed a categorical variable indicating whether the AC is ruled by Indian National Congress (INC) or its allies (INC+) between 2009 and 2014. The variable is allowed to change after a by-election or changes in party alliances. For example, ACs ruled by Praja Rajyam Party (PRAP) after 2010 get the value of 1 as in 2011, PRAP merged into INC. Similarly, after the split in INC and the formation of YSR Congress (YSRC) party a series of by-elections were held and some went from being INC ACs (1) to YSRC ACs (0).

5 Supplementary data to this article can be found online at https://doi.org/10.1016/j.worlddev.2019.01.011

6 The researchers have selected the state of Andhra Pradesh for this study mainly because the sub-district units in rural areas (mandals) lie entirely within Assembly Constituencies (ACs) i.e. most of the ACs (which elect a single MLA) consist of a few mandals and each mandal is part of only one AC. AP is also the only state that has collected MGNREGA implementation data at the AC-level which is uncommon among India's major states.

3. Jeffrey C Blossom, Akshay Swaminathan, William Joe, Rockli Kim, S V Subramanian (2019)

Datasets

- District-level fact sheet and individual data on child malnutrition indicators[7] from the NFHS-4.
- Geographic data provided by the DHS, where sampling clusters—from which households are sampled—are geo-referenced by latitude and longitude coordinates[8] and available via special request.
- The boundary shapefiles for PCs and districts. The "India–Map of Parliamentary Constituencies, 2014"[9] GIS shapefile was downloaded and used as the PC boundaries for this project (from Github 2014a).
- In choosing an appropriate population data set for the study, they analysed the strengths and limitations of 3 different data sets: LandScan global population database 2016, AsiaPop 2015 and Census of India 2011 and finally used Asia-Pop 2015 for the analysis.

Steps for Data processing and representation[10]

Two methodologies have been suggested in the study.

1. Building an indirect crosswalk (geographic interpolation) between districts and PCs using boundary shapefiles, followed by employing a methodology to link clusters to PCs.

- Superimposed the shapefiles for district and PC boundaries, revealing segments of districts contained within each PC. For this purpose, the ArcGIS Intersect command was applied, and this created a new shapefile where each new polygon contained both the district ID and PC ID of the overlapping area.
- For each of the district segments, the proportion of the total district area[11] and population has been calculated using raster maps. This allows the calculation of the area and population estimates for PCs. The percentage population for the intersected areas was also calculated.
- A new shapefile was created by splitting the polygons where they are not identical and creating new geometric shapes.
- The data set was then aggregated by PC ID, the district segments were matched to the NFHS-4 district-level data, and the resulting malnutrition data columns represented the estimated number of individuals in each PC with a particular malnutrition State.
- PC level estimates for each selected indicator have been classified into quintiles for the mapping purpose while the darker shades represent the 'better off' and the lighter implies 'worse off'.

2. Aggregating individual-level data to a potential PC directly linked via the randomly displaced global positioning system (GPS) locations of the NFHS-4 sampling clusters.

In addition, they further refined these methodologies by applying precision-weighted estimations based on multilevel modelling.

7 Four Indicators have been selected for the study, 1) the percentage of stunning for children under five years, 2) the percentage of underweight children under five years, 3) the percentage of wasting for children under five years, 4) the percentage of children aged 6-59 months who are anaemic.
8 Cluster coordinates are mostly collected in the field using global positioning system (GPS) receivers.
9 This contains boundaries mapped for 543 PCs in polygon format and 641 mapped district boundaries in polygon format.
10 The study talks about employing geographic data science approaches to estimate PC indicators.
11 The geographic area in square kilometres of each district was calculated using the Kalianpur 1975/India Zone IIa coordinate system (EPSG:24379).

Source: Compiled by CBGA from the papers mentioned above.

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About the Methodology Notes

The consolidated methodology note documents the methodology used for mapping administrative boundaries (Rural Local Bodies, Urban Local Bodies and Districts) into the electoral boundaries (Assembly and Parliamentary Constituencies) in selected States. The note also highlight the challenges faced in the mapping exercise as well as the steps taken to overcome those.

About the Initiative

The overarching objective of this initiative is to explore how fiscal information available to the citizens can be made more relevant locally in order to create spaces for strengthening political accountability for public financial management (PFM). Guided by such a vision, the initiative set out to - bring coherence between administrative and electoral boundaries by mapping and aligning the administrative boundaries (Gram Panchayats and Urban Local Bodies) with the boundaries of Assembly Constituencies (ACs) and Parliamentary Constituencies (PCs); collect, verify, organize and map disaggregated fiscal information on major development schemes to ACs and PCs; and create analytics and visualizations with the AC-wise and PC-wise fiscal information to facilitate the uptake of such information by different actors in the PFM landscape.

Open Budgets India

About Open Budgets India (OBI)

OBI is a comprehensive and user-friendly open data portal that facilitates free, easy and timely access to fiscal information. It provides budget information for different tiers of government in India in accessible and open (non-proprietary) formats. Please visit the portal at: www.openbudgetsindia.org

CBGA

About CBGA

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