The SatSure Newsletter

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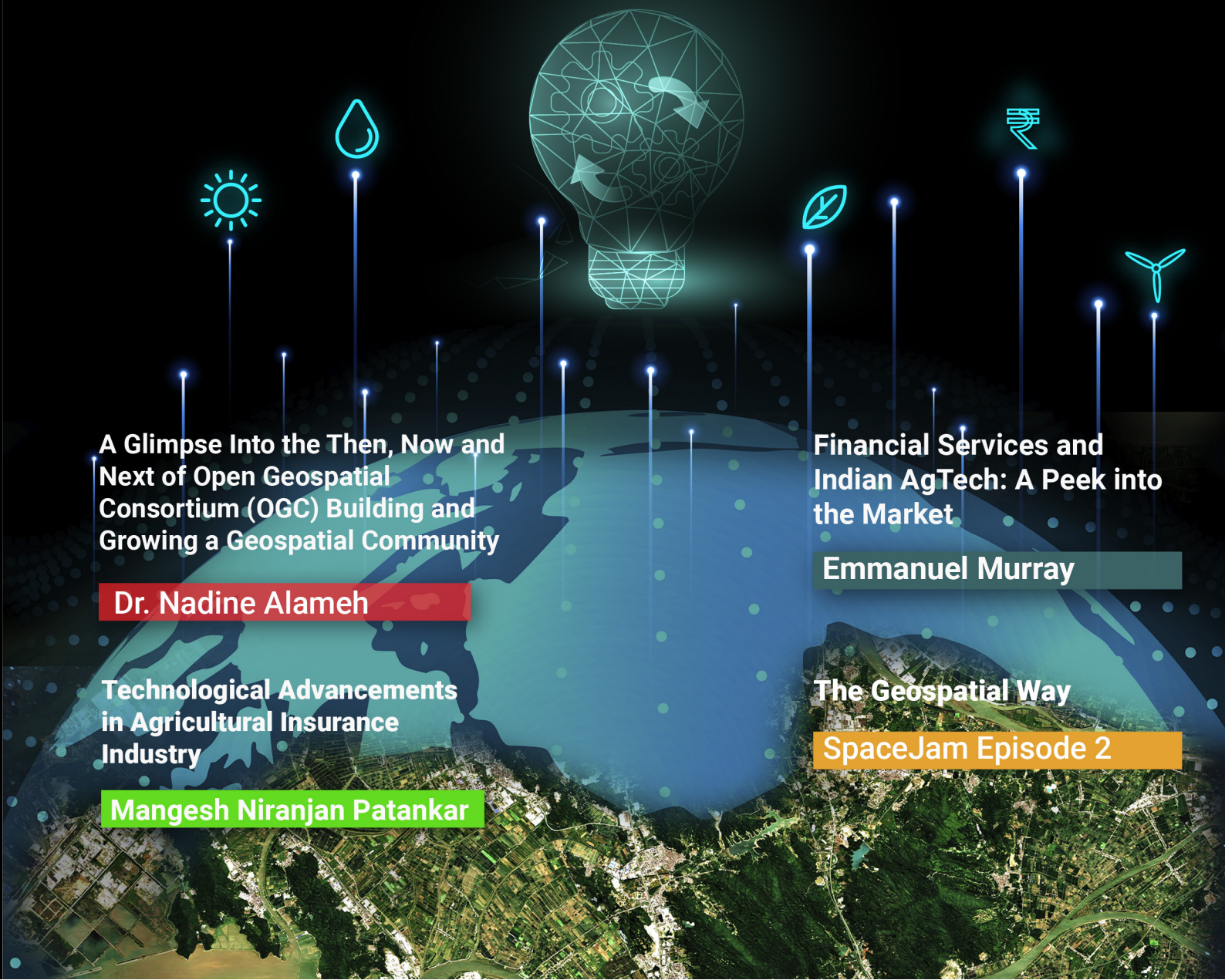
July- September 2021



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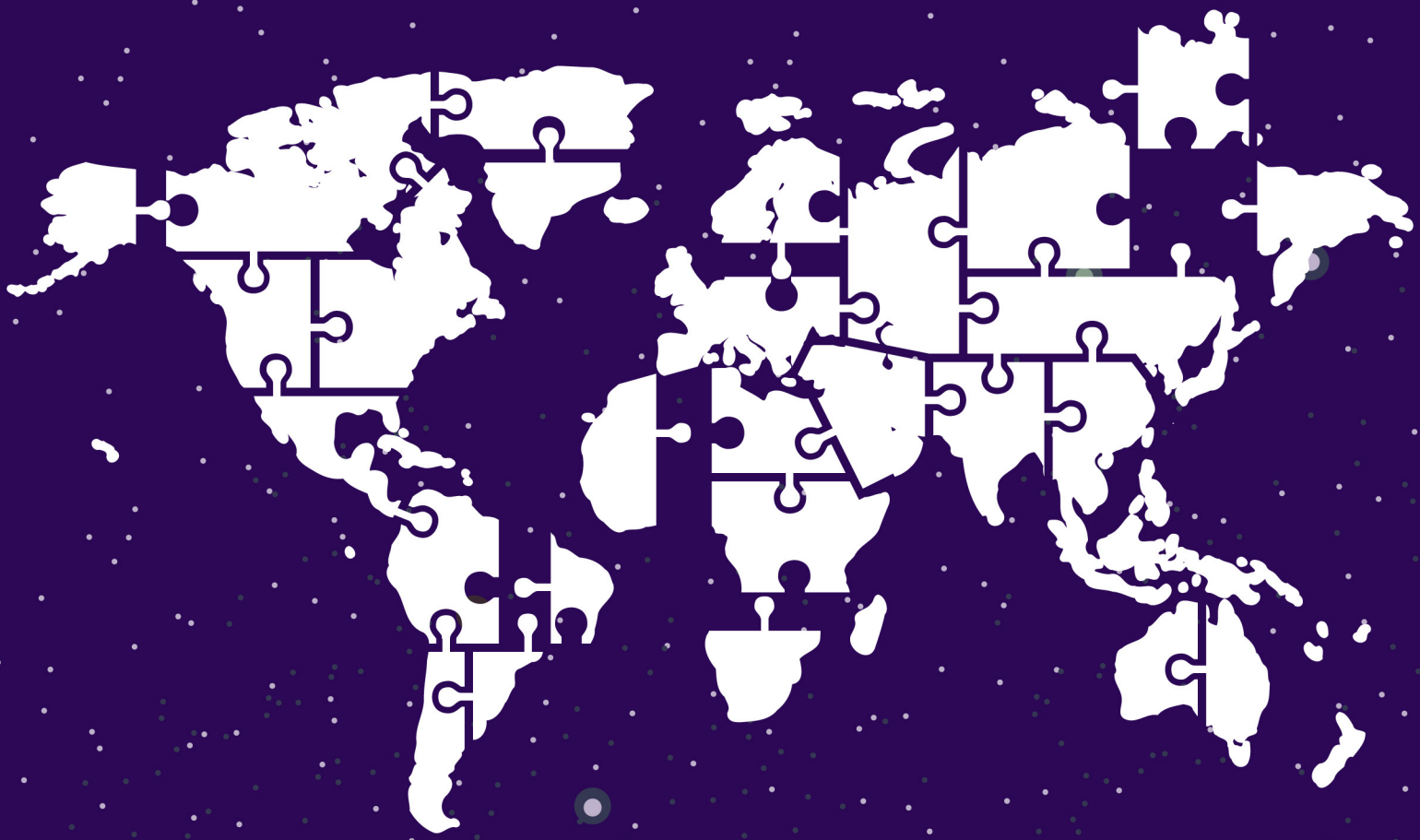
FOREWORD

Pandemic or endemic, it is hard to say right now as life gets back to normal in India. Deal flows in the startup circuits are at an all-time high, and travel restrictions are becoming more predictable. And amidst all the mayhem, the awareness and importance of location and satellite data have grown by leaps and bound. Indeed, the geospatial sector was among the few which globally saw growth since it touches everything from the healthcare sector to agriculture, insurance and reinsurance, energy, public services, and banking to name a few. Given the broad array of applications for geospatial data in various industries, this edition of 'The SatSure Newsletter' (TSNL) focuses on the growth of the geospatial industry and its applications in allied sectors, with snippets from industry leaders who are pioneering new and uncharted territory.

In the first article, Dr. Nadine Alameh, CEO of the Open Geospatial Consortium outlines the organization's founding and objectives, as well as her experience in leading the organisation. Emmanuel Murray, who is a senior advisor, Food & Agribusiness at Caspian Impact Investment Adviser Limited speaks about the technological interventions in the Indian agricultural credit lending system, rural banking and financial services in the second article. Then we have another stalwart, Mangesh Niranjan Patankar, Head of Agriculture Reinsurance India, Swiss Reinsurance Company Ltd, who speaks about the technological advancements in the Indian agricultural insurance and reinsurance industry and the last but not the least will be, the abridged transcript of the second episode of SatSure's video podcast series 'Space Jam' on the applications of geospatial satellite data with the women's in geospatial industry Krishna G Namboothiri, Shobitha Shetty, Devleena Bhattacharjee and Rachana Reddy.

We hope the articles in TSNL adds a little bit of value to our readers in understanding industry trends and their interlinking. Happy reading!

Prateep Basu
Founder and CEO
SatSure



A Glimpse Into the Then, Now and Next of Open Geospatial Consortium (OGC)

Building and Growing a Geospatial Community

Dr. Nadine Alameh

CEO, Open Geospatial Consortium (OGC)

Dr. Alameh is Ex CEO of Snowflake & acted as a Senior Technical Advisor at NASA and a recognized leader in creating and applying open geospatial/mapping standards. She graduated from MIT with a Ph.D. in Information Systems Engineering, and 2 Master's Degrees in Civil Engineering and Urban Planning with a concentration in Geospatial Information Systems.

Can you explain a bit about the Open Geospatial Consortium (OGC), like what led to its creation, its mission and key stakeholders?

First and foremost, I consider the OGC to be a community; specifically, a committed collective problem-solving community of geospatial professionals and consumers dedicated to collaborating on making location information FAIR – Findable, Accessible, Interoperable, and Reusable.

By working together on challenges from disaster response to climate change to infrastructure and smart cities, the OGC community focuses on integrating the data and interoperating the systems so that we can get from data to decision-ready information to impacts!

By working together on the interoperability gaps, we develop internationally ratified open-consensus standards that are freely available to anyone and everyone. When we work together, the community demonstrates the possibility of scenario-driven activities. That's the heart of the OGC Innovation Program – demonstrating the possible, as innovations come and go, new sources of data come and go, new technologies come and go, and as new markets even come and go. The OGC community has been doing that for 27 years. Now with the explosion of data, the recognition of the value of location and the maturity of cloud and space technologies, this community is thriving!

I'm very proud of how global and diverse OGC is! We have 540+ members from all over the world, distributed evenly amongst industry, government and academia.

> **Our strategic government members (the highest level of membership at OGC) include NASA, ESA, NGA, USGS, FAA, NOAA, UK Ordnance Survey, UK Hydrographic Office, Natural Resources Canada.**

Our industry members range from the large businesses to the startups (the fastest-growing group these days) and from the geospatial to the mainstream businesses to include Esri, Hexagon, Trimble, Oracle, Google, Microsoft, AWS, Apple, MAXAR, Planet, and many others.

I encourage the reader to check out the list at https://www.ogc.org/ogc/members and learn about many of the new startups that have joined us, injecting their expertise in cloud, AI, analytics, and more.

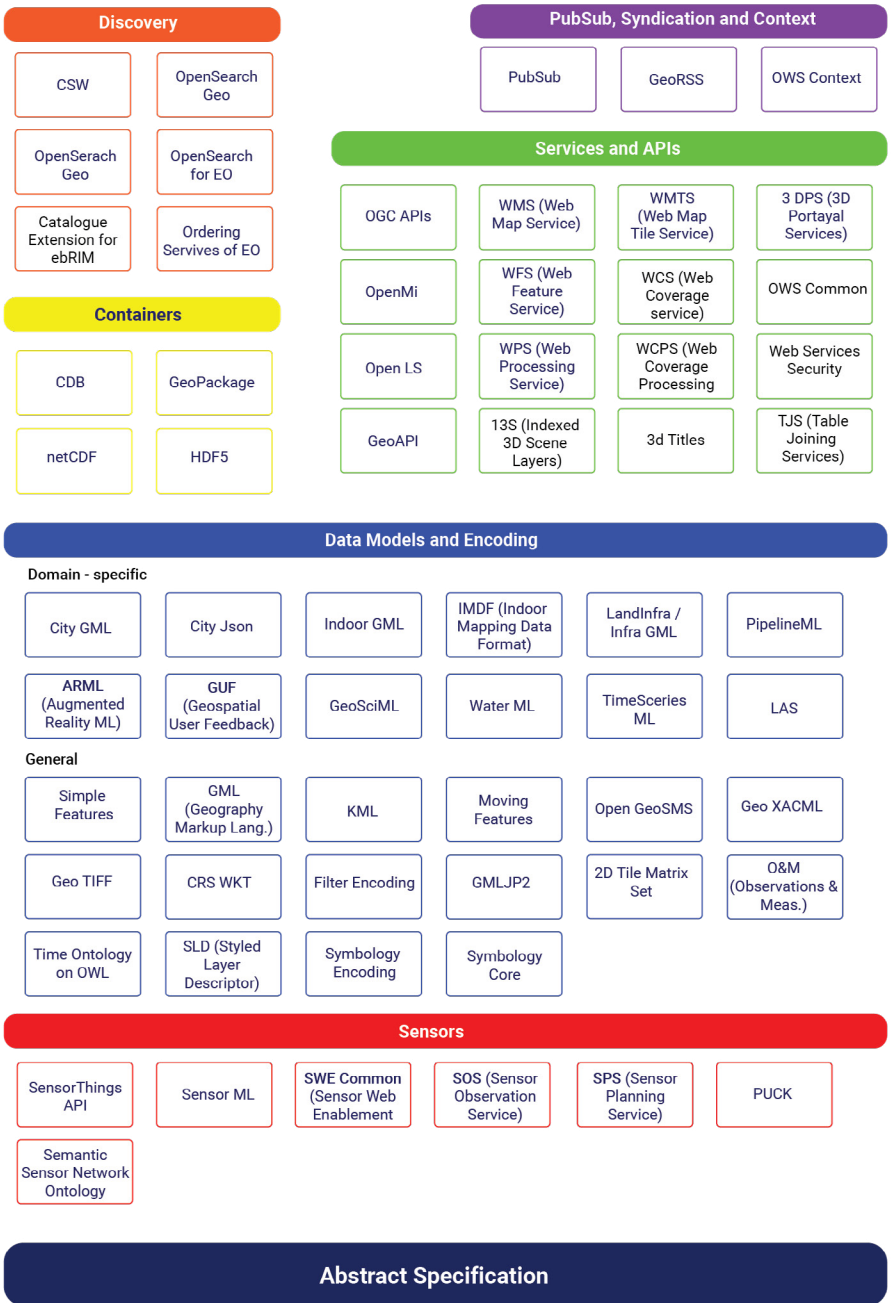
What have been some of the key achievements of the OGC since its inception?

