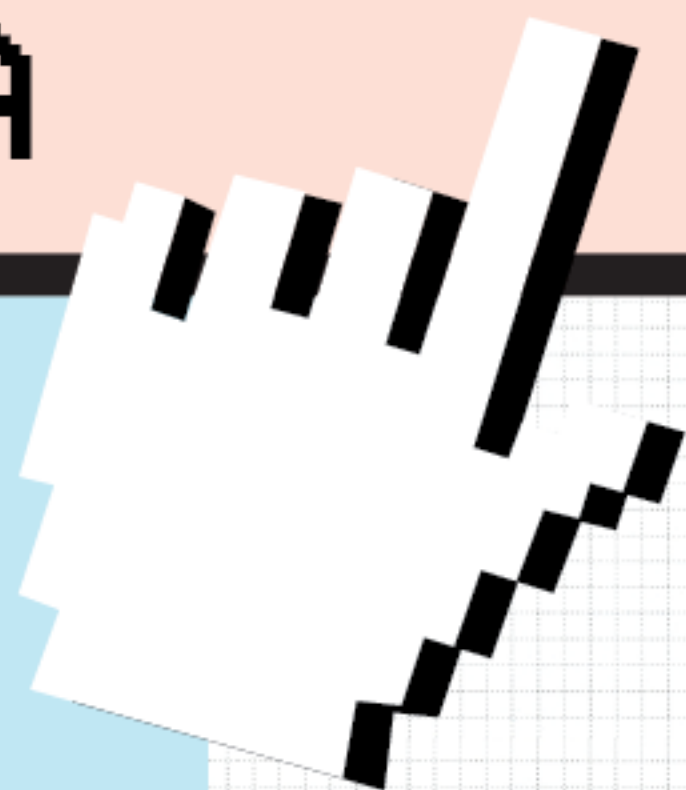


# THE STATE OF FREE & OPEN SOURCE SOFTWARE IN INDIA



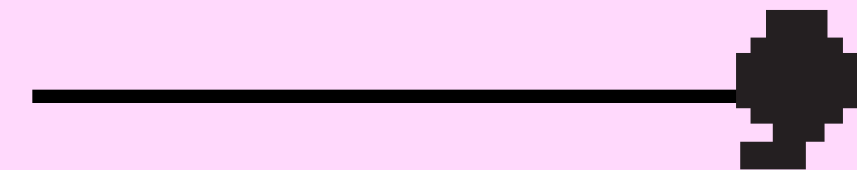


# Preface



The most profound technologies are ones that disappear. They weave themselves into the fabric of every day life until they are indistinguishable from it

**Mark Weiser**  
Former CTO of Xerox  
PARC



One of the most inspiring developments in the last 20 years has been the growth of Free and Open Source Software (FOSS) worldwide. The fact that groups of people can come together, form communities and create world class software code without barriers of geography, and give it away for free, is one of the finest examples of the possibilities enabled by the Internet. From its beginnings as a niche, geeky movement, FOSS has grown into to something that powers your smartphone, the smartwatch on your wrist, the e-government applications, search engines and social media networks that you use, and even the Mars Rover, FOSS has truly woven itself into the fabric of our everyday lives.

As Nadia Eghbal writes in Roads and Bridges The Unseen Labor Behind our Digital Infrastructure, *By making a voluntary investment in our underlying infrastructure, developers made it easier for others to build software. By giving it away for free instead*

*of charging for it, they fueled an information revolution. Developers did not do this for altruistic reasons. They did it because it was the best way to solve their own problems. The story of open source software is one of the great modern day triumphs of the public good.*

Like the rest of the world, India too has benefited enormously from these public goods. Some of India's largest-government projects, and most technology startups have been built on top of FOSS. FOSS communities in India have also organized themselves to solve India's challenges like digital inclusion by creating Indian language fonts, dictionaries and other essential tools that are widely used across the country.

The Government of India has formulated several policies that support FOSS in e-government, encouraging the development of e-gov apps in the collaborative open source development

model, supporting open standards that are critical for FOSS, and discouraging software patents that are an existential threat to FOSS.

At the industry level, some of India's largest software services companies extensively leverage FOSS. Many SMEs have also specialized in providing services around specialized FOSS software like Drupal and others. It seems that all the ingredients that can make a FOSS revolution happen exist, but the catalytic force that can unleash all this potential is missing. Policies exist on paper, with implementation far behind. We consume FOSS without taking leadership, and driving the FOSS development process. Globally, leading technologies like Artificial Intelligence, Internet of Things, 5G etc are being built on FOSS, etc but these same technologies are sold to us with proprietary wrappers at markups that are 60% or more.

The importance of FOSS can be seen in the fact that the best paying jobs in tech today are FOSS skills. Given this scenario, if we continue with a business as usual scenario, India will become an also-ran in the tech world. An alternative scenario is one where the government, industry, academia and the FOSS community

work in concert to deploy FOSS for India's benefit. Government policy states that, all things being equal, preference will be given to FOSS. If this policy is implemented well, it can help grow the domestic market for FOSS systems and services. The FOSS industry can help the government by building technology stacks that are well supported and as easy to implement as Commercial Off The Shelf (COTS) software.

The government could identify strategic areas like 5G/6G, microprocessor technology, AI and others, and work with academia and the FOSS community to build indigenous capabilities.

This will help our country reduce electronics imports, insulate domestic industry from the risk of denial-of-technology regimes, and potentially build Indians companies that take their technology global. Government support for the work of the Indic computing FOSS community can bring millions of Indians who do not know English, into the mainstream of the digital age and expand the domestic IT market.

On their part, the industry and the FOSS community also need to organize themselves



better. For more than a decade, MNCs have been lobbying against India's Patent Law which does not allow software to be patented. Billions of dollars are at stake since a software patent regime will allow MNCs to collect significant royalties on technology sales in India. While FOSS is built around collaboration and the right to share code, software and business method patents are state granted monopolies. The two are fundamentally incompatible, and a reversal of India's patent policies could set back the FOSS ecosystem by decades. Therefore, there is a need for greater vigilance from the FOSS community on this front, and closer engagement with key policy makers. India is one of the few countries that has had a favorable FOSS policy in place for years. However, industry can drive home the advantage, only if it is able to organize itself better, and work closely with the government to ensure that the policy is implemented well.

It is also worth noting that India has the largest base of developers in the world, but its contributions to the global pool of source code has been miniscule. There are many reasons for this, but we must work to change this over the next 5-10 years. From astronomy to mathematics to yoga, India has a tradition

of sharing its knowledge with the world, and Indian FOSS contributions could revive this profound tradition.

I am happy that Omidyar Network India and CivicData Lab have embarked on this study. In the past, there has not been enough documentation of the work that the Indian FOSS community has done.

Therefore, I hope that this study becomes an annual feature so that we can build a historical archive that helps us in future. I hope this report sparks off a conversation that takes the Indian FOSS community to greater heights in the coming years.

**Venkatesh Hariharan**

*An avid FOSS advocate and  
India representative for  
Open Invention Network*



# The Role of FOSS in India's Digital Advancement

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India is well positioned to become a vibrant hub for FOSS innovations. In India, 4G data subscribers have recently crossed more than 598 million of which 96% of them access the digital world via open-source based mobile operating systems

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Free and open-source software (FOSS) is software that is freely licensed to use, copy, study, change, improve, and redistribute.

FOSS is an inclusive term that covers both “free software” and “open-source software”, which despite describing similar ownership models, have differing cultures and philosophies.

The “free software” model advocated by the Free Software Foundation <sup>1</sup> focuses on the fundamental freedoms a software must give to its users, commonly explained as “think of free as in free speech, not as in free beer”.

Whereas “open-source software” as described by Open Source Initiative (OSI) <sup>2</sup> emphasizes on the business-friendly development and use of code, harnessing strengths of the distributed

development model. “Free” and “Open” are different ideologies, but we believe they are not at odds. There is substantial overlap between the two.

If software products are the foundation of the digital economy, then the source code (the version of software as it is originally written i.e., typed into a computer) are its building blocks <sup>3</sup>. In the case of FOSS, these building blocks are made openly available for everyone to tinker, tweak, and improve as they like and to use as building blocks to build other things.

Digital excellence is therefore cumulative, achieved step by step by the continuous efforts of a vibrant community of contributors distributed all over the world. And because of these millions of contributors, most of our digital experiences are powered



<sup>1</sup> “Front Page” - Free Software Foundation - working together for free software, accessed October 20, 2020, <https://www.fsf.org/>.

<sup>2</sup> “News” | Open Source Initiative, accessed October 20, 2020, <https://opensource.org>.

<sup>3</sup> “Source Code Definition,” Source code definition by The Linux Information Project, accessed October 20, 2020, [http://www.linfo.org/source\\_code.html](http://www.linfo.org/source_code.html).





by FOSS today. More than 85% of India's Internet runs on FOSS <sup>4</sup>, we consume it daily to browse via Google <sup>5</sup>, chat over WhatsApp <sup>6</sup>, book train tickets from the Indian Railway Catering and Tourism Corporation (IRCTC) <sup>7</sup>, perform bank transactions at the State Bank of India (SBI) <sup>8</sup> or watch a show on Netflix <sup>9</sup>.

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More than 85% of India's Internet runs on FOSS

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**FOSS offers new avenues for economic, technological and talent growth that are rooted in the commons-based peer production of information, knowledge, and culture <sup>10</sup>.**

The ownership and usage policies of software products are becoming intertwined with freedom and equity in society as people move to an increasingly digitally enabled existence.