Since its inception in 1994, OGC has impacted so many areas of our life. Perhaps OGC is most known for the suite of OGC Web Services that has underpinned Spatial Data Infrastructures everywhere.

According to GeoSeer, there are over 2 million distinct spatial GIS Web Map Service (WMS), Web Feature Service (WFS), Web Coverage Service (WCS) and Web Map Tile Service (WMTS) datasets hosted on over 280,000 live services from around the world.

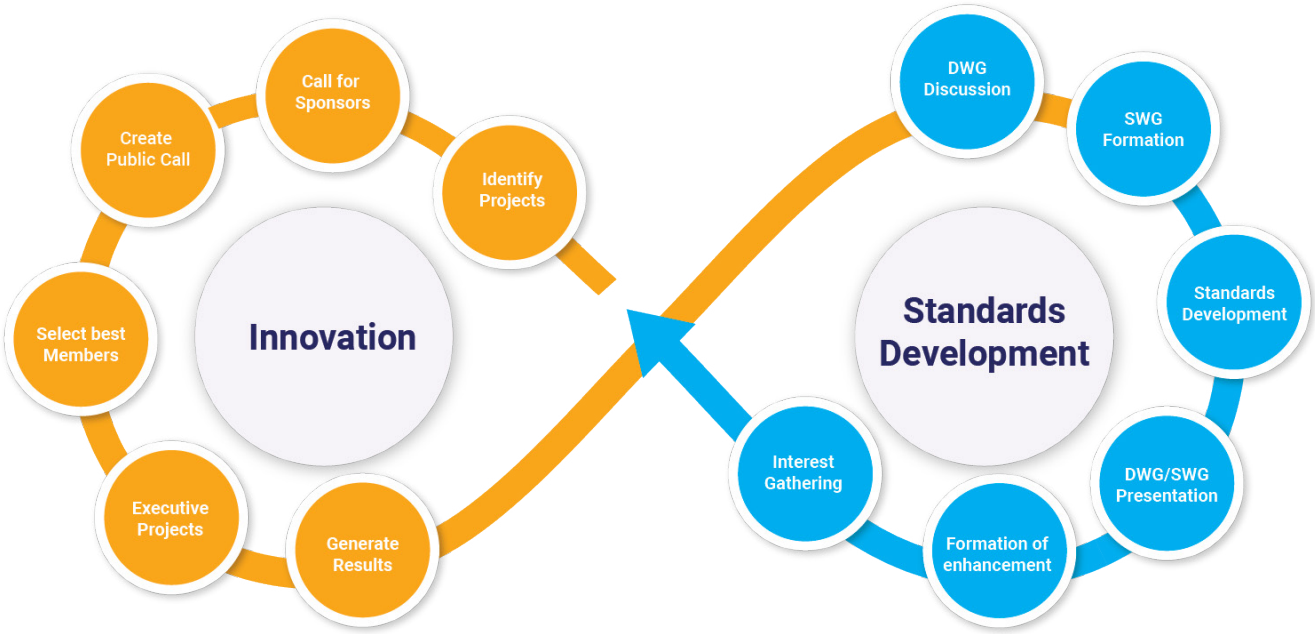
Did you also know that KML, GeoTIFF, NetCDF and HDF5 are OGC Community standards? Developed by the community of experts and brought into OGC to maintain and evolve. Again, I encourage the reader to check out the list of standards on our website.

Beyond the standards, OGC's key achievements over the last 27 years are bringing the community together to experiment together on 'The Problems of the Day' in the OGC Innovation Program (effectively OGC's R&D lab). The Innovation initiatives cover domains from Marine, Agriculture, Disasters & Climate to Pandemics, Aviation, Defense and Public Safety while leveraging technologies from IoT, Earth Observations, GeoAI, multi-cloud federations, security, Open APIs etc.



Perhaps OGC's key achievement has been to bring together the community to iterate on the development of standards and testing of innovations in an open, collaborative forum!

Most recently we have begun to capture some of the impact stories of our membership in a series of blogs which I would encourage the reader to check out!



You have had a long association with the OGC since its early days. We would love to see from your eyes how it has evolved over the years.

I love this question!
I have always said that when a person is "once OGC, always OGC!" That's very true for my journey with OGC. I had experienced OGC as a student/researcher while at MIT when we collaborated on the first OGC Innovation Program to develop the Web Map Service standard. I have experienced OGC as a sponsor representative for NASA, hence injecting requirements related to discovering and accessing large earth observation data via OGC standards.

> I, later, experienced OGC as a small business, Starting an aviation data exchange business by leveraging the principles of interoperability and geospatial information exchange that I learned at OGC.

And I got the opportunity to experience OGC as the Executive Director of the Innovation Program (what I used to call the fun part of developing standards!).

And now I get the honour and pleasure to bring it all together in my role as CEO. It's fascinating to be part of OGC these days let alone lead the organisation. Why? Because the whole world has changed since the inception of OGC!

01 The world has finally appreciated the value of location, so what used to be a small geospatially savvy community is now literally every business and every application using location.

The opportunity for impact is so much greater now. That's why we are making our standards way more implementer and developer-friendly to enable the non-geospatially savvy developers to consume location-based information.

02 We are also dealing with a whole new generation of users/consumers (I use my kids as an example in pretty much every talk) who have grown up with iPhones, Alexas' of the world, sensors, learning about space (SpaceX made that pretty cool for this new generation), and growing

in the metaverse- the whole new frontier for geospatial combining the real and the virtual world.

03 And sadly, we are also dealing with some pretty complex global challenges like climate change and the recent pandemics.

I believe that the only way we can address such global threats at a global scale is if data is made available using open standards. If there are problems that transcend the boundaries of departments, organizations, agencies, countries and continents, we will continue to need agreed-upon standards to share information and implement solutions at scale.

It makes sense then to evolve with the times. And that's what we are doing at OGC, from modernising our standards to develop the OGC APIs (the future building blocks for Location) to modernizing how we develop standards to match the pace of innovation and the demand for geospatial as the glue for the world's applications. That's why we find ourselves advancing activities like geopackage (for exchange of information for mobile devices) to 3D data representation and streaming, to SensorThings and sensor-fusion, to indoor mapping with IMDB and IndoorML, to dabbling with GeoAI and supporting GeoBIM interoperability for smart cities. The opportunities are limitless these days, and the need for interoperability is high.

With Earth Observation (EO) data becoming a critical dataset in the geospatial sector, are there any key challenges that you have come across in updating the existing data exchange and visualisation standards since the user base of EO data has exploded in the past 4-5 years?

Indeed, the base of EO data has exploded in the past 4-5 years. What we are referring to as "New Space" is simultaneously offering exciting solutions while uncovering integration challenges. A few of the challenges that our members are working on within both our Standards and Innovation programs include:

- How to evolve software architectures that allow the execution of data processing applications on the same infrastructure hosting the data (minimising data transport costs) – this is driven by the fact that EO data is hosted on multi-cloud environments?
- How to evolve our APIs to optimise data handling via discovery and access interfaces, and how do we improve the findability and accessibility of EO data? This impacts our work on the OGC API-Maps, Processes, Records, Tiles and SensorThings.

- How to deal with Analysis-Ready Data and standardise data cubes to store, transport, and access multi-dimensional data efficiently?
- How to leverage Linked Data approaches to achieve a higher level of interoperability in a world drowning with data?
- How to deal with multi-sensor fusion and connect space/sky/ surface sensor data to create decision-ready information?
- What do we do with GeoAI as a community? How can we make training data FAIR? How do we evolve our metadata and data quality standards to capture the AI part of the data chain?
- How do we stop wasting precious resources on individually convincing potential customers to trust all this new data (and the value of integrating it with existing data)? How can we do that as a community?

Honestly, the list is big, and that's why the OGC community is energised. It's up to us to support the new ecosystem of new EO data as well as IoT data such that we don't all reinvent the wheel with every customer and every application, and every domain.

It would be beneficial for our readers if you could elaborate a bit on how a member benefits from becoming a member of OGC.

I love this question too. The simple answer is to become part of the global community of industry, government and academia and contribute to shaping the future of Location in literally every domain imaginable! The most significant benefit is to be part of a powerful and highly valued ecosystem that is not dominated by a single technology, industry or organization.With the pace of innovation these days, we need to be together as a community to keep up and ensure we can make the impact that we know we can at the scale we want.

With respect to specific benefits, how about the following (extracted from the OGC website)

The Community - OGC's quarterly member meetings, augmented by virtual meetings, provide many benefits to our members. Whether a member is searching for partners or new clients, working on a tough technical challenge, providing end-user requirements, or collaboratively testing new approaches and technology, these meetings are of high value.

Global Leadership - Active OGC members provide world-recognized leadership, for example, by contributing requirements, sponsoring innovation initiatives, implementing and commercialising new products and technologies, all focused on the common need to solve pressing data sharing and technology interoperability challenges.

Expert and Trusted Knowledge - The OGC consists of the world's leading experts from the user community and providers of information technology products and services. The open environment ensures there is easy access and a simplified transfer of location-based knowledge among members.

Innovation, Technology and Standards - OGC's unique process provides a collaborative, cost-sharing process to rapidly test technology and standards, using real-world scenarios in combination with new and innovative technologies and techniques. OGC members - sponsors that identify and fund requirements and participants selected competitively and compensated to provide solutions - use our agile and collaborative process as a valuable R&D testing program. The high impact results of these initiatives move on to become OGC standards or community best practices, benefitting the global community.

Technology Monitoring and Forecasting - OGC monitors global industry trends which affect the direction of the overall industry. This service provides valuable insight and indicators of the maturity and potential future direction of the work of OGC to help members stay informed in a time of volatile and disruptive technology change.

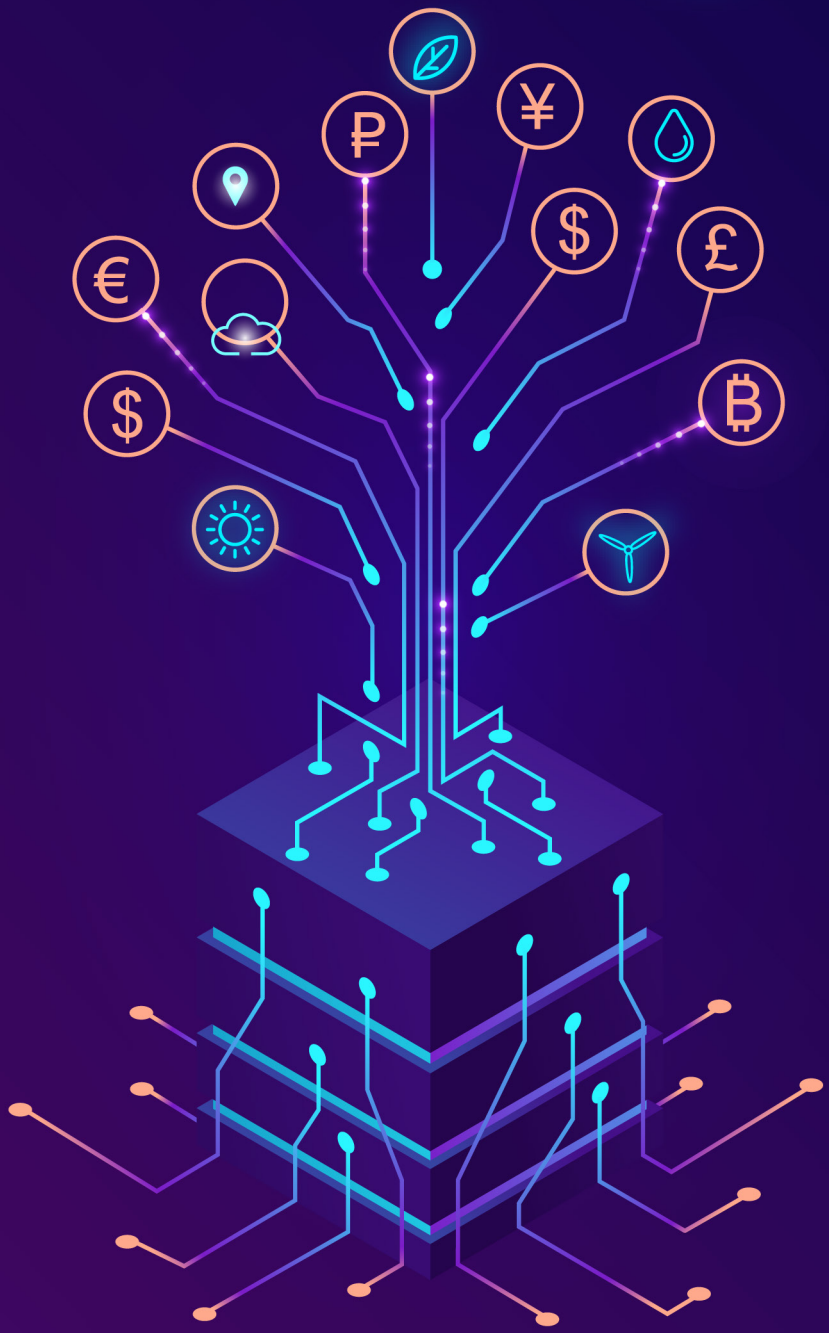
As the CEO of OGC, what are the key goals that you are targeting to achieve for expanding its reach and how will it benefit the geospatial developers and users community globally?