FOSS has decentralized software production to a large extent, leading

to greater inclusivity in software supply chains. On average, FOSS products are much more affordable than their proprietary counterparts and give increased personal control and freedom to creators and users alike. This is especially relevant in a world where communities look for representation and agency, and without which, the future of the digital economy may be controlled by a handful of people and corporations.

**India is well positioned to become a vibrant hub for FOSS innovations.** In India, 4G data subscribers have recently crossed more than 598 <sup>11</sup> million of which 96% of them access the digital world via open-source based mobile operating systems (primarily Android) <sup>12</sup>.

With this level of usage, India has increasingly become an emerging market for mobile applications and related software, built to run on FOSS-enabled devices. According to GitHub, India now ranks 3<sup>rd</sup> in the world in terms of FOSS usage and

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<sup>4</sup> "Web Server Usage Distribution in the Top 1 Million Sites," Web Server technologies Web Usage Distribution, accessed October 20, 2020, <https://trends.builtwith.com/web-server>.

<sup>5</sup> "Open Source by the Numbers at Google," Google Open Source Blog, accessed October 20, 2020, <https://opensource.googleblog.com/2020/08/open-source-by-numbers-at-google.html>.

<sup>6</sup> "Whatsapp Encryption Overview," [https://scontent.whatsapp.net/v/t39.8562-34/89275998\\_627986927772871\\_4167828889579552768\\_n.pdf?nc\\_sid=2fb2a&nc\\_ohc=yzp1baGk8wAX9OhTuD&nc\\_ht=scontent.whatsapp.net&oh=38e642c6e140d22d756c1cb633e8f79c&oe=5F905251](https://scontent.whatsapp.net/v/t39.8562-34/89275998_627986927772871_4167828889579552768_n.pdf?nc_sid=2fb2a&nc_ohc=yzp1baGk8wAX9OhTuD&nc_ht=scontent.whatsapp.net&oh=38e642c6e140d22d756c1cb633e8f79c&oe=5F905251), December 19, 201

<sup>7</sup> The Centre for Railway Information Systems (CRIS) books more, happier passengers with infrastructure powered by, accessed Oct 20, 2020 Red Hat <https://www.redhat.com/en/files/resources/en-rh-cris-books-more-happier-passengers-infrastructure-powered-by-red-hat-12022727.pdf>.

<sup>8</sup> Bhragu Haridas, "How Enterprises Are Leveraging Open Source Tech to Drive Digital Transformation - ET CIO," ET CIO.com, July 17, 2020, <https://cio.economictimes.india-times.com/news/strategy-and-management/how-enterprises-are-leveraging-open-source-tech-to-drive-digital-transformation/77011012>.

<sup>9</sup> "Open Source," Netflix TechBlog, accessed October 20, 2020, <https://netflixtechblog.com/tagged/open-source-infrastructure-powered-by-red-hat-12022727.pdf>.

<sup>10</sup> Yochai Benkler, "FREEDOM IN THE COMMONS: TOWARDS A POLITICAL ECONOMY OF INFORMATION," Duke Law Journal Vol. 52 (2003): p. 1245, <https://scholarship.law.duke.edu/dlj/vol52/iss6/3/>.

<sup>11</sup> "India Mobile Broadband Index 2020," accessed Oct 2020, [https://www.nokia.com/sites/default/files/2020-02/Nokia\\_MBIT\\_2020\\_Report%20%28web%29.pdf](https://www.nokia.com/sites/default/files/2020-02/Nokia_MBIT_2020_Report%20%28web%29.pdf).

<sup>12</sup> "Mobile Operating System Market Share India" | StatCounter Global Stats, accessed Oct 2020, [https://gs.statcounter.com/os-market-share/mobile/chart.php?device=Mobile&device\\_hidden=mobile&statType\\_hidden=os\\_combined&region\\_hidden=IN&granularity=monthly&statType=Operating%20System&region=India&fromInt=201908&toInt=202008&fromMonthYear=2019-08&toMonthYear=2020-08&csv=1-infrastructure-powered-by-red-hat-12022727.pdf](https://gs.statcounter.com/os-market-share/mobile/chart.php?device=Mobile&device_hidden=mobile&statType_hidden=os_combined&region_hidden=IN&granularity=monthly&statType=Operating%20System&region=India&fromInt=201908&toInt=202008&fromMonthYear=2019-08&toMonthYear=2020-08&csv=1-infrastructure-powered-by-red-hat-12022727.pdf).



continues to witness an exponential boost with more developers preferring FOSS libraries and software solutions <sup>13</sup>.

**However, India still lags behind the global landscape in building sustainable home-grown projects and needs a strategic plan to incubate and proliferate domestic FOSS innovations worldwide <sup>14</sup>.**

Awareness of the ecosystem as well as a culture of contributing and growing code repositories in the open is missing. India's moderate contribution to FOSS is surprising since the country has a large and diverse Information Technology workforce of more than 4.36 million employees and an aggregate IT revenue surpassing

US\$180 billion in year 2019 <sup>15</sup>.

The country's software industry has seen massive advancement in the last three decades and now constitutes approximately 8% of the country's GDP <sup>16</sup>. To translate these capabilities into rich FOSS contribution, leadership, and innovation there is a need to develop a robust strategic plan to shape the FOSS ecosystem in the country, and to implement this through coordinated action between stakeholders.

For this to happen, actors must be aware of and value the efforts, historical and present – of all partners in this ecosystem.



<sup>13</sup> "The State of the Octoverse," The State of the Octoverse, accessed October 20, 2020, <https://octoverse.github.com/>.

<sup>14</sup> "Can India ever become a global FOSS hub", LINUX For You. September 2010. [https://www.mindtree.com/sites/default/files/2017-10/306%20mindtree-thought-posts-can-india-ever-become-a-global-foss-hub\\_0.pdf](https://www.mindtree.com/sites/default/files/2017-10/306%20mindtree-thought-posts-can-india-ever-become-a-global-foss-hub_0.pdf)

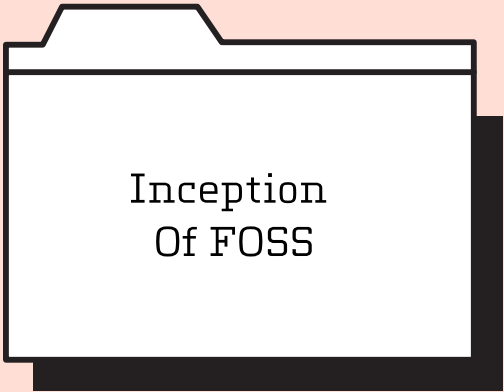
<sup>15</sup> Samrat Sharma, "IT Industry May Become Lighthouse for India's Growth; Here's How Many IT Firms Operate in India," The Financial Express, February 17, 2020, <https://www.financialexpress.com/industry/it-industry-may-become-lighthouse-for-indias-growth-heres-how-many-it-firms-operate-in-india/1870795/>.

<sup>16</sup> "Indian IT-BPO Industry" NASSCOM, accessed October 20, 2020, <https://web.archive.org/web/20121220032358/http://www.nasscom.in/indian-itbpo-industry>.



# Chronicling the FOSS movement in India

Based on our conversations and reading, we classified the FOSS movement into six eras mentioned below.



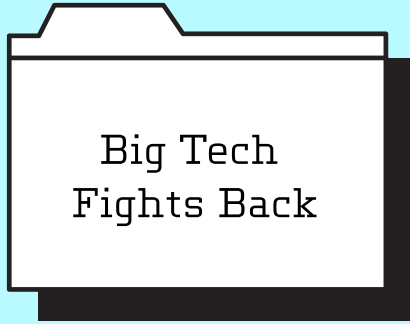
1886 - 1978



1978 - 1989

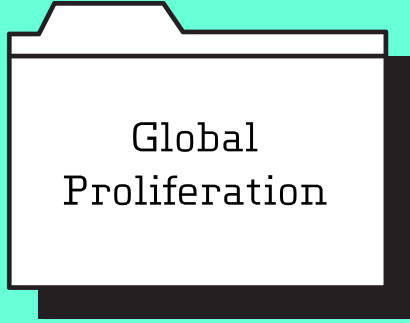


1991 -1998

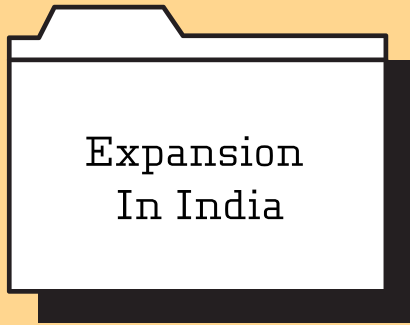


1998 -2008

X



1999 - present



2001 - present

[Click here for the complete FOSS Timeline](#)



**The origins of the FOSS movement in India can be found in the early 1990s** with the community efforts of pioneers like C.V. Radhakrishnan, late Atul Chitnis, Nagarjuna G, K. S. S. Nambooripad, Satish Babu, Raj Mathur and more. By early 2000s, India witnessed germination of a variety of Indian Linux User Groups (ILUGs) groups and Free Software User Groups (FSUGs) spanning different cities and towns.

We have also seen several software localization initiatives in Indian languages and “Freedom Walks” covering 1200+ kilometers promoting free software usage <sup>17</sup>. FOSS communities continue to grow organically, engaging developers from diverse programming backgrounds to come together, learn and code.

FOSS has also led to some major policy shifts in governments across the globe. While, it began trickling into Indian policy and administration at the turn of the century, and has been growing in importance since.