As the CEO of OGC in an amazing part of the geospatial industry's journey, I am trying first and foremost to support our growing community in making location information FAIR – Findable, Accessible, Interoperable and Reusable. To do that, the key goals that we are targeting include:

- Modernising the suite of standards – that's the whole OGC API effort (I encourage the reader to check out the 2 min video on the OGC APIs)
- Making our standards more implementer and developer-friendly by simplifying the standards to make them relatable to the non-geo consumer and by working closely with the developer community on sprints that lead to documentation that eventually become standards
- Providing a supportive forum for all the startups incorporating geospatial/location information as part of their value proposition- it's a win-win, we learn from them, and they

learn from us

- Leveraging the Innovation Program to bring the community around key global challenges like health, disasters, climate or marine; and to create a safe, neutral environment for uncovering and collaboratively addressing the interoperability issues to address those challenges in an agile, practical manner.
- Bridging communities to ensure that they are not reinventing the wheel is key to the success of smart cities and the metaverse!
- Supporting the community in highlighting the value of geospatial/location by working with them on targeted impact stories in various domains
- Strengthening our partnerships with other organisations like Khronos, NSGIC, USGIF, OSGeo, Open AR Cloud, BuildingSmart, TopioNetworks, Open and Agile Smart Cities, GEO, etc. to be able to scale our reach, our impact and our activities
- Raising the awareness of our responsibility as a community in location data privacy and the ethical uses of geospatial/location information.

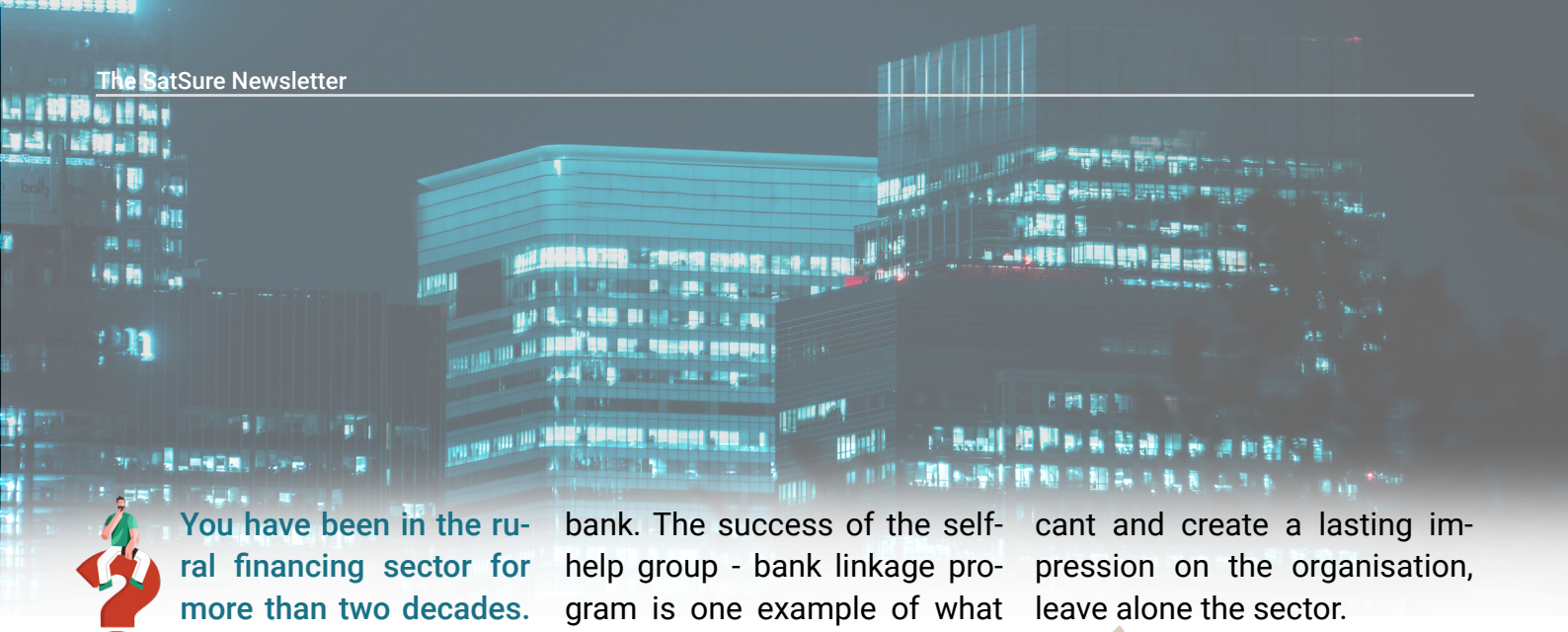


Financial Services and Indian AgTech: A Peek into the Market

Emmanuel Murray

Senior Advisor, Caspian Impact Investment Adviser Private Limited

Emmanuel Murray's role in Caspian is in supporting the Eco-system development through working with Incubators & Start-ups in the Food & Agri space. He is also a Director on the Board of NABKISAN Finance Ltd, a subsidiary of NABARD that funds FPOs and other Agribusiness Enterprises.



You have been in the rural financing sector for more than two decades. What would you say are the critical differences in the approach adopted by the public and the private sector banks for operating and competing in this sector?

India's Public Sector Banks (PSBs) attract the country's best talent because of the competitive recruitment & selection processes and attractive compensation packages. Therefore, as compared to private sector banks, public sector banks have abundant and unmatched expertise. Because of employment stability, relatively lower work pressure, and the ability to preserve work-life balance, applicants from even notable corporations (Infosys, Goldman Sachs) choose to work for public sector banks.

This human resource can do miracles and provide results like no one else can, because of their talent, understanding of the market, domain expertise and rich experience. The ability of the leadership to inspire the team and provide clear instructions influences the performance of the public sector bank. The success of the self-help group - bank linkage program is one example of what is possible and what was achieved because of the determined efforts of the banks' human capital.

In PSBs, a "push strategy" is required to make things happen, but if sucessful, exceptional results are seen, often surpassing private banks. The short tenure of the top executives in PSBs and the hierarchical decision making is a concern. In PSBs, after the post of GM, promotions to executive director involve moving to a different bank, and the post is considered a temporary holding area on the way to chairmanship. Political patronage is part and parcel of promotion process.

Furthermore, by the time people get to the top, they are left with a tenure of two years, which is too short to do anything significant and create a lasting impression on the organisation, leave alone the sector.

Regional Rural Banks (RRBs), established in the 1970s, were an effective vehicle for rural finance. Unfortunately, too much tinkering too often, left them without a fair chance to prove themselves, and resulted in them becoming irrelevant and today they are no different from commercial banks. It was a short-lived, prematurely ended policy disaster.

Private banks, on the other hand, are visionary in their planning and outstanding in managing possibilities. ICICI Bank and HDFC Bank have been able to grow and achieve substantial results. However, the issue with Private banks is that they are too bottom-line driven and operate in a predatory style. They wish to deliver financial services at low cost by not deploying their own human resources. So, the private sector can do things, but it requires oversight and supervision to check on

what and how they're doing.

India's Public Sector Banks are like crown jewels. Nobody can dispute their significance, regardless of what is said about fintech or the private sector, displacing them in the financial services market.

HDFC Bank has become the market leader in personal loans. ICICI Bank at one time had a strategy to capture 25% market share in rural credit, but realised it was not an easy thing to do.

Therefore, it's a good idea for each bank to specialise in distinct verticals.

The failure to build a specialised cadre of credit officers is the primary reason public sector banks languish. Credit is a function that not every bank officer can perform. If there were a specialised cadre of officers managing rural credit, things would have been a lot better in terms of service delivery than they are today.

The recruitment process of human resources in banks is the main reason why you see people are frustrated while interacting with public-sector banks. For a bank position, proficiency in Mathematics and English abilities are given weightage in the recruitmenr process, which are not the most essential skills for rural banking. Attention should be placed on skills such as attitude, communication skills, empathy, and patience, which are not tested. Another reality is that middle-aged officers get promoted from the clerical cadre and sent to rural branches, typically for mandatory rural posting, and since by this age, their children are in senior school or college, they end up coming for the postings without family, inconveniencing everyone, including customers. Private banks, on the other hand, may not deliver remarkable results. A few banks are succeeding in this area, but it must be nurtured, grown over time, and requires serious long-term commitment.

There is a huge disparity between public and private sector bank lending when it comes to agri finance. Even though rural areas are subject to PSL criteria, do you think the gap will narrow in the future, or what must be done to increase the willingness to lend? There is a substantial numerical disparity between the largest Agri lender among PSBs and private sector banks. How will this disparity manifest itself in the future?

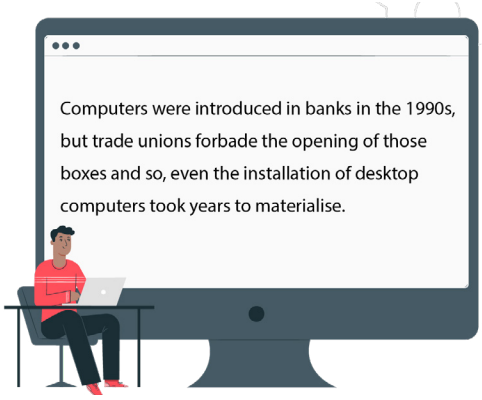
The largest Indian private sector bank prefer to skim the market. As a result, they will only look at the high end of the market, such as large farms and simple service clients. So, unless a different model is available, it will remain the same. If there is an unmet or unserved demand, and issues such as system delays, overburdening, and inability to service effectively, the private sector has a role. However, everyone does not have to be doing everything, like

The banking industry is known for being a laggard in terms of technological adoption and the agricultural banking industry is even farther behind in terms of retail banking. Do you believe this will open doors for developing Agritech? Can they compete with banks that spent decades building infrastructure and trust if they are given the missing link - technology?

We need to put this in a historical context. India's financial industry was poorly

regulated leading to mushrooming of companies in the countryside that defrauded people of their savings. Therefore, RBI has been selective about who is allowed to provide banking services and has restricted it to a small number of regulated entities.

The other constraint is that for banks, adoption of technology needs management's appreciation of the need and its integration into other work processes, which takes time.



Public sector banks have been sluggish on the credit side, whereas private banks have responded aggressively and rapidly in the past. I believe that consumer interests may get compromised, so there is a need to open-up with care. There are occasions where the Reserve Bank has had to issue, cease, and desist from operating orders on specific products and certain ways of doing things. Activities, such as KYC and other critical tasks, cannot be outsourced by banks to private parties.

In addition to the generation gap, there are numerous reasons why banks have not integrated these technologies into the financial system.

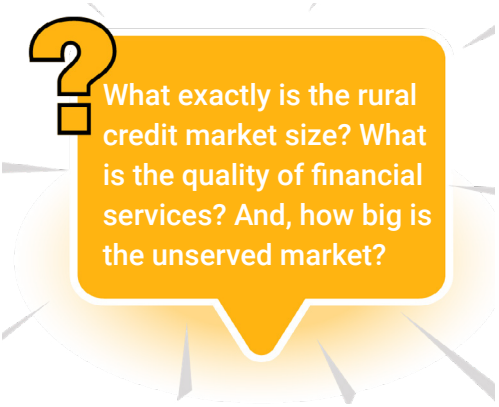
Data security, while integrating these into the bank's system, is a significant challenge and this appears to be a global issue. For example, SBI may say they will build something in-house or do something similar to what private banks offer, but it takes its own course.

So, they may have someone in charge of IT, but this resource is in charge of so many things and may be the stumbling block preventing too much innovation from coming in too rapidly. So, rather than blaming the management, we must point the finger at the banks' IT departments.

What is your view on the level of product customisations provided by the digital transformation vendors to cater to the pain points of rural banking? Whether it is the public sector or private sector, Banks have been facing challenges in getting market share in rural credit. What is your opinion about the number of growing fintech firms offering CRM products and customised solutions to Banks?

It is not difficult to customise technology, and this is not a limitation. A year ago, we were in interior Kalahandi, Odisha. We found that the Jio connectivity was there, and people had smartphones and watched movies on smartphones. So, data has reached the interior corners of the country and technology can ride on that.

We should revisit some of the earlier questions, such as



Then, look at the appropriateness of the products being offered. In my experience working in districts and visiting remote rural bank branches; banks that are already present are familiar with the area's topography and inhabitants, and they have penetrated credit deep into the countryside. Still, are there huge untapped markets? It remains a mystery.

If there are individuals who aren't so far lent, it's because they are hard to lend customers for a bank. Serving those clients will be as tricky for a fintech as it is for a bank. The product flexibility can be enhanced, and there's no question that it can be made

better and frictionless. However, it's necessary to ask, what precisely has prevented someone from doing it already?

To compare the hype around Rural Fintech, I would suggest one have a look at Fintechs operating in urban and MSME space.

What was the addressable market portrayed by these fintechs? And how far have they succeeded in getting?

They had these huge projections, but they are nowhere near what they claimed they would achieve.

Anyone can lend money. Collecting it back is the indicator of success, and how will that be accomplished is the question.

80% of people will pay back, technology or no technology, fintech or bank. Collecting the balance 20% is work.

Even in metropolitan areas with large population densities, fintechs are losing 5% to 8% of what they lend, and they haven't achieved a substantial breakthrough in solving this. It's too early to say whether rural markets will behave differently.

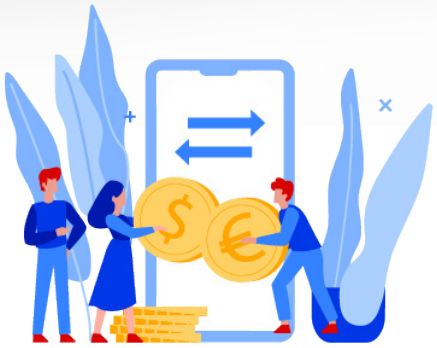
Microfinance offers an indication that credit management costs are close to 10%. So, if someone wants to do it in rural India, it will be more or less around that percentage, and the cost of credit and risk cost would have to be factored in to arrive at the final cost.

The RBI stipulated that credit scoring should be used to issue loans in the mid-2000s when TransUnion and Equifax were working with banks towards the end of the decade. This accelerated the velocity of lending for all retail banking portfolios, except agricultural. So, nowadays, several firms, like SatSure, are endeavouring to do land scoring. What is your anticipation of the scenario, what worked for credit scoring activities and what are the risks for businesses like SatSure, based on your expertise from working at organisations like RBI and NABARD?

Credit bureaus have aided in looking at criteria other than credit score when providing loans, like what the person's aggregate borrowings are?

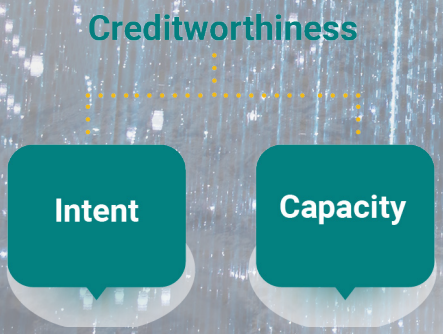
How many banks/ lending institutions has the person borrowed from? Is he/she over his due date with someone? Did he/she default on someone?