Countries and supranational unions (like the European Union) <sup>18</sup> have adopted FOSS in different capacities like the Federal Source Code policy in the USA <sup>19</sup>, or the Bulgarian, German, Ecuadorian government officials or the French Gendarmerie completely switching over to FOSS <sup>20,21,22,23</sup>.

In India, The Kerala government has been a leader in supporting FOSS, first by showing its official support with the State IT Policy in 2001<sup>24</sup> which led to various government agencies in Kerala including the Kerala State Electricity Board <sup>25</sup> as well as the Government Secretariat <sup>26</sup> moving to machines that ran fully on Linux. In 2009 it set up the International Centre for Free and Open Source Software (ICFOSS) <sup>27</sup>. These changes have been saving the Kerala government about Rs 300 crores every year <sup>28</sup>.

In 2011, the Indian Supreme court moved all its activities to Ubuntu and encouraged all the other courts in the country to transition as well <sup>29</sup>.

<sup>17</sup> “Freedom Walk: To Claim, Ensure and Preserve Freedom!,” Freedom Walk, accessed October 20, 2020, <http://www.freedomwalk.in/>.

<sup>18</sup> AC Consultants, “The Economic and Social Impact of Software and Services on Competitiveness and Innovation,” Shaping Europe’s digital future - European Commission, April 3, 2017, <https://ec.europa.eu/digital-single-market/en/news/economic-and-social-impact-software-and-services-competitiveness-and-innovation>.

<sup>19</sup> Tony Scott, “Federal Source Code Policy - United State of America”, Aug 8, 2016. [https://web.archive.org/web/20160920231938/https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m\\_16\\_21.pdf](https://web.archive.org/web/20160920231938/https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_21.pdf)

<sup>20</sup> Devin Coldewey, “Bulgaria Now Requires (Some) Government Software to Be Open Source,” TechCrunch (TechCrunch, July 6, 2016), <https://techcrunch.com/2016/07/05/bulgaria-now-requires-some-government-software-to-be-open-source/>.

<sup>21</sup> “[News] Ecuador Ahead of the World with Democracy of Knowledge,”accessed October 20, 2020, <http://compgroups.net/comp.os.linux.advocacy/-news-ecuador-ahead-of-the-world-with/1773288>.

<sup>22</sup> Nick Heath, “How Munich rejected Steve Ballmer and kicked Microsoft out of the city”, Tech Republic, Nov 18 2013, Accessed Nov 18, 2020, <https://www.techrepublic.com/article/how-munich-rejected-steve-ballmer-and-kicked-microsoft-out-of-the-city/>

<sup>23</sup> Paul Ryan, “French Police: We Saved Millions of Euros by Adopting Ubuntu,” Ars Technica, March 12, 2009, <https://arstechnica.com/information-technology/2009/03/french-police-saves-millions-of-euros-by-adopting-ubuntu/>.

<sup>24</sup> “Kerala State IT Policy”, 2001, <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan002950.pdf>

<sup>25</sup> “FOSS experience of KSEB”, ICFOSS, accessed October 2020, [https://icfoss.in/doc/FOSS\\_Transition\\_Policy/FOSS%20experience.pdf](https://icfoss.in/doc/FOSS_Transition_Policy/FOSS%20experience.pdf)

<sup>26</sup> Vinson Kurian, “Kerala Legislature Announces Smooth Transition to Free Software,” The Hindu BusinessLine, March 12, 2018, <https://www.thehindubusinessline.com/news/national/kerala-legislature-announces-smooth-transition-to-free-software/article20821938.ece1>.

<sup>27</sup> “Home,” ICFOSS, accessed October 20, 2020, <https://icfoss.in/>.

<sup>28</sup> Abhishek Prakash, “With FOSS, Indian State of Kerala Saves \$58 Million Each Year,” It’s FOSS, March 9, 2017, <https://itsfoss.com/open-source-kerala/>.

<sup>29</sup> Diksha P Gupta. “Indian Supreme Court Opts for Ubuntu 10.04 - LINUX For You,” Open Source For You, August 25, 2016, <https://www.opensourceforu.com/2011/11/indian-supreme-court-opts-for-ubuntu-10-04/>.





And, in 2015, Indian government as part of its Digital India programme announced a “policy on the adoption of open source software for the Government of India” <sup>30</sup> as well as policy on “Collaborative Application Development by Opening the Source Code of Government Application” to show its commitment towards further developing the country as a digitally empowered society and a knowledge economy using FOSS.

The policy has come up against some critique especially with respect to the implementation framework for the policy <sup>31</sup>.

Over the last decade, FOSS has continued to push and thrive in

areas as diverse as the web, mobile computing, embedded systems, robotics, computer graphics, gaming, virtual reality, big data. This has led to co-option of FOSS by big businesses, especially those running on the internet, FOSS suddenly became quite ubiquitous. Now large firms like Microsoft have done a 180 on their FOSS stance. In India, most large companies (Tata Consultancy Service, Wipro, Infosys) now use FOSS technology quite frequently. This decade has also seen the rise of homegrown FOSS projects like Calibre <sup>32</sup>, ERPNext <sup>33</sup>, Chatwoot <sup>34</sup>.

<sup>30</sup> “Digital India Programme: Ministry of Electronics & Information Technology(MeitY) Government of India,” Digitalindia, October 5, 2020, <https://www.digitalindia.gov.in/>.

<sup>31</sup> “FOSS for Public Use: Free and Open Source Software for Digital India” SFLC, accessed Oct 2020. <https://cis-india.org/openness/blog-old/meeting-notes-on-foss-roundtable.pdf>

<sup>32</sup> “Calibre E-Book Management,” calibre, accessed October 20, 2020, <https://calibre-ebook.com/>.

<sup>33</sup> Erpnext.com, “Open Source Cloud ERP,” ERPNext, accessed October 20, 2020, <https://erpnext.com/>.

<sup>34</sup> “Provide Exceptional Customer Support Over,” Chatwoot, accessed October 20, 2020, <https://www.chatwoot.com/>.



# Indian FOSS Ecosystem & its Challenges

As we look ahead to chart where the FOSS movement in India can go, we must acknowledge the challenges and opportunities that lie in this journey ahead.

**The key actors in the FOSS movement are individual volunteers and consultants, FOSS groups, schools, higher educational and research institutes, online educational actors, micro small and medium tech enterprises, global tech firms, local and state governments, national governments, FOSS funders, and FOSS investors.**



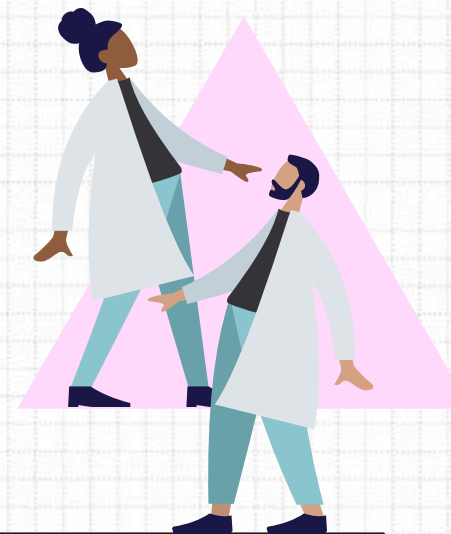
FOSS & Community

- FOSS Groups
- Funders
- Non Profit Organisations
- Volunteers



FOSS & Businesses

- Global Tech Firms
- Micro, Small & Medium Enterprises
- Consultants



FOSS & Education

- Higher Education & Research Institutes
- Online Education
- Schools



FOSS & Governments

- National Governments
- State & Local Governments



In the past, we have witnessed these stakeholder groups come together around some important efforts. These moments of collaboration led to a boost in localization of code in Indian languages including liaising with the Bureau of Indian Standards (BIS) to support open interoperable file formats <sup>35</sup>.

From our discussions with the community it has also been

apparent that they played a substantial role in helping draft key state and national policies in relation to FOSS.

Looking ahead, these actors must address a few key challenges in working towards a common vision of creating a vibrant FOSS community in India.

These are:

Collaboration

Literacy

Mentorship

Policy making

<sup>35</sup> John Ribeiro, "India Rejects Office Open XML Again," InfoWorld (IDG News Service, March 21, 2008), <https://www.infoworld.com/article/2642706/india-rejects-office-open-xml-again.html>.



Collaboration

**There are plenty of small thriving FOSS communities but there is not as much collaboration or co-creation between them to yield a louder voice.** While there are a lot of thriving regional FOSS communities, there are not many spaces or figureheads who can unite contributors and communities around a common goal while providing pathways to get there. This makes it difficult to retain developers and attract a diverse and inclusive talent pool. We continue to see lack of funds, low retention rate, high burnout, and lack of incentives making most FOSS communities struggle to sustain.

Literacy

**FOSS literacy and capacity of our youth has not kept its pace with the emerging market demands.**

While almost all major academic development tools are FOSS (such as R [36](#), Python [37](#), LaTeX [38](#)) there is still not enough formalization of FOSS curriculums and programmes in public and private education institutes. This is particularly true for programmes in regional languages which have dissuaded uptake and retention of FOSS by students and early-stage developers for whom English is not a first language, which makes up more than 80% of the population [39](#). Competing demand for resources and unavailability of localised content further hinders adoption at the grassroot level. There is also a need to communicate the values and principles of FOSS to young learners, fostering a collaborative culture of contribution.

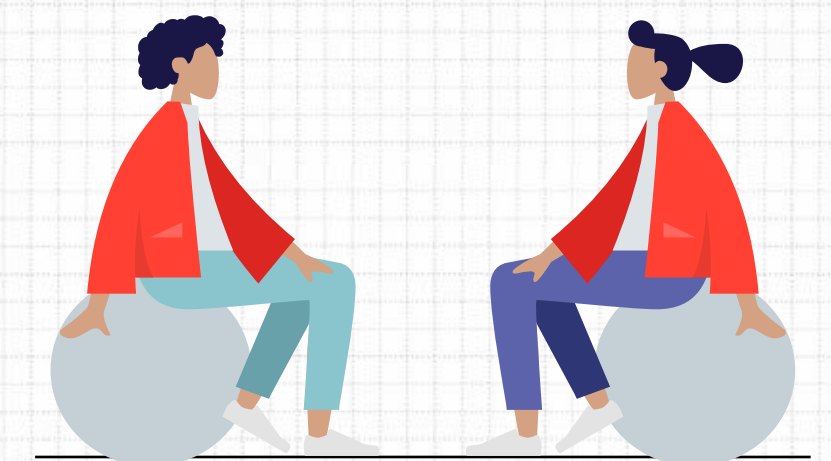
## Mentorship

**The Indian tech business ecosystem lacks an enabling environment to support and grow FOSS innovations.** The various Indian big tech players, especially IT enabled Service (ITeS) companies still remain quite agnostic when choosing to keep their underlying code open source or not, especially with regards to their key services and offerings. There is also a large gap in transitioning from being an active part of the community to building a successful business around FOSS. Most entrepreneurs focused on FOSS have limited support and mentorship options available in terms of legal compliances, financial sustainability, procurement opportunities and more.

Policy making

**While India has a FOSS policy for e-governance, there are major gaps in implementing it in practice.**

Even after having a progressive FOSS policy and framework, governments are not yet able to engage India's vast developer community to co-create open-source digital assets. Both regional and national government agencies still lack sufficient tech capacity to drive FOSS initiatives.



<sup>36</sup> “The R Project for Statistical Computing,” R, accessed October 20, 2020, <https://www.r-project.org/>.

<sup>37</sup> “Our Community,” Python.org, accessed October 20, 2020, <https://www.python.org/community/>.

<sup>38</sup>“A Document Preparation System,” LaTeX, accessed October 20, 2020, <https://www.latex-project.org/>.

<sup>39</sup> “Indian at a glance”, MoHUA, accessed November 13, 2020, [https://www.censusindia.gov.in/Census\\_Data\\_2001/India\\_at\\_glance/glance.aspx](https://www.censusindia.gov.in/Census_Data_2001/India_at_glance/glance.aspx).

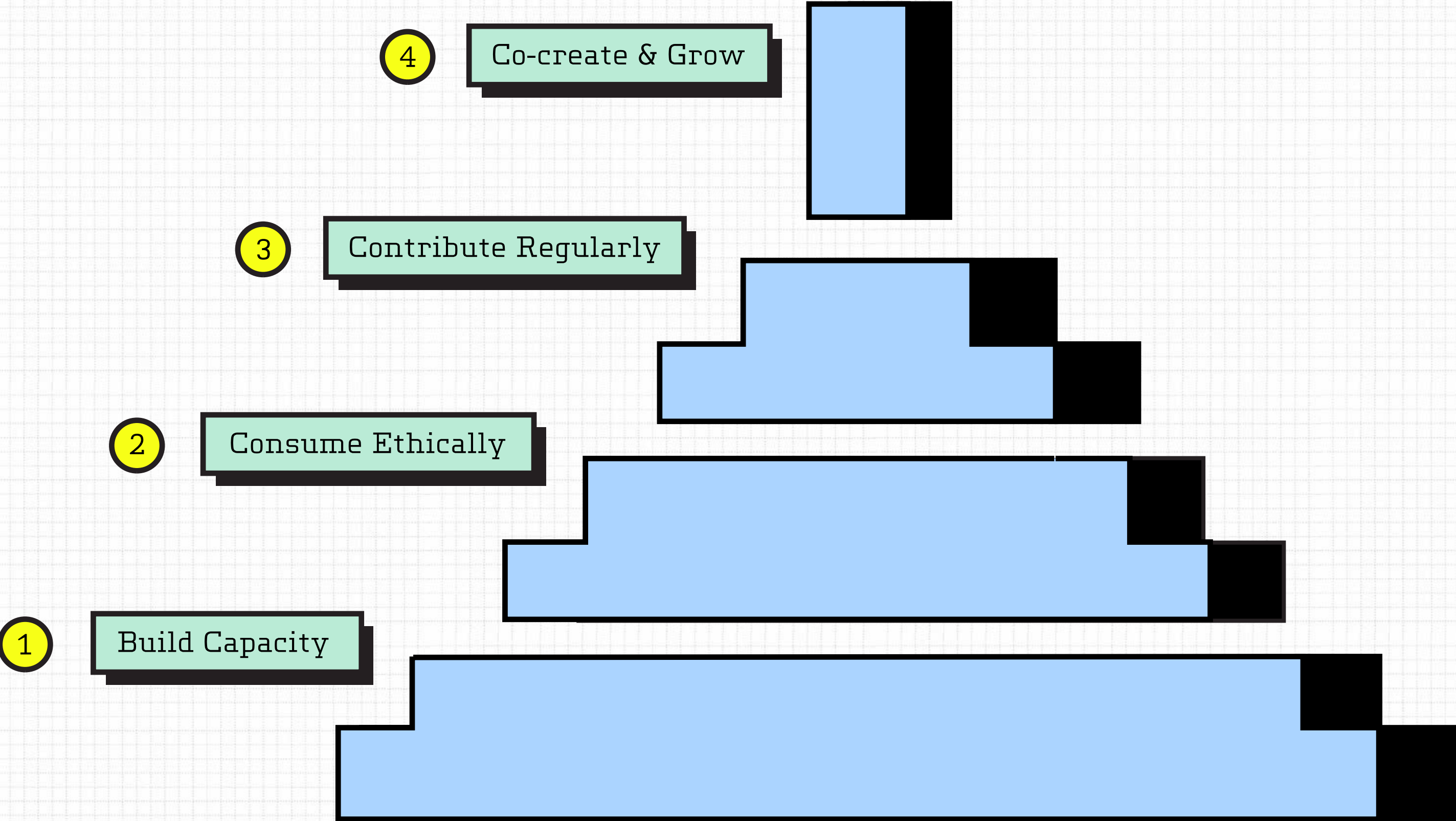


# Recommendations to step up India's FOSS game

To address some of the above mentioned challenges, we propose 4Cs for FOSS growth for various stakeholders to:

- Build **Capacity**
- **Consume** Ethically
- **Contribute** Regularly, and
- **Co-Create** & Grow

Based on the research including interviews, discussions and reading circles conducted as part of this study, we believe the following recommendations can be undertaken by the four key actors to support FOSS ecosystem in India:



**Figure 1:** The 4Cs of FOSS Growth for Major Stakeholders



Regional & National level FOSS interest groups across India

**Eg:**

- Free Software Foundation
- FOSS@Amritra
- PyLadies Delhi



Individuals volunteering time to contribute to the ecosystem and mobilising community

**Eg:**

- Aruna Sankaranarayanan
- Balasubramanian D
- Cherry G Mathews
- Kamal Velan



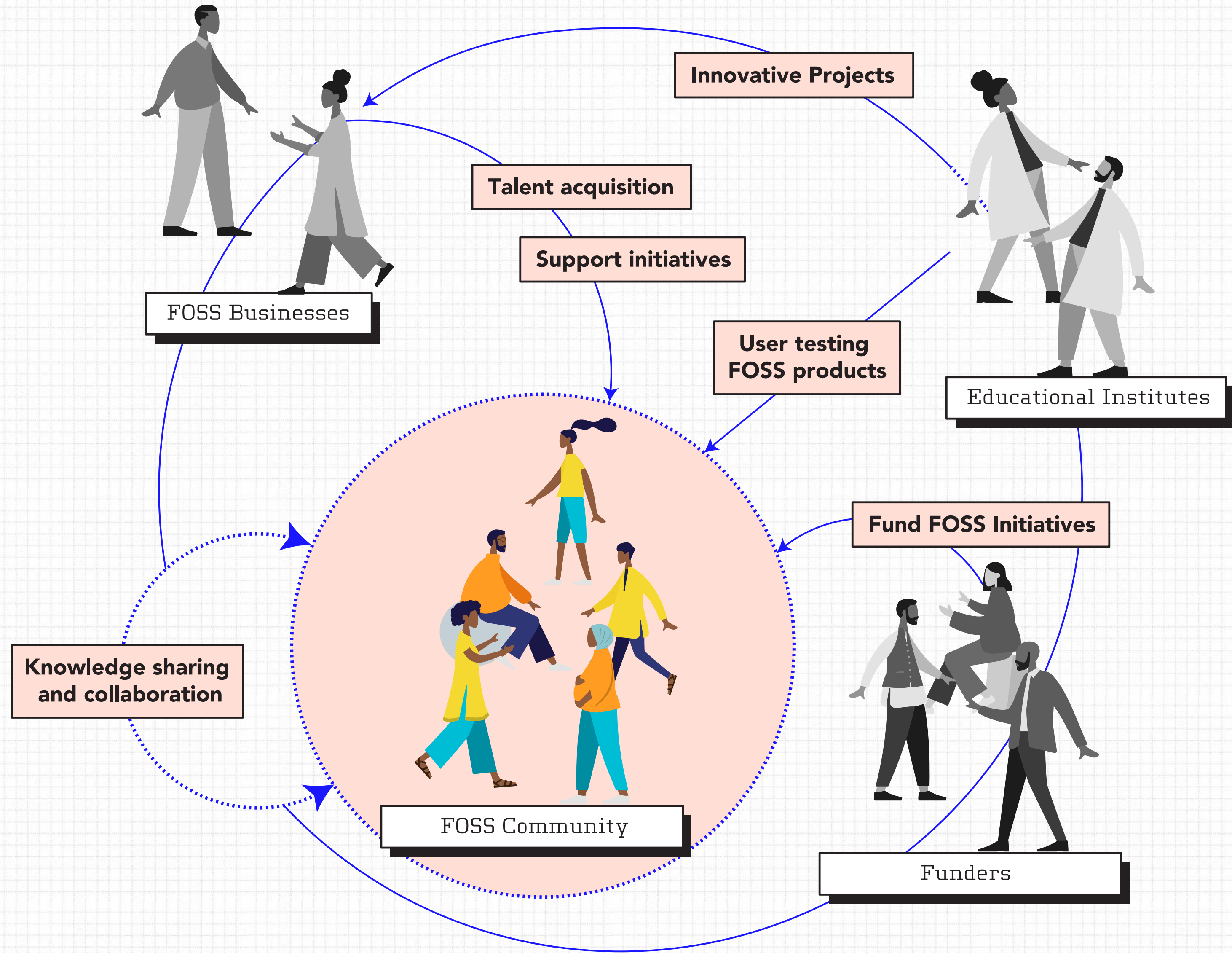
Help in grassroots adoption of FOSS by recommending policy and governance frameworks and funding and promoting FOSS initiatives