These are fascinating pieces of independent data that have been available through credit bureaus and aided in the multiplication of credit. Credit has been enhanced because we now have a better borrower profile, and as a result, there's a reasonable probability that the person will not default if he/she takes a loan.



A credit score might sometimes be deceptive. A person may have been prompt in returning his debt, however, when a default occurs and actual visits are made, it has sometimes revealed that the individual is not the picture that the credit score reflects, with a 'katcha' house and family issues; that credit score do not reflect. When viewed in isolation, it gives a false impression of the person's creditworthiness, so over-reliance on credit scores is fraught with risk.

In order to determine creditworthiness, two factors must be considered: intent and capacity. While credit scores can be used to identify 'intent,' there hasn't been much effort to determine ability to repay,' which is where SatSure comes in.



Farm score can be used in conjunction with credit scores to more precisely measure a farmer's creditworthiness. There are cattle, labour, and several other sources of income, that satellite images cannot capture. Today, non-agriculture sources can account for up to half of a person's income. These make up a substantial percentage of the revenue and must be combined with crop data to get a total score for the farmers we are considering to lend.

Many fintech's are attempting to market their products, and some are gaining traction even though they may not be the perfect market fit. They may be erecting barriers to entry for businesses with better market fit products (which can benefit banks and farmers) but aren't well-known. Venture capital firms take a bet on because the market size seems so huge and attractive.

The fact of the matter is, bankers are waiting to exit rural India, leaving the ground open for intermediaries, agents and fintechs to enter and cash on it. It will be harmful to the country if policymakers do not compre hend this threat and act upon it. Things could become worse and worrisome if they pretend to be unaware. Again, bankers are very short-term thinkers; each Chairman considers his future advancement, and each man has his own set of objectives.

The Government and RBI have an important role to have the right policies and police this space. Rural banking is at a critical juncture; and we need to sound the alarm bells to everyone's ears. Otherwise, it's going to get worse.

SatSure focuses on scalability using satellite data to be more precise in business models.

We found scoring incredibly useful from a credit and collection standpoint since we are essentially utilising primary data and then analysing the patterns. But our scores must be combined with Bureau data of their current clients to get the best results. However, there always exist challenges around the speed of adoption. How do you see the friction reducing over time and what do you think needs to be done?

You can establish patterns using satellite data that might help banks create profiles of people they should lend money to, and whom they shouldn't. Unfortunately, there is no shortcut, and anyone attempting to enter this space will encounter these barriers. It will add a lot more value to the system if you can provide evidence-based outcomes of the advancements.

At present, due to the constant rotation of staff, institutional knowledge is transient, and no systems exist for systematic knowledge transfer causing inefficiencies since familiarisation takes time with each change of guard. Internally, banks need to address this risk and hence management buy-in is very essential for firms like SatSure, who employ continuous monitoring and algorithm processes to capture people's behaviour over time. It will be highly beneficial in decision making and can simplify agricultural credit processes in the long-term.

The Agtech part has generated much hype, but the tech component is superficial; it's all about the supply chain. Since you are currently operating an investment firm and have backed several businesses, I wanted to understand your perspective. What are your thoug hts on the supposed 'VC-created Agtech hype'?

Farms to Fork and Agfintech are perceived as having strong CAGRs. As a result, they attract venture capital since VCs may not discover growth opportunities elsewhere. Therefore, Farm to Fork and Fintech models are receiving all of the funding.

I can't speak about the fintech model since it's early days, but farm to fork models are unsustainable because the majority of them are losing money for every unit of revenue.They can sustain as long as there are continuing rounds of funding. Firms like Uber and Zomato are valued based on metrics having no link to profitability. A similar pattern seems to be unfolding

in Agtech; the largest farm-to-fork startups are struggling to attract the next round of funding, and they are financially stretched. It is difficult to say where they're heading.

Technological Advancements in Agricultural Insurance Industry

Mangesh Niranjan Patankar

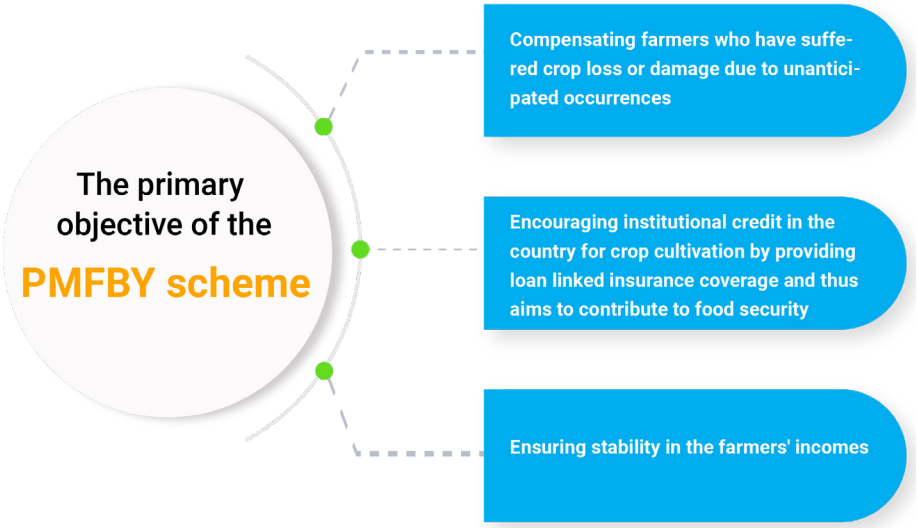
Head of Agriculture Reinsurance, Swiss Reinsurance Company Ltd, India

Mangesh Niranjan Patankar heads the local agriculture underwriting team at the India branch of Swiss Re. He is responsible for managing the Indian agriculture reinsurance business. Prior to this, Mangesh served as an Underwriter in the Agriculture team in Singapore, where he worked on structuring, pricing and underwriting crop and livestock reinsurance products for markets in South Asia and the Philippines.

The PMFBY (Pradhan Mantri Fasal Bima Yojana) has been in India for five years.

What have been the scheme's most significant achievements in India?

The primary objective of the PMFBY scheme is to help farmers produce more sustainably by:



As the products are index-based and reflect the status of the farm productivity for a larger administrative unit, it also encourages the individual farmers to see to it that they increase their individual, farm-specific productivity through the use of new and contemporary farming techniques.

There have been similar products in the past, like the National Agriculture Insurance Scheme (NAIS) and Modified National Agricultural Insurance Scheme (MNAIS). Still, the traction that PMFBY has gained is incredible.

Compared to NAIS – which existed until 2015, PMFBY provides several additional features to take care of localised perils, post-harvest losses and mid-season disasters facing farming communities. In the inauguration year, the scheme received quite an encouraging response from most of the states. The sum insured, crops insured, and farmers' participation increased, thanks to the heavy subsidy commitments by the Centre and State. Compared to MNAIS – which remained a relatively smaller scheme due to co-existence with NAIS – the PMFBY scheme has successfully adopted technological interventions such as mobile-based yield data collection, satellite data-based smart sampling, a dedicated scheme portal for enrolment, subsidy handling and claim settlement. Moreover, as against MNAIS, where the claims disbursed under the non-yield index components were minimal, we have seen much higher benefits disbursed under PMFBY. Key examples include post-harvest losses in Maharashtra in 2019, sowing failure losses in Rajasthan in 2018, localised calamity losses in Haryana and Odisha in various years.

One definite success for the government is putting the PMFBY plan into action and actively marketing it. There have been some critiques, but that too has a beneficial impact as some of those are addressed under the subsequent revisions of the scheme.

The key focus remains on fairness in subscription, as well as claims assessment. I would like to point out that a mandatory AADHAAR (national identification number) linkage has been widely implemented since 2017.

The second point is land record integration, which is dependent on the state's infrastructure, and thus the success of finding genuine beneficiaries varies from state to state. However, the concept of area correction factors largely helps in curbing the problem of oversubscription.

As far as fairness in claims is

concerned, there is a detailed protocol for crop sowing failure, post-harvest failures, and mid-season adversities. For the yield index component, the government is developing smart sampling methodologies for the major crops in various states. Swiss Re worked on this concept way back in 2013, along with the Maharashtra government, CRIDA, the Agriculture Insurance Company of India and a private ag-tech firm. However, it has taken time to translate such efforts into government policies. I am glad to say that the Government of Odisha has started putting this concept into practice since 2018, and it has been an enormous success. Overall, we have seen increased ground monitoring by insurers, rationalisation, digitisation and improved accuracy of crop cutting experiments.

What are the critical gaps in the PMFBY that technology has been able to fill, and which ones remain?

In 2016, when the PMFBY era began, despite very well-articulated operational guidelines, many uncertainties prevailed around the implementation aspects. However, the stakeholders were determined to ensure that the guidelines are practised the intended way, and technological intervention significantly enables that. For example, AADHAAR linkage and land record integration have made a difference. Even more important is the widespread use of technology to sample CCE locations and record their outcomes. Whereas smart sampling as a concept has existed for a long time, PMFBY perhaps created the urge to translate it into practice. Central government institutions like MNCFC, NRSC and individual state governments are heavily involved in instrumentalising this on the ground.

The Central Government has attempted to roll out a simple smartphone app handed to local agriculture authorities to record CCE outcomes in several states. Additionally, a counter application is provided to the insurance companies or their vendors to check the findings. That was the feature that prior systems lacked, maybe because smartphones were not widely available at that time. It is a progressive step, and the best thing is that these applications are simple to comprehend, and anyone with a basic understanding of smartphones can operate them. Although not all the CCEs are being conducted using these apps, the uptake is phenomenal over the past three years.

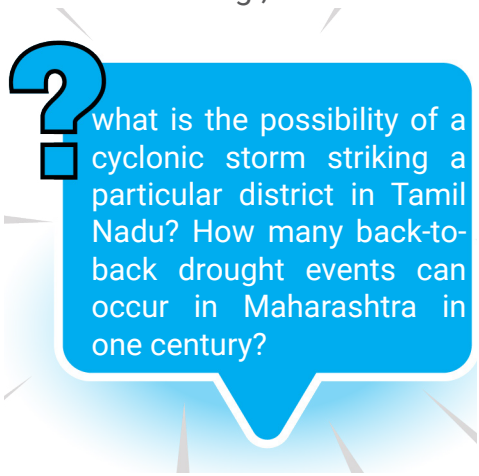
Overall, the behavioural changes around the topic of yield data recording is a major victory of the PMFBY scheme.

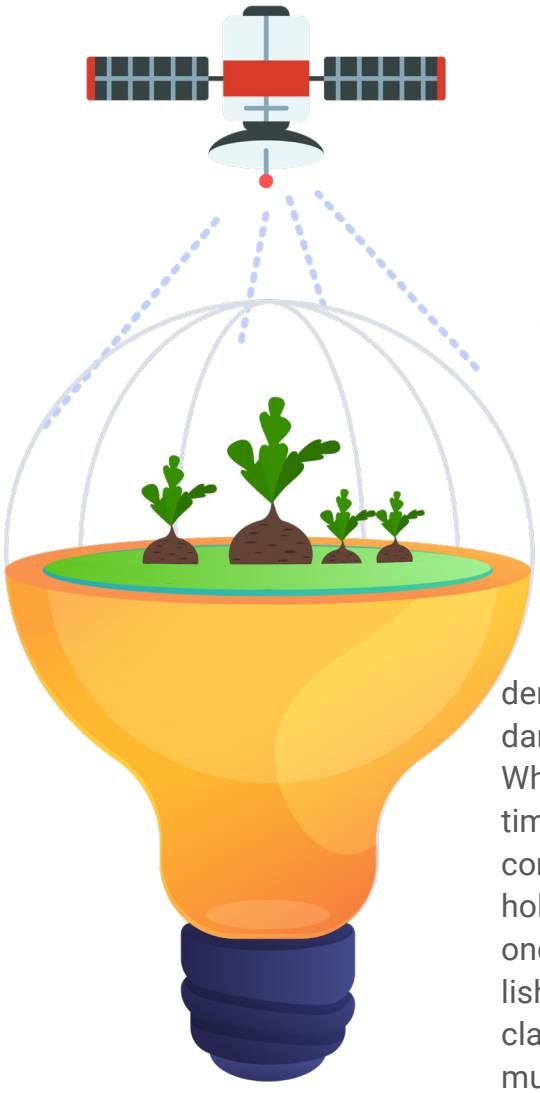
We also see increased use of social media for advertising the benefits and performance of the scheme. Government, as well as insurers, are seen

adopting such digital marketing techniques.

Do you see any significant gaps in PMFBY that technology can bridge, such as claim assessment, underwriting, etc., where technology can make a difference?

Technological interventions have played a key role as far as distribution and claims assessment is concerned. As yield index remains the predominant component of PMFBY, and most insurers have been using merely 10 to 15 years of yield data for their underwriting decisions, it is important to look beyond this period and dig deep to understand the unseen frequency of major weather events. For this purpose, we can use satellite-based weather, soil moisture and vegetation datasets. This gives a better idea of the return periods of the calamities - e.g.,





We need this know-how built in the underwriting decision-making systems of the insurers and among the states implementing this scheme as the product prices can be driven by these unseen events.

Let's also not forget about the issues that manually recorded yield datasets have in the country. The validation of such datasets in the past – especially pre-2015 when PMFBY did not exist – has been weaker, and further, the measurement of such datasets may not have happened at the level where the scheme wants it to be. This poses challenges around the correctness of such datasets.

If we think more broadly, going beyond the manually recorded yield-based insurance, we see immense product structuring opportunities using similar datasets. An example is the recent adoption of the Crop Health Factor by the West Bengal Government. The idea is to design an alternative to yield index and reflect crop stress using objective parameters derived from optical and radar remote sensing datasets. Whereas such products need time to stabilise and a lot of commitment from the stakeholders for ground-truthing, once the design gets established, the underwriting and claim as sessment can happen much more quickly and transparently.

Do you think the rise of Agtech's in India will open up opportunities for new insurance product design that caters to farmers' and agricultural cooperatives' more hyper-local needs?

Certainly! Hyper-localisation is already happening as the existing crop insurance speaks about implementation at the Gram Panchayat level, which

was unheard of a few years back. However, even after implementing the crop insurance at this level, we hear deviations in farmer specific experiences and the representative yield index.

It would be better to provide compensation to farmers who have suffered losses on their land. This can only happen if we have excellent farmers and land records database.

With the rise of ag-techs, I am sure we can start inching towards a farm level insurance product. However, this journey won't be easy. I do not doubt the abilities of ag-techs in supporting such products, but the insurance industry needs time to develop suitable infrastructures to process a significant amount of data. We need appropriate skillsets and data management systems. Moreover, not all states have digitised land records and insurers cannot handle this part of the journey.

We have experienced freak events in recent years, such as the Tamil Nadu drought (2016) and the Madhya Pradesh floods (2019), which have about a one hundred-year return period. The worst part is that we are witnessing more of these events – indicating a need to revise the assumptions around such return periods. The 2021 Europe floods are a classic example.

This warrants continuous updates of the premium rates and, thus, more investments from the government in terms of premium subsidies.

Insurance penetration remains a concern for South and South-Eastern Asian countries, but what is more worrisome is the skewed distribution of subscription rates across the countries. We need a serious discussion around agriculture insurance needs at the national level in several countries in these regions to institutionalise comprehensive risk-transfer mechanisms similar to PMFBY in India or the Thai Rice scheme in Thailand. As far as the financial risk-taking capabilities are concerned, the reinsurance industry is relatively resilient to absorb these risks because of the allocation of capital to risks spread across the globe. Thus, the resilience of domestic insurance companies would be largely dependent on their reinsurance purchase mechanism. Such a resilient primary insurance market can significantly impact the risk-taking abilities at the domestic level, which would mean more insurance penetration in such countries. Apart from reinsurance, insurance-linked securities can be considered an alternative, although we haven't yet seen this in the region.

In recent years, frequently occurring catastrophic events have become the new normal, and insurance is a key component that must be there. What influence has the reinsurance business had in South Asia and Southeast Asia, where insurance penetration is significantly lower?

What do you believe are the essential technologies that insurers should invest in to accomplish their objectives?

It's surprising that in India, the profitability of primary insurance companies is dependent on investment income over underwriting income. This implies that the premiums they receive are insufficient to cover the claims they pay out in any given year.

Insurers, in my opinion, need more vital collaboration with the global reinsurance industry to further improve the underwriting and exposure management models in the business.

In claim management, new yield-based model products will emerge over the years, which will largely automate the processes.

Such transition needs upgrading skillsets of the current underwriters, claim managers and surveyors and more investments in data crunching and data management abilities of every insurer.

Closing Note

Agriculture insurance was formerly treated as an unsustainable sector, and most of the schemes used to provide claim subsidies to support the insurance industry. In the past five to six years, India's Central and State governments have run a massively complex crop insurance successfully and sustainably without any claim-subsidy features. They have put PMFBY on the world map. Compared to this, interventions in allied agriculture insurance products – such as livestock and aquaculture – are minimal. With an annual aquaculture production value more than USD 16 bn and milk production alone valued above USD 100 bn, we see a huge protection gap in these sub-sectors. The insurance development pace for them can be increased with the learnings from PMFBY. Like crop insurance, we will have to rely on technological interventions to create trustworthy and sustainable products in these other segments to help the insurance industry grow to its full potential and bridge the protection gaps.

Space Jam

The Geospatial Way

Krishna G Namboothiri

Product Manager of the Data Science team at SatSure, Bangalore.

Devleena Bhattacharjee

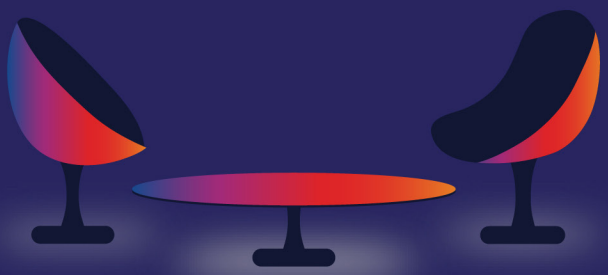
Founder, CEO at Numer8, Mumbai.

Rachana Reddy

Satellite development engineer at Berlin Space Technologies in Germany.

Shobitha Shetty

PhD researcher at Norwegian Institute for Air Research (NILU), Norway.

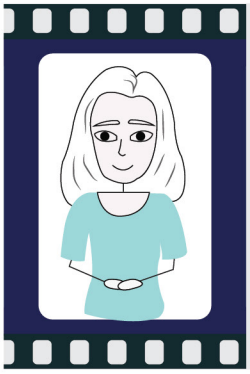


In 1832, a cholera outbreak prompted the first use of geospatial analysis when Charles Piquet drew a map depicting cholera hot spots throughout 48 Paris districts. Fast forward nearly 200 years to witness how technological breakthroughs are revolutionizing the geospatial business and giving interactive insights that were not feasible even a decade ago, as various companies track the spread of the COVID-19 pandemic.

We've seen data become enormously more prosperous over the last five years. Archaeology, disaster response, urban planning, infrastructure, logistics, retail, and transportation are just a few of the industries that have embraced advanced geospatial analytics.

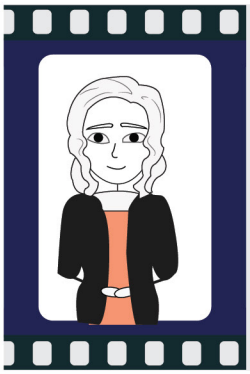
The 2nd episode of the SpaceJam series, titled '**The Geospatial Way**' focused on the critical aspects of the geospatial industry and its evolution over the years.

SpaceJam Cast



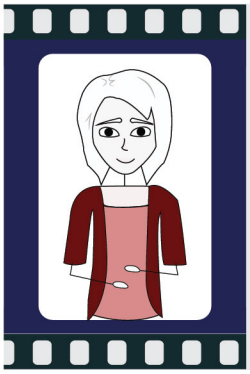
Rachana Reddy

Rachana works for Berlin Space Technologies in Germany as a satellite development engineer. She has previously worked for India's ISRO and Germany's DLR space agencies and holds a master's degree in space engineering from Technical University Berlin (TU-B).



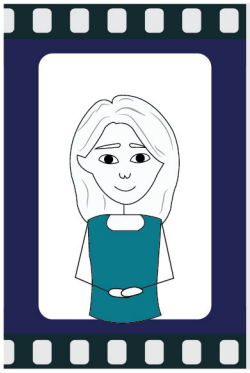
Krishna Namboothiri

Krishna is a Data Science Product Manager at SatSure and working on farm credit scoring. Previously she has worked with ISRO for three years and also completed her masters in Electrical Engineering with a specialization in applications of Systems Theory.



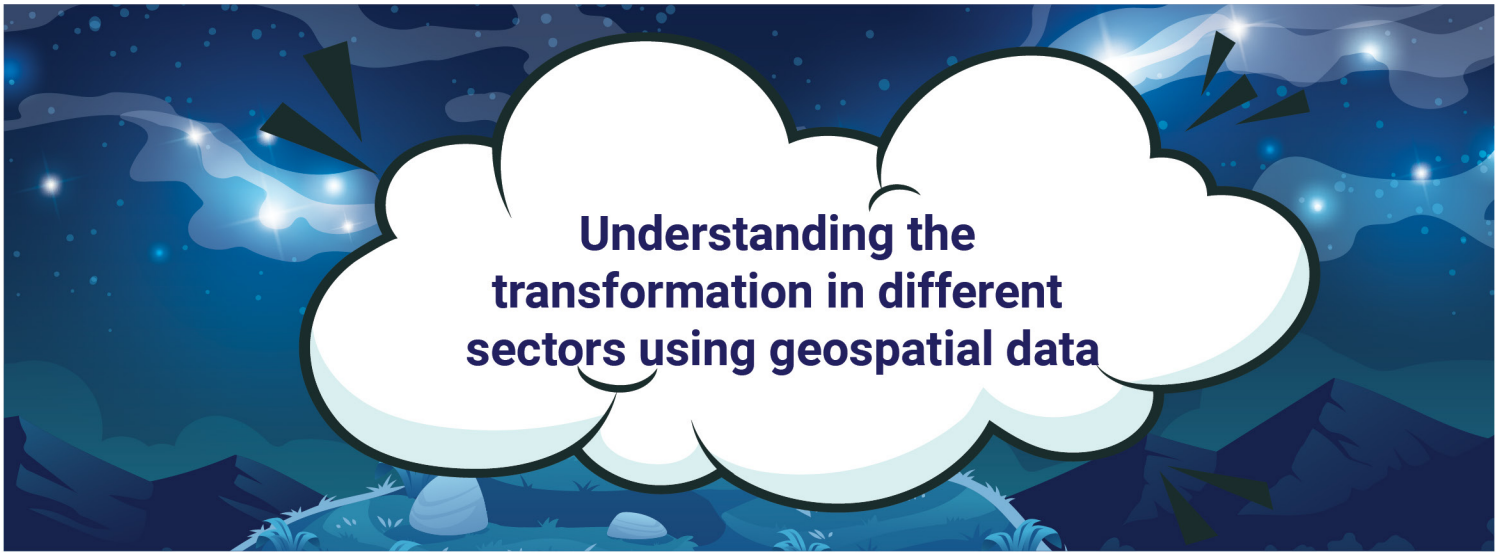
Devleena Bhattacharjee

Devleena has over 15 years of expertise as a data scientist. She is the founder of Numer8, which builds a profitable, traceable, and sustainable seafood ecosystem leveraging satellite and other sensor data.



Shobitha Shetty

Shobitha is a PhD researcher at Norwegian Institute for Air Research (NILU), Norway, using satellite data for air pollution monitoring. She has completed her masters from IIRS/ITC and also worked at SAP and SatSure previously.


Understanding the transformation in different sectors using geospatial data

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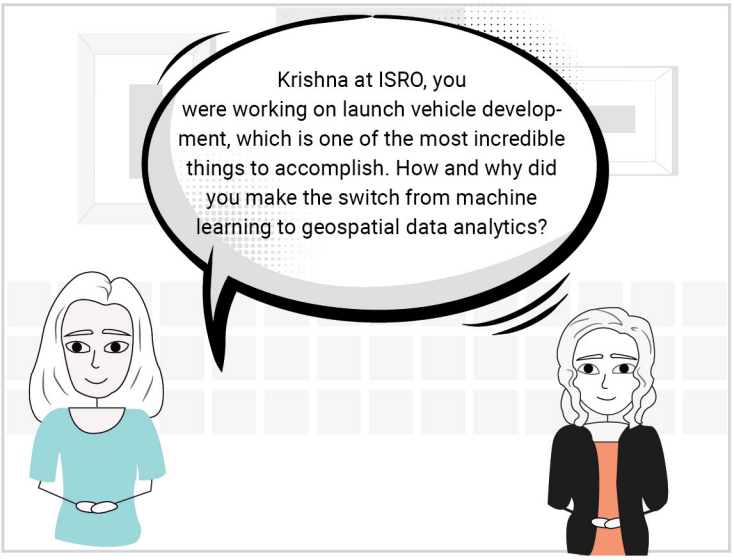
Krishna at ISRO, you were working on launch vehicle development, which is one of the most incredible things to accomplish. How and why did you make the switch from machine learning to geospatial data analytics?

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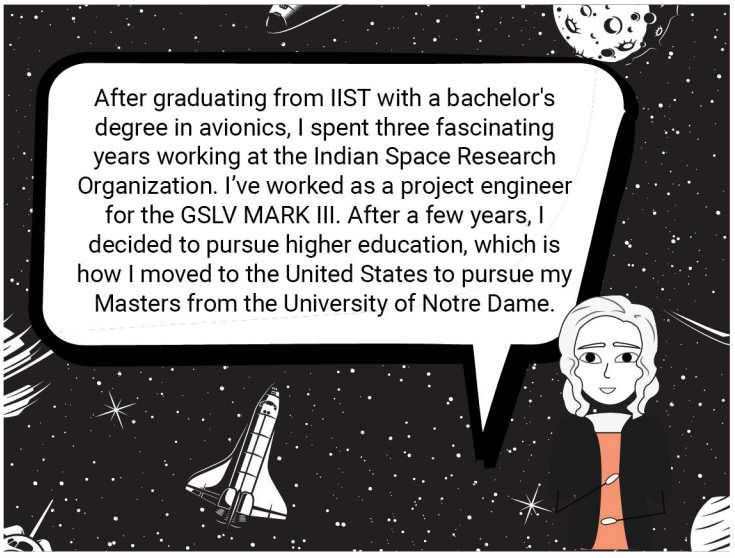
After graduating from IIST with a bachelor's degree in avionics, I spent three fascinating years working at the Indian Space Research Organization. I've worked as a project engineer for the GSLV MARK III. After a few years, I decided to pursue higher education, which is how I moved to the United States to pursue my Masters from the University of Notre Dame.

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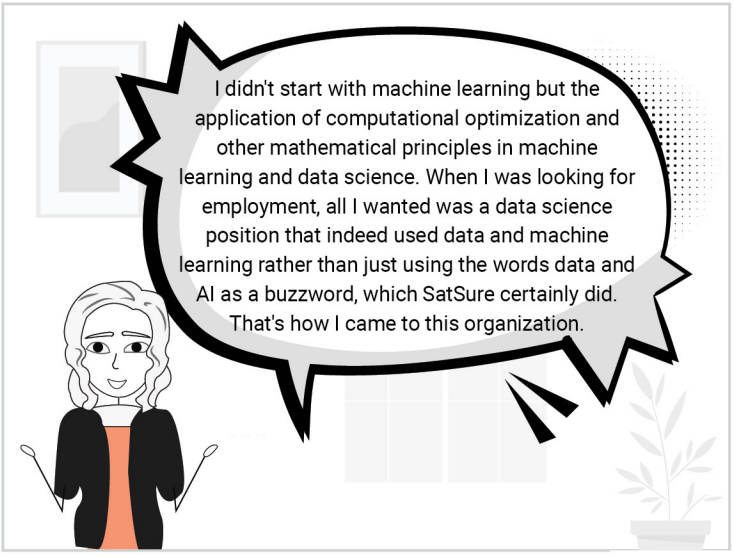
I didn't start with machine learning but the application of computational optimization and other mathematical principles in machine learning and data science. When I was looking for employment, all I wanted was a data science position that indeed used data and machine learning rather than just using the words data and AI as a buzzword, which SatSure certainly did. That's how I came to this organization.