**Eg:**

- Centre for Internet and Society
- FOSS United Foundation
- eGovernments Foundation
- IT for Change
- Mozilla Foundation
- Software Freedom Law Centre







**Figure 1:** The Sphere of Influence for FOSS & Community



**Help onboard new members to FOSS and mentor them to develop their individual and collective roadmaps,** there is a need for a long term vision of personal and professional development to retain and sustain FOSS communities.

Eg: [Outreachy](#)

Software Freedom Conservancy organizes internship programs called Outreachy for typically underrepresented groups <sup>41</sup>.

**Build teams that can effectively engage with and mobilize the community.** FOSS communities and projects need to actively and responsibly allocate funds and resources for community mobilization and other activities. Most Indian FOSS Leaders were originally developers who recognized this need and became community mobilisers. Building a well-supported team with shared responsibility prevents putting the pressure of such a critical role on a single person, who often feels the need to be constantly “on”, that leads to burnout and resignations.

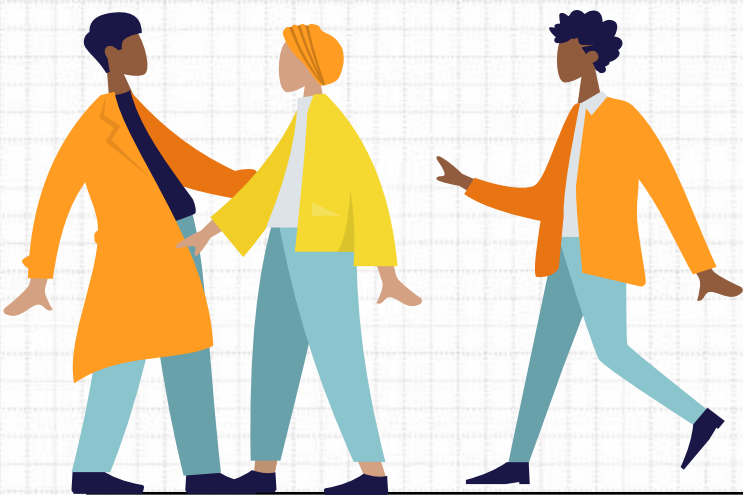
Eg: [Succession Planning for FOSS Communities](#)

A good example is the work of Vicky Brausser, a FOSS advocate who conducts succession planning training for FOSS Communities <sup>40</sup>

**Incubate indigenous innovative FOSS based projects,** creating structures of financial and legal support for FOSS communities to begin and foster projects that are driven by a need to solve a problem would increase project retention, contribution and support from within the community resulting in more robust and sustainable projects.

Eg: [The Linux Foundation](#)

The Linux Foundation, a non-profit technology consortium that supports the growth and promotion of the different projects and communities around Linux <sup>42</sup>.



<sup>40</sup> “Internships Supporting Diversity in Tech,” Outreachy, accessed October 20, 2020, <https://www.outreachy.org/>.

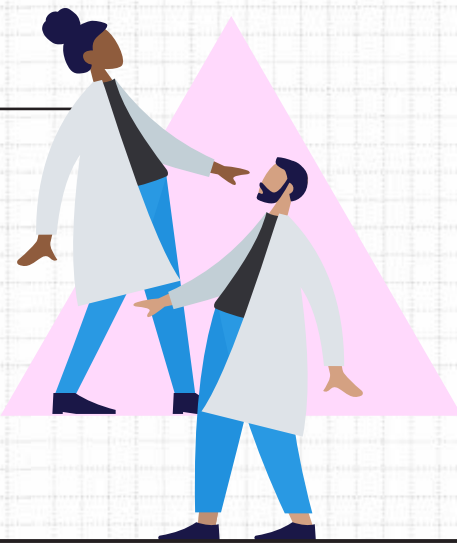
<sup>41</sup> Vicky Brasseur, “For Project Safety Back up Your People, Not Just Your Data,” Opensource.com, April 16, 2018, <https://opensource.com/article/18/4/passing-baton-succession-planning-foss-leadership>.

<sup>42</sup> “Supporting Open Source Ecosystems,” The Linux Foundation, accessed on October 15, 2020, <https://www.linuxfoundation.org/>.



Research & educational institutes, independent, public or private entities working to harness FOSS in academia

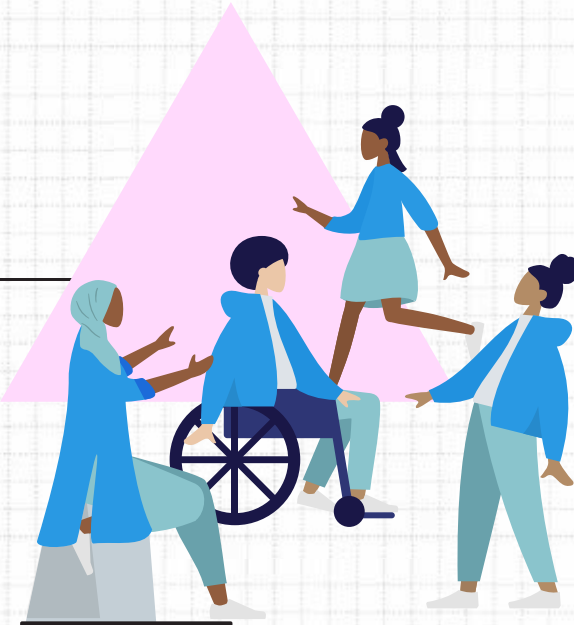
- Eg:**
- *Bhabha Atomic Research Centre*
  - *Tata Institute of Fundamental Research*
  - *IIT Bombay*



Higher Education & Research Institutes

Institutes imparting education and FOSS literacy to K - 12 children

- Eg:**
- *Govt. Schools in Assam*
  - *Govt. Schools in Kerala*



Schools

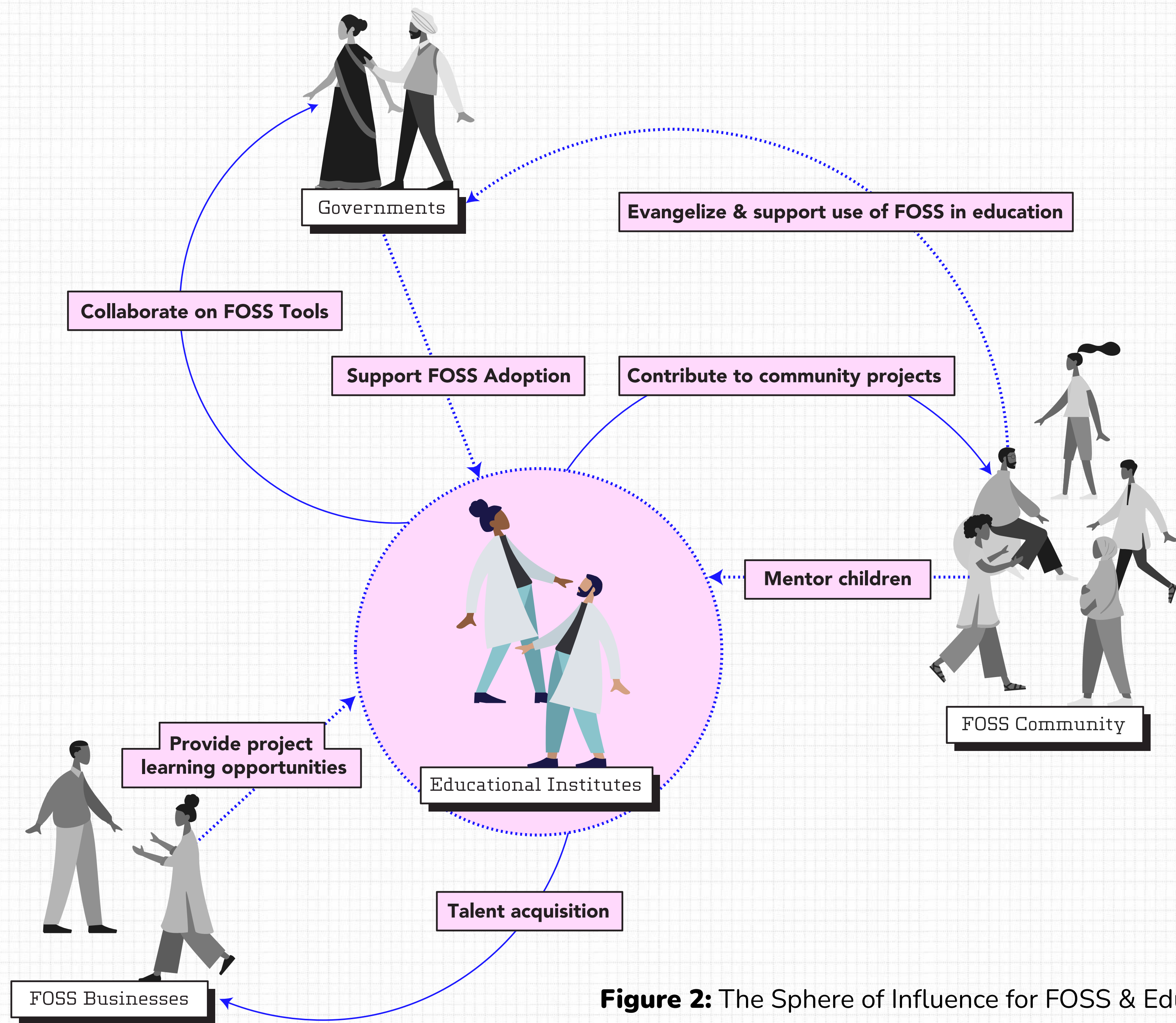
Online platforms imparting education and FOSS literacy

- Eg:**
- *Khan Academy*
  - *Spoken Tutorial*



Online Education





**Figure 2:** The Sphere of Influence for FOSS & Education



**Build FOSS-led digital literacy programs empowering both educators and learners.** A FOSS led curriculum needs to be created and adopted in schools to facilitate awareness and adoption around FOSS from an early age.

Eg: *IT@School - The Kerala Model*

IT@School, is a special purpose vehicle company funded by the Government of Kerala with the aim to fuel FOSS enabled Information and Communications Technology (ICT) education in the state <sup>43</sup>.

**Localize digital literacy curriculum to enable learners to learn and contribute in their native languages.** Collaborate with the community to ensure localisation and adoption of such technologies.

Eg: *Spoken Tutorial*

Spoken Tutorial, an educational content portal that teaches students FOSS <sup>44</sup>.

**Create programs to identify and grow FOSS communities in educational institutes.** Focus on introducing students to FOSS development along with FOSS communities working in specific focus areas.

Eg: *FOSSEE*

The program on Free/Libre and Open Source Software Education (FOSSEE), which works with communities while organizing conferences and forums <sup>45</sup>.



<sup>43</sup> Biju Prabhakar and Arun M, “IT@ SCHOOL AND FREE SOFTWARE IN EDUCATION: THE KERALA MODEL,” Information, Society, and Development, 2007. <https://www.space-kerala.org/files/it-school.pdf>.

<sup>44</sup> “Spoken Tutorial Project, IIT Bombay,” Home, accessed October 20, 2020, <https://spoken-tutorial.org/>.

<sup>45</sup> “POSTER,” FOSSEE, accessed October 20, 2020, <https://fossee.in/>.

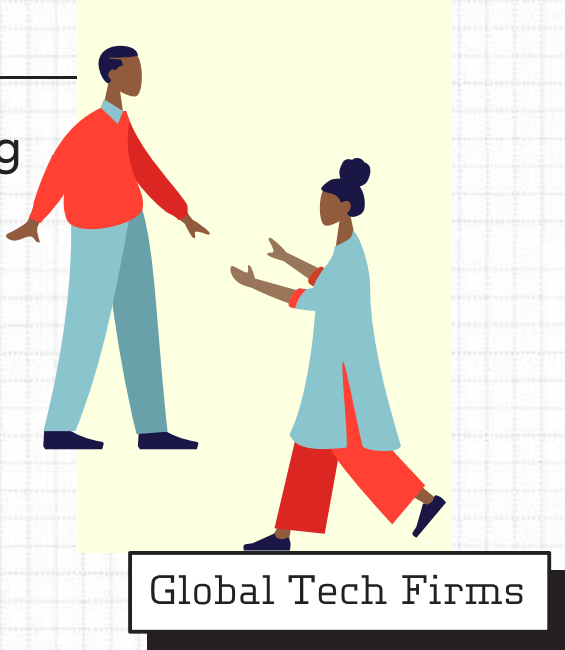


# FOSS & Business

Global tech firms having an Indian FOSS presence

Eg:

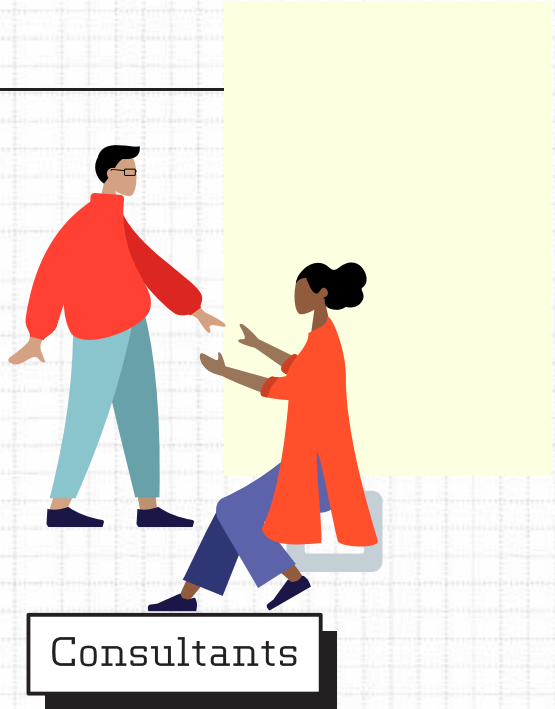
- Amazon
- Google
- GitHub
- Red Hat
- Tata Consultancy Service
- Thoughtworks
- Wipro



Individuals contracted to work on FOSS projects within organisations

Eg:

- Ankur Sethi
- Arun Raghavan
- Nirbheek Chauhan
- Steven Deobold
- Vaishali Thakkar



Start ups implementing FOSS based solutions in India

Eg:

- Ashnik
- Bagisto
- Coopon
- Dhiway
- Frappe Technologies
- Hasura



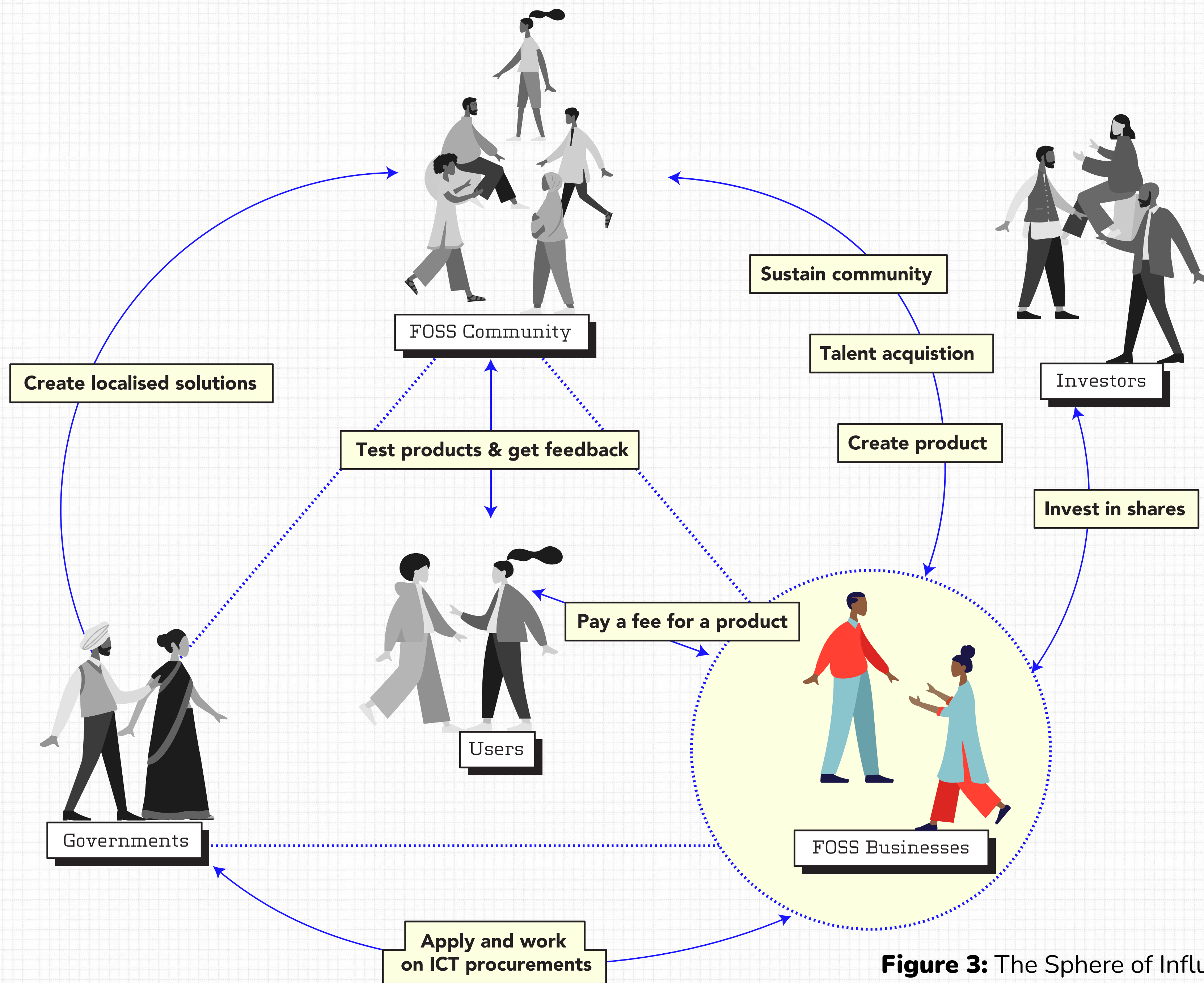
Organisations that allocates capital for FOSS with the expectation of a future financial return or to gain an advantage

Eg:

- OSS Capital
- Strive VC
- 3One4 Capital







**Figure 3:** The Sphere of Influence for FOSS & Business



**Support FOSS based start-ups to monetize their products/services.**

Indian FOSS companies have a unique opportunity to help customers migrate from proprietary closed-source software to mature FOSS alternatives and provide dedicated support. Ecosystem players like incubators, investors, and evangelists can help instil awareness, conduct training and provide technical support for FOSS start-ups to correctly utilize licenses, and create sustainable business models.