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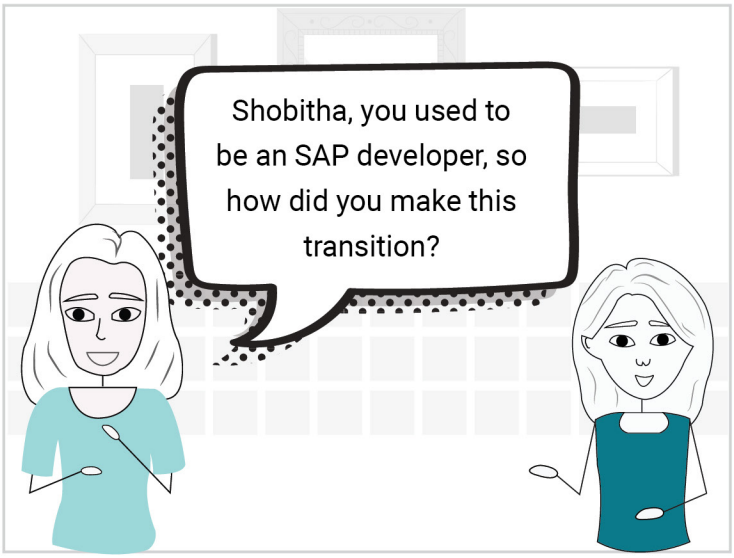
Shobitha, you used to be an SAP developer, so how did you make this transition?

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My passion for programming led me to work as an SAP developer, but Earth observation was always something I was interested in. So, after a few years of gratifying work in SAP, I began to focus on earth observation, GIS remote sensing. At that time, I pursued a master's degree in earth observation and GIS from IIRS and ITC, which was like the best of both worlds, combining teaching from both disciplines.

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Before commencing your entrepreneurial career with Numer8, Devleena Bhattacharjee, you had a lot of prior experience in data analytics and data intelligence in non-space sectors, but how did the space bug bite you?

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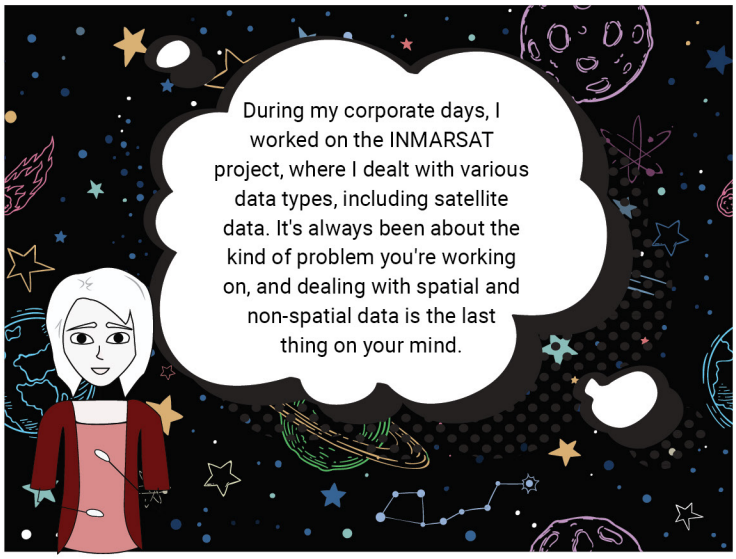
During my corporate days, I worked on the INMARSAT project, where I dealt with various data types, including satellite data. It's always been about the kind of problem you're working on, and dealing with spatial and non-spatial data is the last thing on your mind.

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As a result, we are capable of slicing and dicing both types of data to solve the problem. So, we can't only look at data through a geospatial lens; we also need to look at it through data analysis or data science lens.

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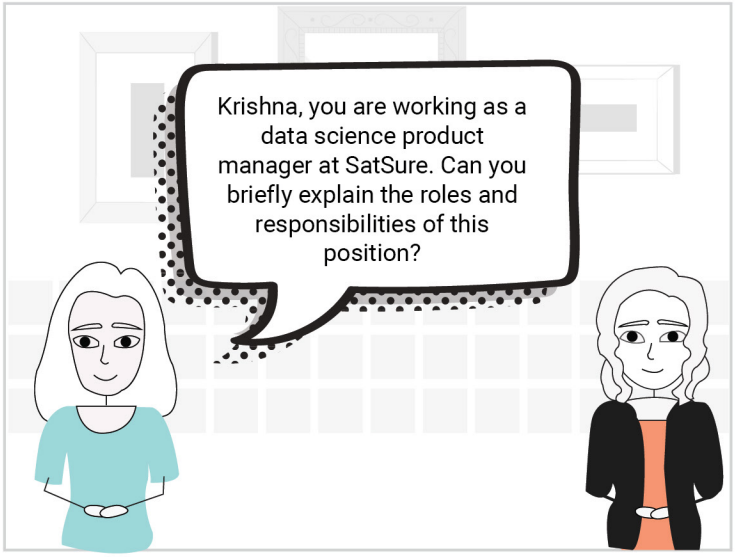
Krishna, you are working as a data science product manager at SatSure. Can you briefly explain the roles and responsibilities of this position?

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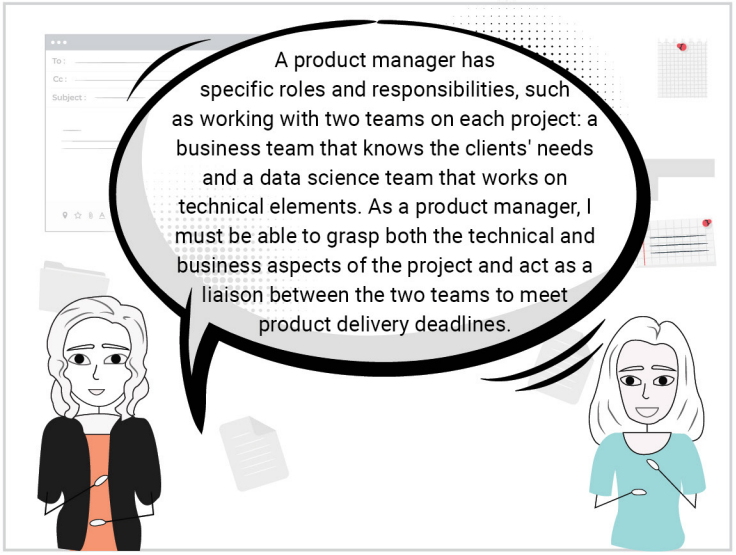
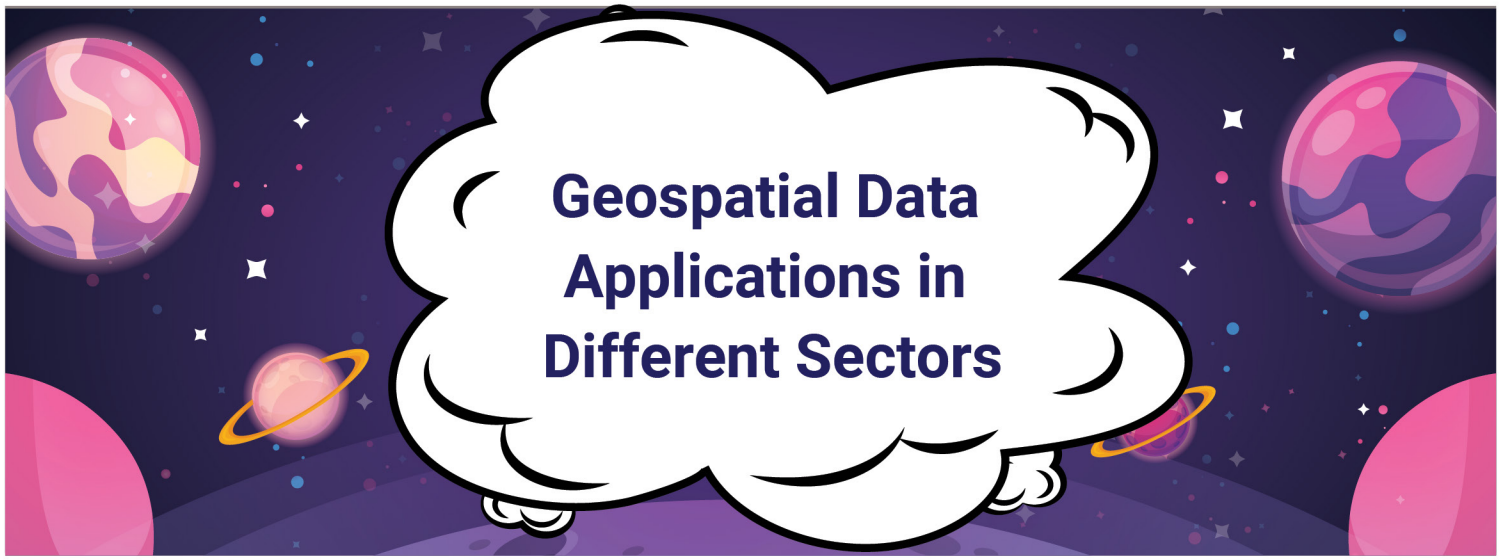

A product manager has specific roles and responsibilities, such as working with two teams on each project: a business team that knows the clients' needs and a data science team that works on technical elements. As a product manager, I must be able to grasp both the technical and business aspects of the project and act as a liaison between the two teams to meet product delivery deadlines.


Geospatial Data Applications in Different Sectors

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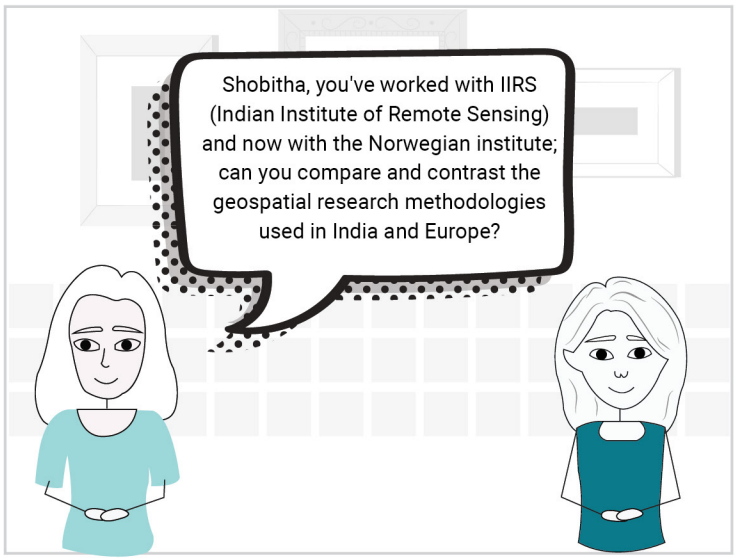
Shobitha, you've worked with IIRS (Indian Institute of Remote Sensing) and now with the Norwegian institute; can you compare and contrast the geospatial research methodologies used in India and Europe?

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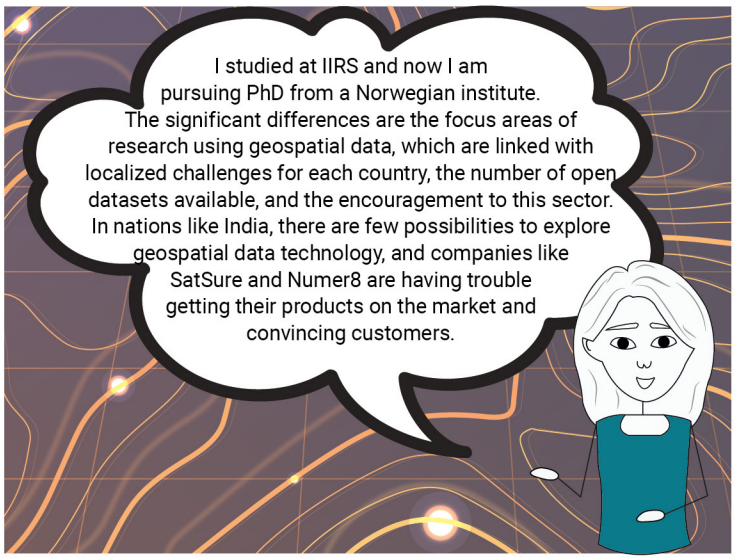
I studied at IIRS and now I am pursuing PhD from a Norwegian institute. The significant differences are the focus areas of research using geospatial data, which are linked with localized challenges for each country, the number of open datasets available, and the encouragement to this sector. In nations like India, there are few possibilities to explore geospatial data technology, and companies like SatSure and Numer8 are having trouble getting their products on the market and convincing customers.

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Devleena, what are your opinions on the potential for downstream geospatial data applications in developing countries?

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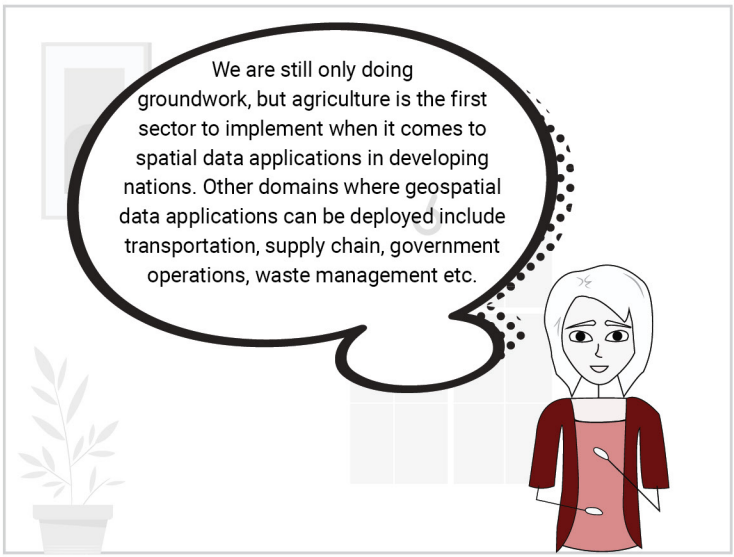
We are still only doing groundwork, but agriculture is the first sector to implement when it comes to spatial data applications in developing nations. Other domains where geospatial data applications can be deployed include transportation, supply chain, government operations, waste management etc.