Eg: [Coopon](#), [Chiguru Tech](#), [Tidelift](#) & [Open Collective](#)

**Incentivize FOSS contributions from tech companies.**

Large tech players can create internal FOSS friendly policies to incentivize contributors from within their workforce to contribute to FOSS projects as in the case of the policies from Zalando (an e-commerce company) <sup>50</sup> and Netflix <sup>51</sup>.

Eg: [Zalando](#) & [Netflix](#)

□ These organizations have strong FOSS contribution guidelines to help with their hiring.

**Grassroots promotion of FOSS.**

Corporate Social Responsibility programmes can support FOSS contributions in the form of hackathons or conferences to crowdsource and germinate innovative ideas.

Eg: [India OS conference](#)

□ The India OS conference organized by Frappe Technologies <sup>52</sup> focusing on the creators and contributors to FOSS <sup>53</sup>.

**Co-create enterprise FOSS projects with the community.**

Businesses have a unique opportunity to collaborate with diverse communities to build large-scale FOSS projects.

Eg: [Apache Superset](#)

□ Apache Superset, a data visualization tool, which was first created by AirBnB and then entered the Apache incubator for sustained contribution from the community <sup>54</sup>.

□ Continuous commitment is required to build legal, financial and growth structures for helping FOSS businesses of different kinds including FOSS-focussed Indian start-ups (like Coopon <sup>46</sup>, Chiguru Tech <sup>47</sup>) and pro-FOSS financial offerings (like Tidelift <sup>48</sup>, Open Collective <sup>49</sup>) that help create a means by which FOSS contributors can monetize their work.

<sup>46</sup> “We Are a Science and Technology Workers’ Cooperative Working on Making Ethical Technology Available, Accessible and Affordable to the Masses,” Coopon Scitech LLP, accessed October 20, 2020, <https://cooponscitech.in/>.

<sup>47</sup> “Chiguru Technologies,” Chiguru Technologies, accessed October 20, 2020, <https://chiguru.tech/>.

<sup>48</sup> Tidelift, “Managed Open Source Software - the Tidelift Subscription,” Tidelift, accessed October 20, 2020, <https://www.tidelift.com/subscription/tidelift-tour>.

<sup>49</sup> “Open Collective,” Open Collective - Make your community sustainable. Collect and spend money transparently., accessed October 20, 2020, <https://opencollective.com/>.

<sup>50</sup> “Zalando Open Source: Contributing Upstream,” Zalando Open Source | Contributing upstream, accessed October 20, 2020, <https://opensource.zalando.com/docs/using/contributing/>.

<sup>51</sup> “Netflix Open Source,” Netflix Open Source Software Center, accessed October 20, 2020, <https://netflix.github.io/>.

<sup>52</sup> “Excellent Open Source Products and Services,” Frappe, accessed October 20, 2020, <https://frappe.io/>.

<sup>53</sup> “Why IndiaOS,” IndiaOS, accessed October 20, 2020, <https://indiaos.in/why-indiaos>.

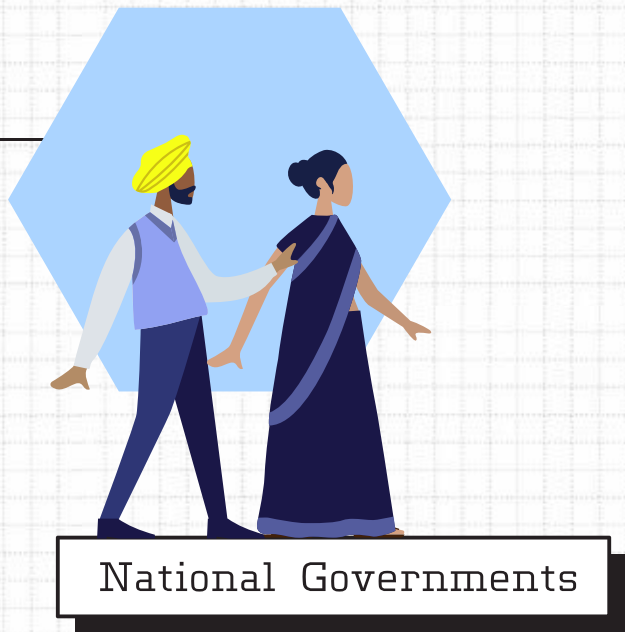
<sup>54</sup> “Welcome,” Welcome, accessed October 20, 2020, <https://superset.apache.org/>.



Departments & agencies  
of central government  
using FOSS for nation  
wide adoption of  
ICT initiatives

**Eg:**

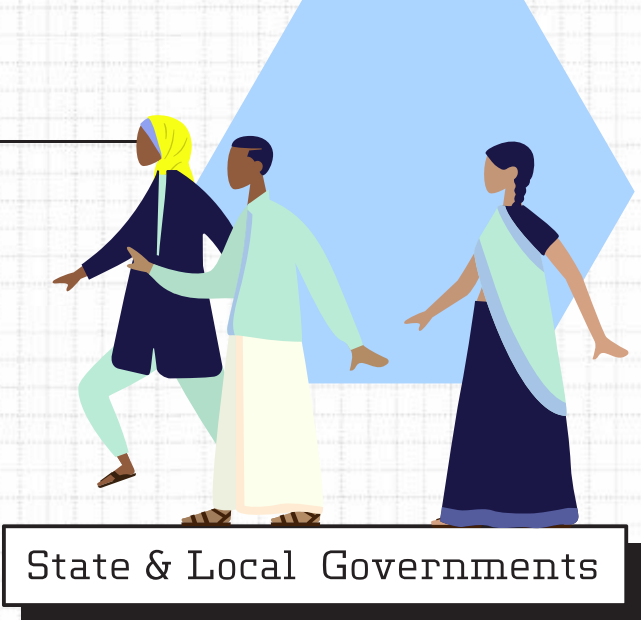
- *Centre for Development  
of Advanced Computing*
- *Indian Railway Catering  
& Tourism Corporation*
- *Ministry of Housing  
& Urban Affairs*
- *Supreme Court of India*



Regional government  
agencies driving  
grassroots adoption  
of FOSS led initiatives