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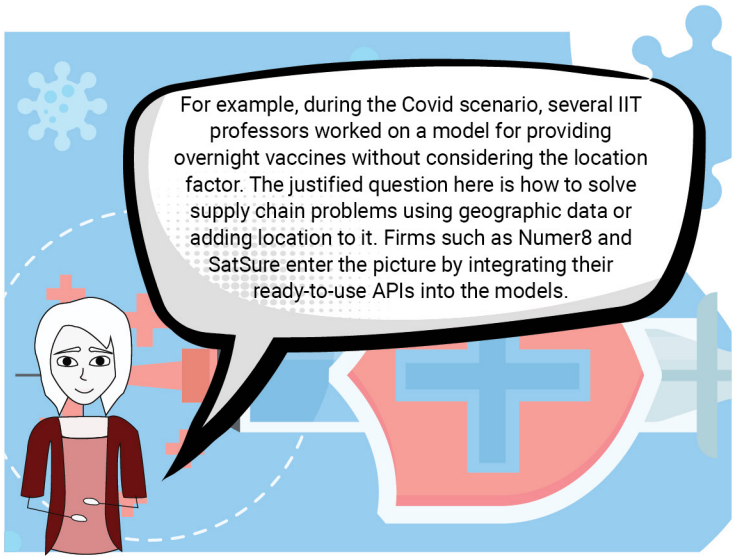

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Product Development Challenges in Using Geospatial Data

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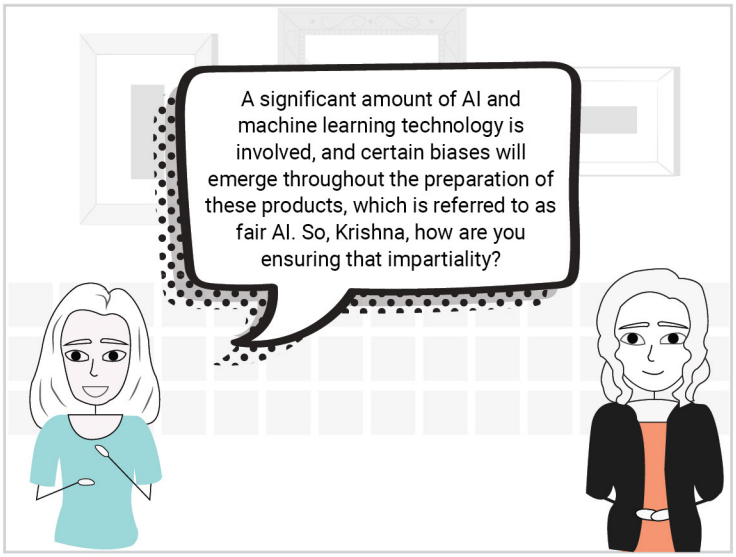

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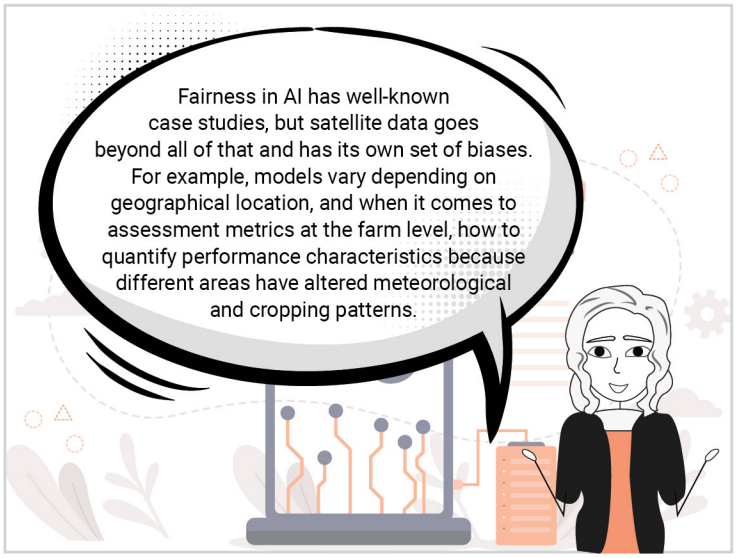

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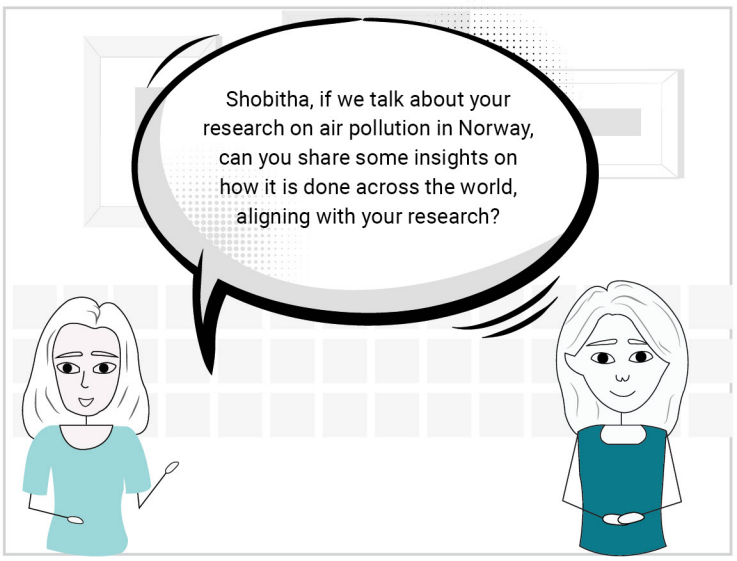

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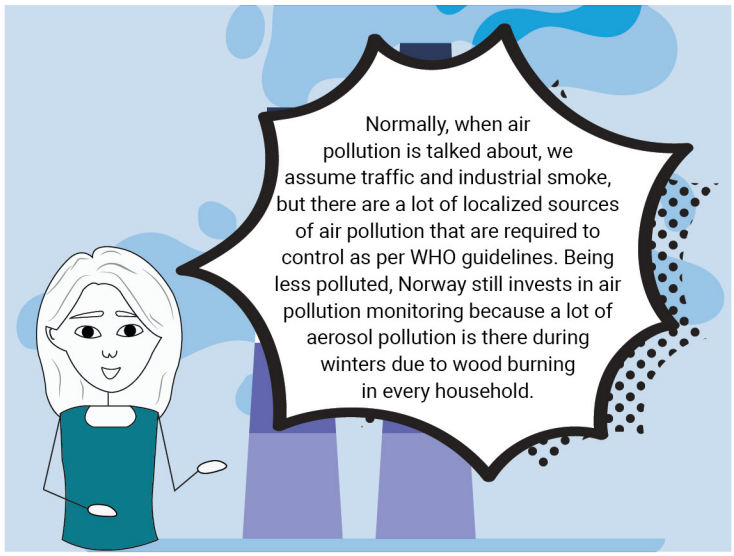

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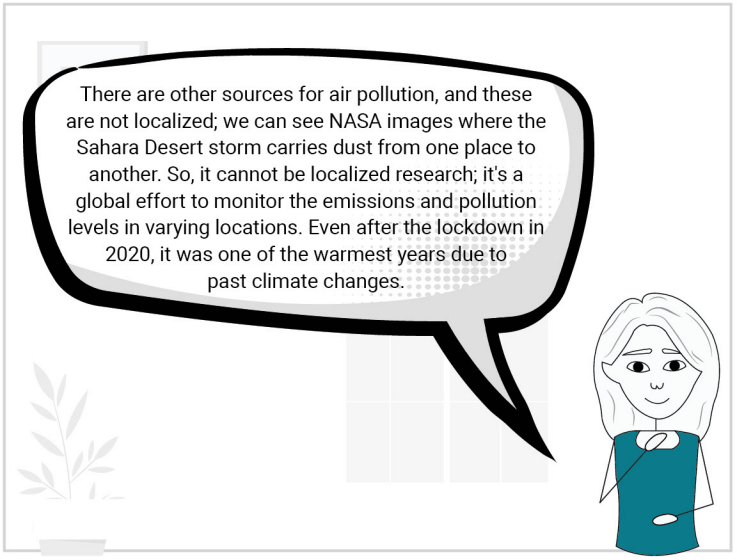

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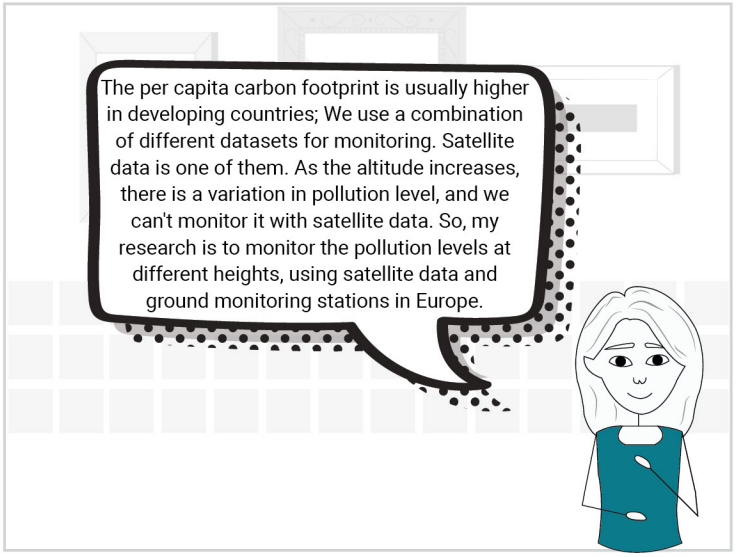

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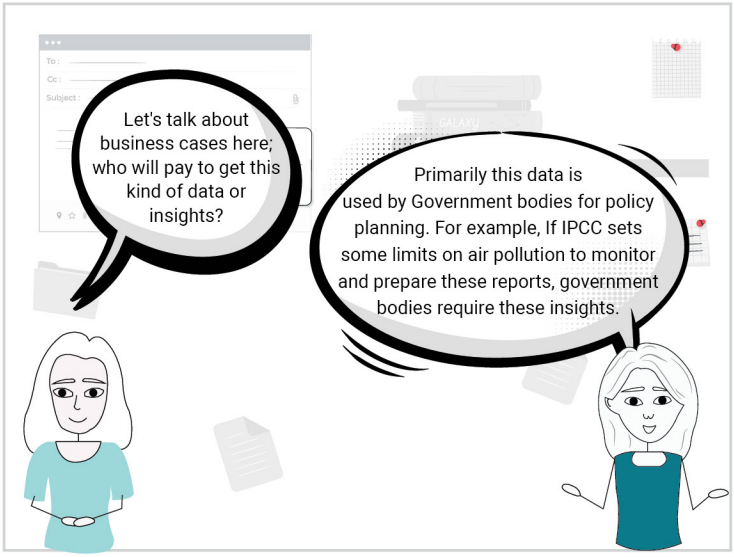

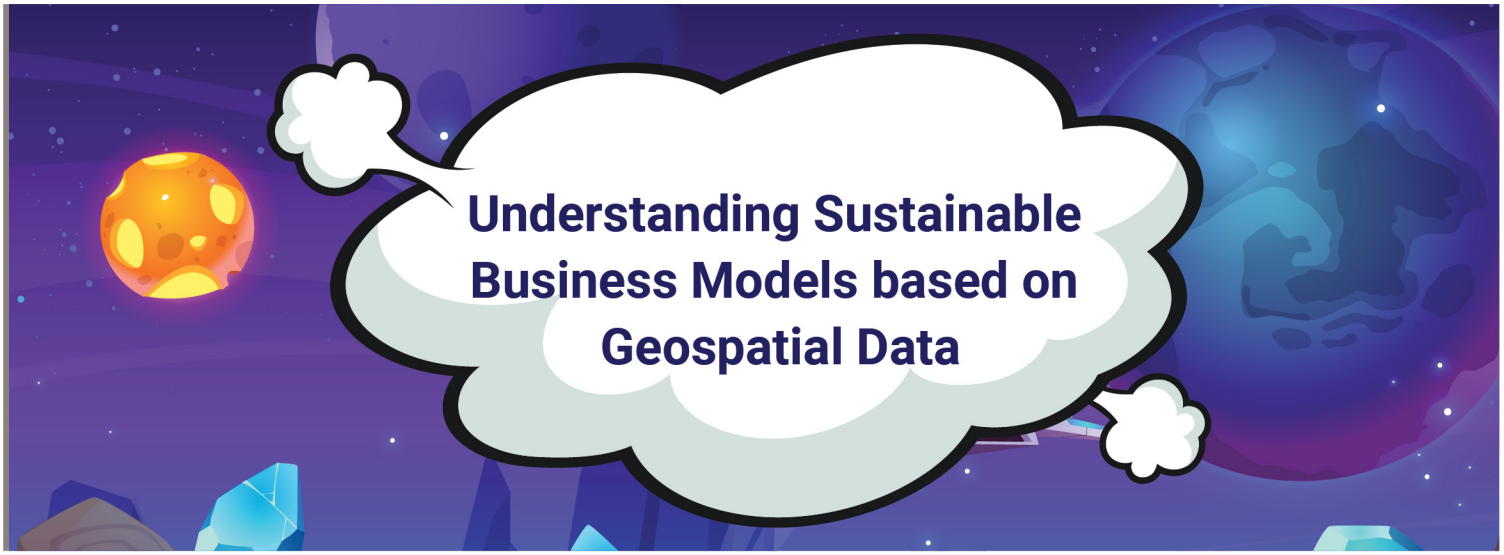
Understanding Sustainable Business Models based on Geospatial Data

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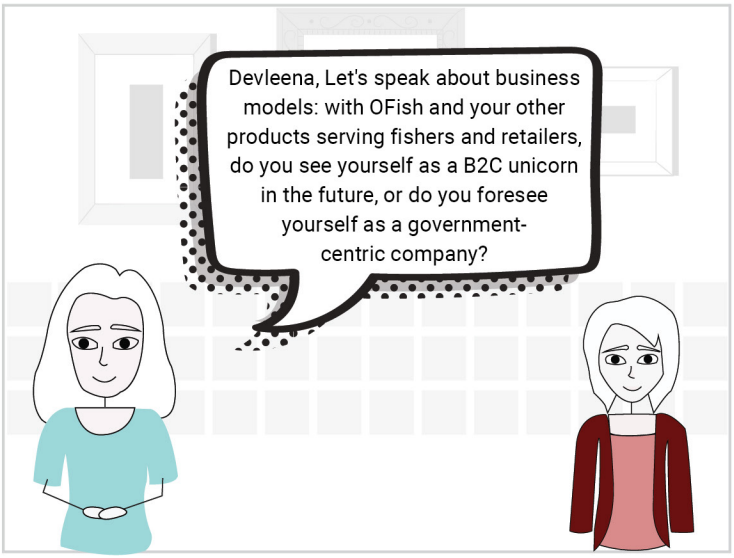
Devleena, Let's speak about business models: with OFish and your other products serving fishers and retailers, do you see yourself as a B2C unicorn in the future, or do you foresee yourself as a government-centric company?