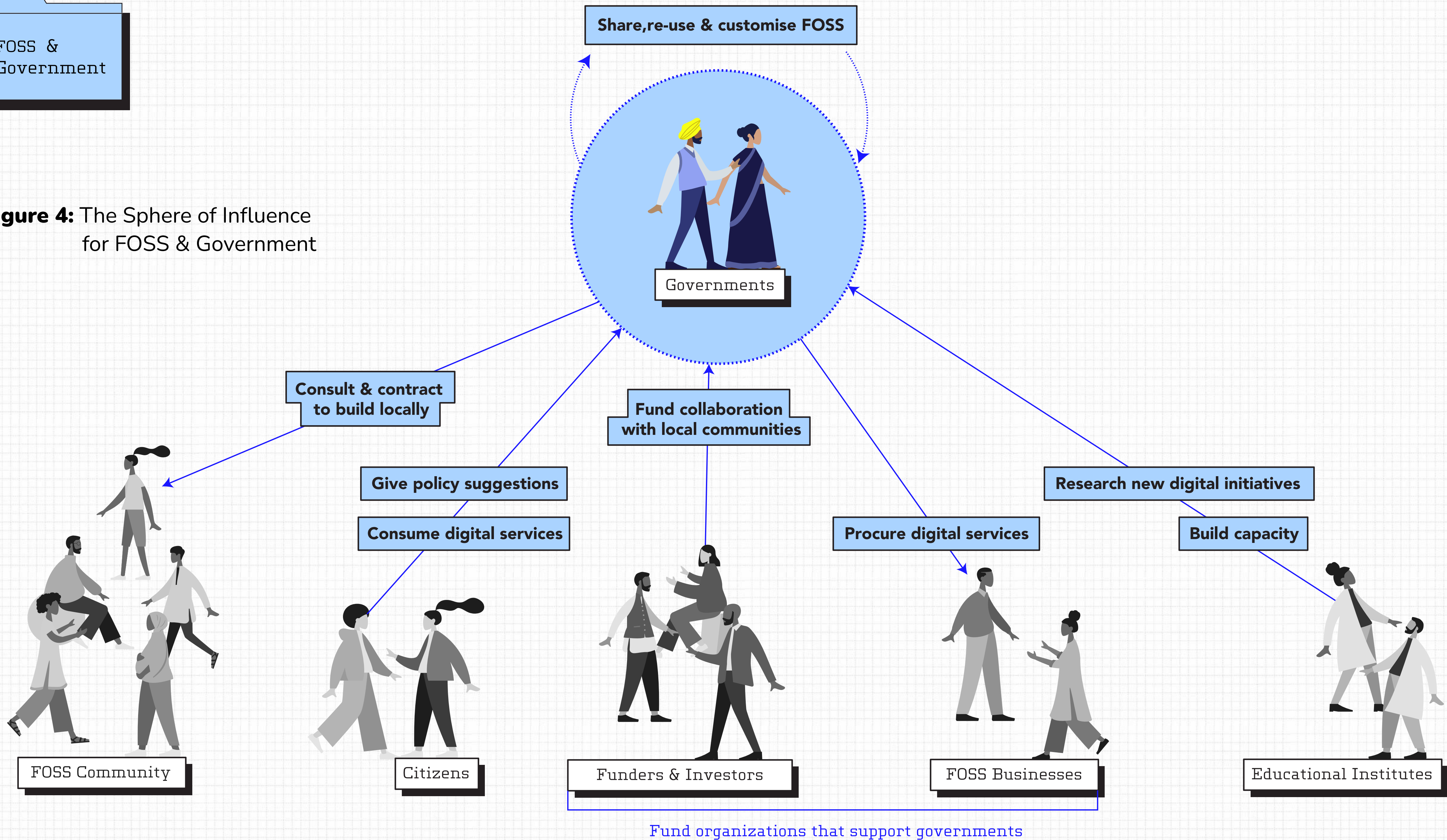
**Eg:**

- *International Centre  
for Free and Open  
Source Software*
- *North Eastern Regional  
Centre of the National  
Institute of Rural  
Development*





**Figure 4:** The Sphere of Influence for FOSS & Government





**Work with FOSS companies to give more control and ownership to the state and reduce vendor lock-ins.** Governments should pick private partners who are incentivised to work in the public’s interest as opposed to companies that sell products and are incentivised to tie the government down and keep maintenance costs high. Services run by a government needs to be flexible and adaptable, however, direct partnership with product companies are aligned to create dependency. Therefore partnerships must occur through intermediaries with the specific mandate of avoiding vendor lock-in.

Another alternative for governments is to “own” the software they use and get private partners to develop the capacity and expertise within the government to maintain it. Either way, governments should use FOSS if they do not want to be tied down.

Eg: [Kerala Legislative Assembly](#)

□ The Kerala Legislative Assembly moved all of their IT operations into GNU/Linux based systems with the assistance of Zyware Technologies <sup>55</sup>

**Build community-facing government teams on national and regional levels** that work dedicatedly on FOSS, and work to increase their capacity and bandwidth over time through supported training and learning camps. Organize FOSS fellowships to attract more talent to this program on the existing and various upcoming digital transformation initiatives.

Eg: [ICFOSS](#)

□ ICFOSS, an autonomous organization setup by the government of Kerala with the mandate of popularizing FOSS <sup>56</sup>. 18F, a digital services agency within the United States government which has a strong Open Source policy and presence <sup>57</sup>.



<sup>55</sup> Kurian, “Kerala Legislature Announces Smooth Transition to Free Software,” The Hindu BusinessLine, March 12, 2018, <https://www.thehindubusinessline.com/news/national/kerala-legislature-announces-smooth-transition-to-free-software/article20821938.ece1>.

<sup>56</sup> “Home,” ICFOSS, accessed October 20, 2020, <https://icfoss.in/>.

<sup>57</sup> “Digital Service Delivery: Open Source Policy,” 18F, accessed October 20, 2020, <https://18f.gsa.gov/open-source-policy/>.



**Work closely with communities to enable co-creation of FOSS-driven open digital ecosystems**

to build robust digital infrastructure, interoperable, open-source GovTech applications, open standards, digital policies and practices.

Eg: *SPACE, Kerala*

□ The government of Kerala works closely with SPACE and other local FOSS communities to implement key digital policies and services in the state<sup>58</sup>.

**Make the source code of all public facing government software open source, and enable scrutiny by public interest FOSS communities.**

This will help create transparency, accountability and trust in government technology, identify and correct bugs and improve it over time.

Eg: *Bulgaria, United Kingdom & Free Software Foundation in Europe*

□ The electronic governance act in Bulgaria requires all government software to be FOSS <sup>59</sup>

□ Government Digital Service of the United Kingdom makes everything open by default <sup>60</sup>.

□ The Free Software Foundation in Europe has petitioned for all government software in Europe to be FOSS with some results <sup>61</sup>.



<sup>58</sup> “Society For Promotion of Alternative Computing and Employment,” Society For Promotion of Alternative Computing and Employment, accessed October 20, 2020, <http://www.space-kerala.org/>.

<sup>59</sup> Devin Coldewey, “Bulgaria Now Requires (Some) Government Software to Be Open Source,” TechCrunch (TechCrunch, July 6, 2016), <https://techcrunch.com/2016/07/05/bulgaria-now-requires-some-government-software-to-be-open-source/>.

<sup>60</sup> “Government Digital Service,” GitHub, accessed October 20, 2020, <https://github.com/alphagov>.

<sup>61</sup> Free Software Foundation Europe (FSFE), “Public Money, Public Code,” Public Money, Public Code, accessed October 20, 2020, <https://publiccode.eu/>.



# Sustained Collaborations to Build Future Pathways for FOSS in India

**The current pandemic has amplified FOSS's importance due to the movement's ability to bring diverse actors together to build, localize and deploy crisis response solutions.**

Indian FOSS communities have been very active in responding to the health and economic crisis caused by COVID-19.

Due to the purposeful and collaborative nature of the FOSS community, reusable applications can be quickly prototyped and constantly improved. These qualities are essential during times of emergency when there is limited time for research and development. Examples of needs that FOSS communities have responded to during this crisis include monitoring the virus outbreak <sup>62</sup>,

building necessary community awareness, tools to crowdsource information on hospital capacity, help volunteers to coordinate et cetera <sup>63</sup>.

Restrictions to physical/public spaces during the pandemic, has created a real need for digital learning spaces and services that are accessible and egalitarian. FOSS has a real chance to enable this change and create more equitable learning solutions <sup>64,65,66</sup>.

Even governments are gearing towards releasing the source code of some of their efforts in the open to build the necessary trust in their service, Ireland, for example, stands out as a shining example of FOSS in the public sector. Its contact tracing app was installed by around 1 million people in the first

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<sup>62</sup> “Coronavirus in India: Latest Map and Case Count,” Coronavirus Outbreak in India, accessed October 20, 2020, <https://www.covid19india.org/>.

<sup>63</sup> “Coronasafe Network,” Coronasafe Network, accessed October 20, 2020, <https://coronasafe.network/>.

<sup>64</sup> Guidance on Open Educational Practices during school closures, utilizing OER under COVID-19 pandemic in line with UNESCO OER Recommendation. May 2020. [https://iite.unesco.org/wp-content/uploads/2020/05/Guidance-on-Open-Educational-Practices-during-School-Closures-English-Version-V1\\_0.pdf](https://iite.unesco.org/wp-content/uploads/2020/05/Guidance-on-Open-Educational-Practices-during-School-Closures-English-Version-V1_0.pdf).

<sup>65</sup> Cathy Li, “The COVID-19 Pandemic Has Changed Education Forever. This Is How,” accessed October 20, 2020, <http://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/>.

<sup>66</sup> Kashika Chadha. “Digital Literacy in India: Structural Constraints and NEP 2020”. Sep 4 2020, <https://www.sprf-in.cdn.ampproject.org/c/s/www.sprf-in/amp/digital-literacy-in-india-structural-constraints-and-the-nep-2020>.





36 hours and, due to its success, the code used to build it was subsequently given to the Linux Foundation, enabling other regions to emulate its success <sup>67</sup>.

Similarly, Arogya Setu, the contact tracing app was also released in the open by Indian government after a lot of protests from the community <sup>68</sup>.

While these efforts are more important during the pandemic than ever before, they should not end with the emergency.

The factors that make FOSS uniquely positioned to deliver during the pandemic, are the same ones that make **FOSS an ideal choice for developing open-source digital ecosystems with a long-term vision.**

We have a unique opportunity to build scalable & replicable FOSS public goods like civic-engagement platforms, information management systems, and analytical tools. FOSS communities are vital to co-create citizen centric digital services and shared infrastructure.

Their strong participation will ensure transparency, build trustworthiness, and help localize solutions to support regional needs and inclusion.

**While we are already at a historical peak of consuming open source software in one form or the other in our lives, it's now time to invest more in creating a sustainable and inclusive FOSS ecosystem.** The recent developments signal India becoming a fertile ground for FOSS innovations, with more actors joining hands to build public interest technologies, scalable tech-driven businesses and to ensure better service delivery.

A strategic investment in growing the FOSS ecosystem will not only help us onboard the next half billion internet users in our digital journey of growth, but will also create safe, diverse and open environments for citizens to participate, co-create and grow together.

<sup>67</sup> "Ireland Donates Contact Tracing App to Linux Foundation," NearForm Enterprise Software Solution Development, October 13, 2020, <https://www.nearform.com/blog/ireland-donates-contact-tracing-app-to-linux-foundation/>.

<sup>68</sup> "Arogya Setu," GitHub, accessed October 20, 2020, <https://github.com/AarogyaSetu>.





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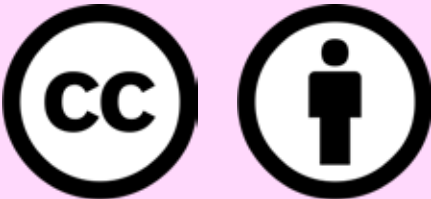
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