26


In my opinion, the term Unicorn refers to a company that is performing well but does not represent the bottom line. But, in our situation, I believe the challenge is whether we can develop a viable, lucrative geospatial business aimed at customers rather than the government. Although the government is not yet a customer, engaging with them will provide us access to a vast pool across large geographic areas.

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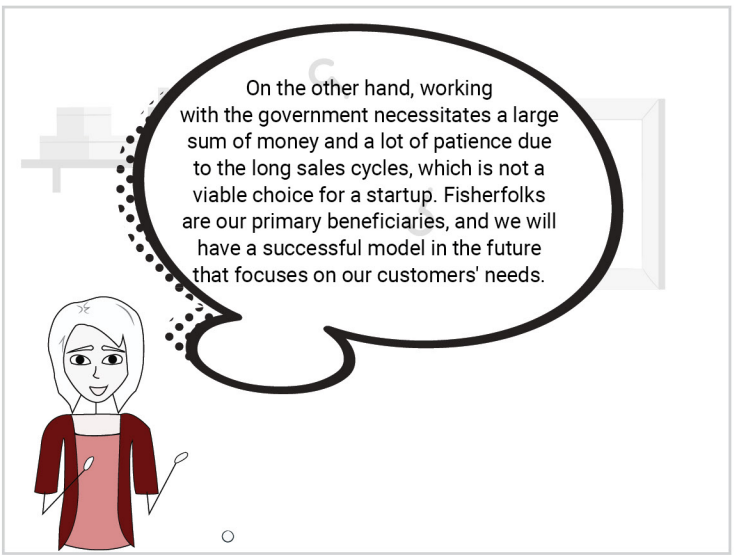
On the other hand, working with the government necessitates a large sum of money and a lot of patience due to the long sales cycles, which is not a viable choice for a startup. Fisherfolks are our primary beneficiaries, and we will have a successful model in the future that focuses on our customers' needs.

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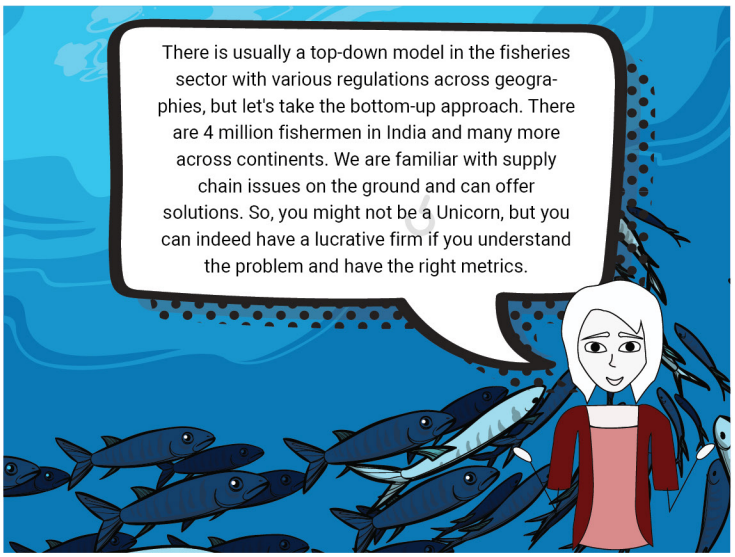
There is usually a top-down model in the fisheries sector with various regulations across geographies, but let's take the bottom-up approach. There are 4 million fishermen in India and many more across continents. We are familiar with supply chain issues on the ground and can offer solutions. So, you might not be a Unicorn, but you can indeed have a lucrative firm if you understand the problem and have the right metrics.

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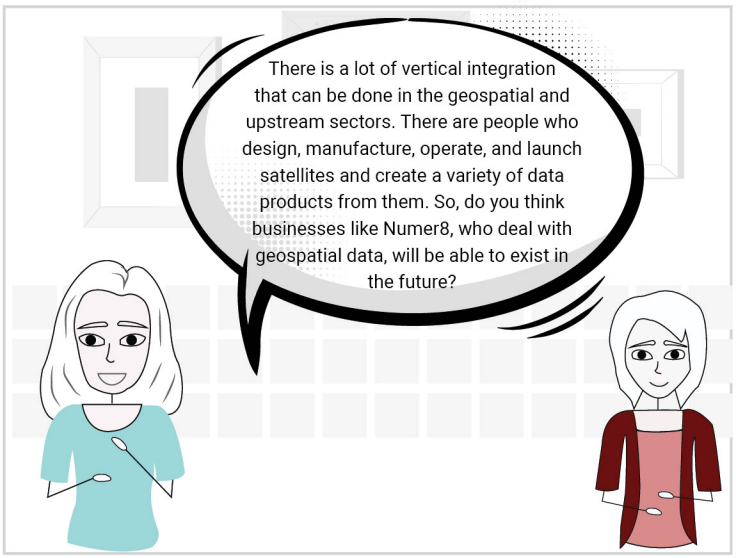
There is a lot of vertical integration that can be done in the geospatial and upstream sectors. There are people who design, manufacture, operate, and launch satellites and create a variety of data products from them. So, do you think businesses like Numer8, who deal with geospatial data, will be able to exist in the future?

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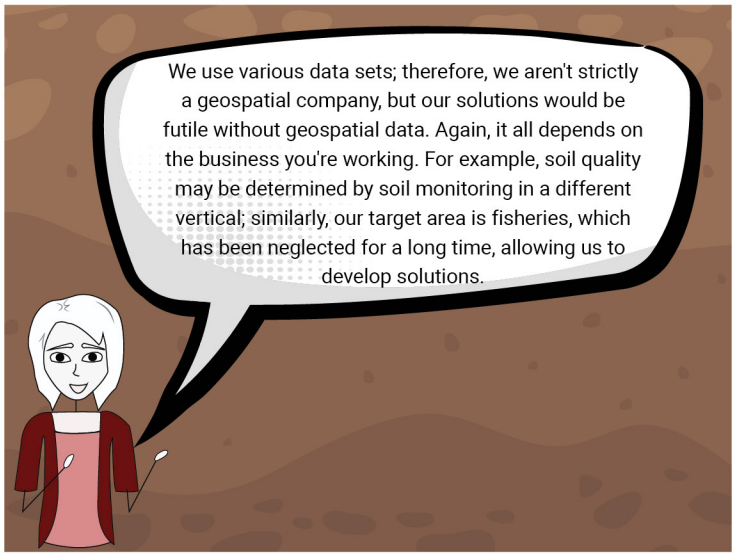
We use various data sets; therefore, we aren't strictly a geospatial company, but our solutions would be futile without geospatial data. Again, it all depends on the business you're working. For example, soil quality may be determined by soil monitoring in a different vertical; similarly, our target area is fisheries, which has been neglected for a long time, allowing us to develop solutions.

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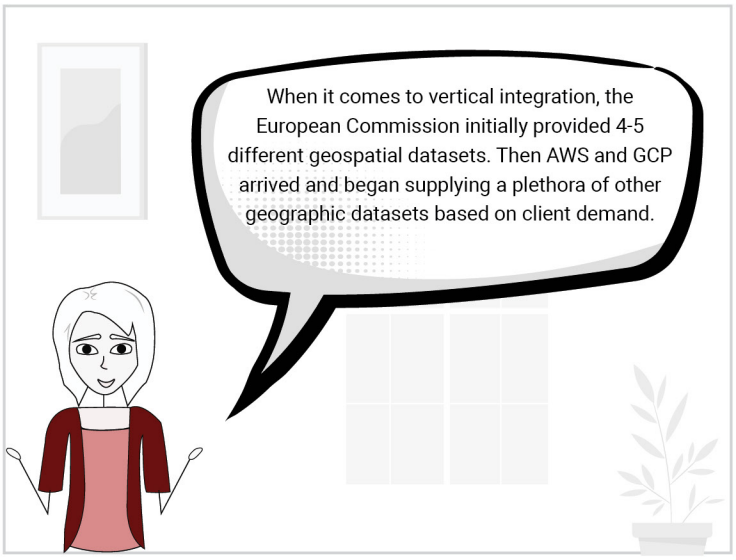
When it comes to vertical integration, the European Commission initially provided 4-5 different geospatial datasets. Then AWS and GCP arrived and began supplying a plethora of other geographic datasets based on client demand.

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As a result, from a business perspective, you must continuously evolve with the industry. The best part about the geospatial earth observation data Analytics Company is that it does not prevent us from supplementing with various fresh data sets to stay in the company and expand our horizons to other possibilities.


Entrepreneurial Challenges in Earth Observation Industry

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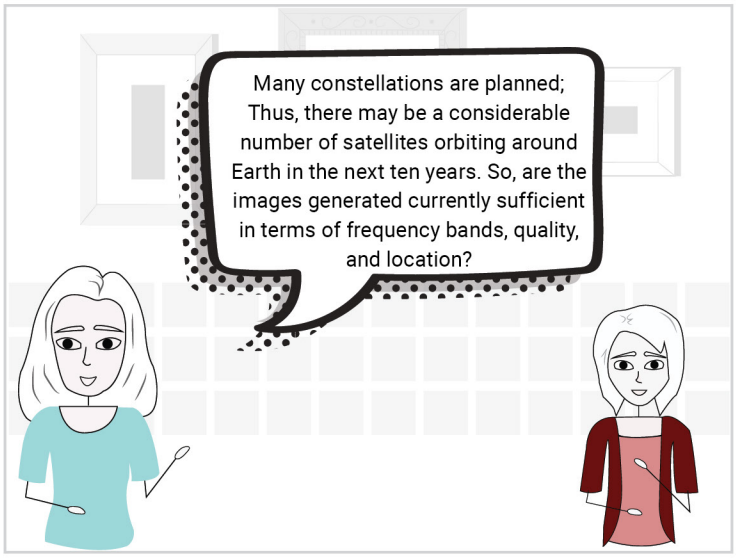
Many constellations are planned; Thus, there may be a considerable number of satellites orbiting around Earth in the next ten years. So, are the images generated currently sufficient in terms of frequency bands, quality, and location?

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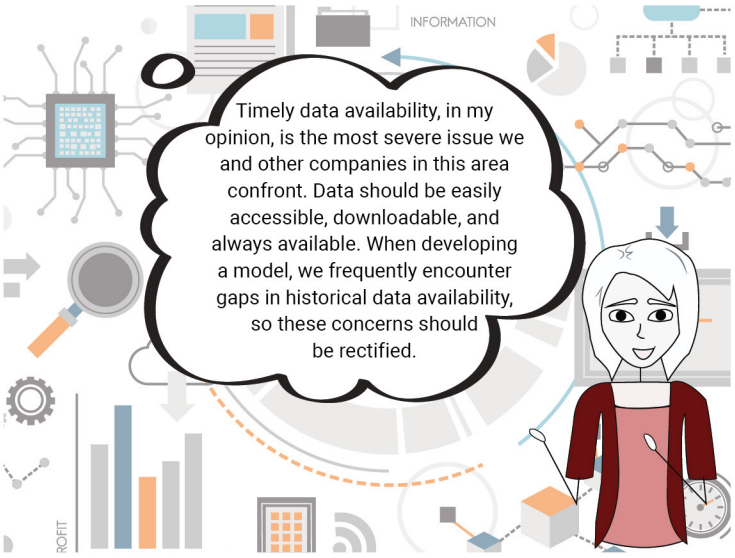
INFORMATION
Timely data availability, in my opinion, is the most severe issue we and other companies in this area confront. Data should be easily accessible, downloadable, and always available. When developing a model, we frequently encounter gaps in historical data availability, so these concerns should be rectified.

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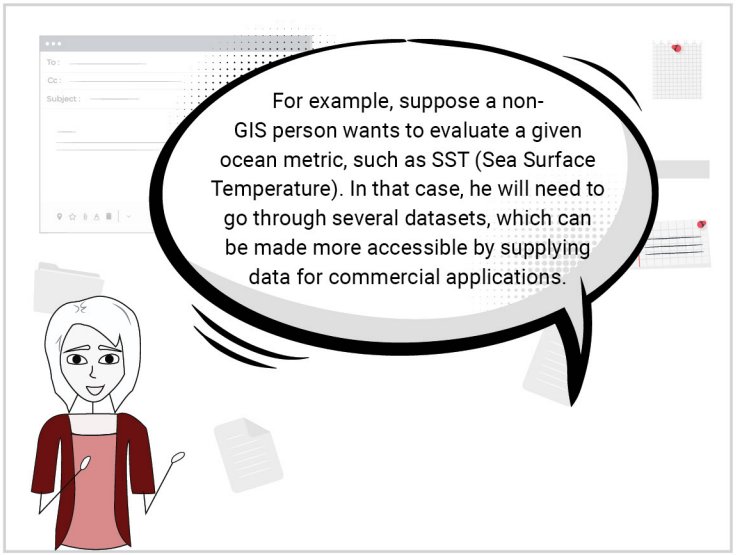
For example, suppose a non-GIS person wants to evaluate a given ocean metric, such as SST (Sea Surface Temperature). In that case, he will need to go through several datasets, which can be made more accessible by supplying data for commercial applications.

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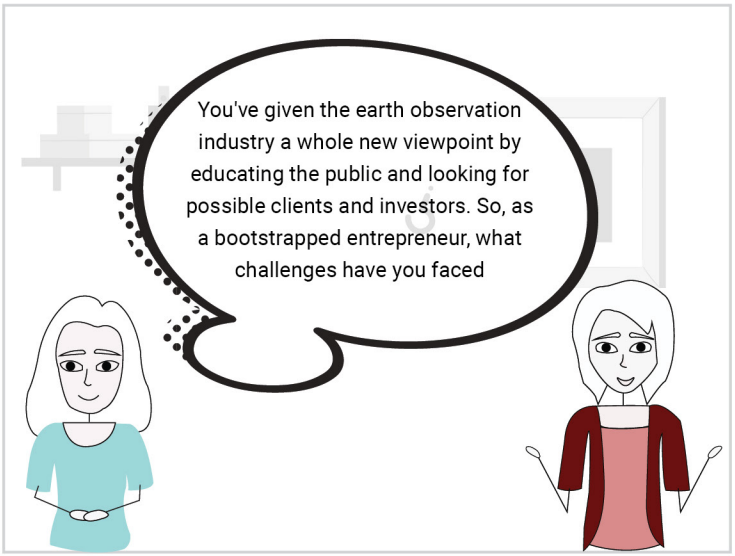
You've given the earth observation industry a whole new viewpoint by educating the public and looking for possible clients and investors. So, as a bootstrapped entrepreneur, what challenges have you faced

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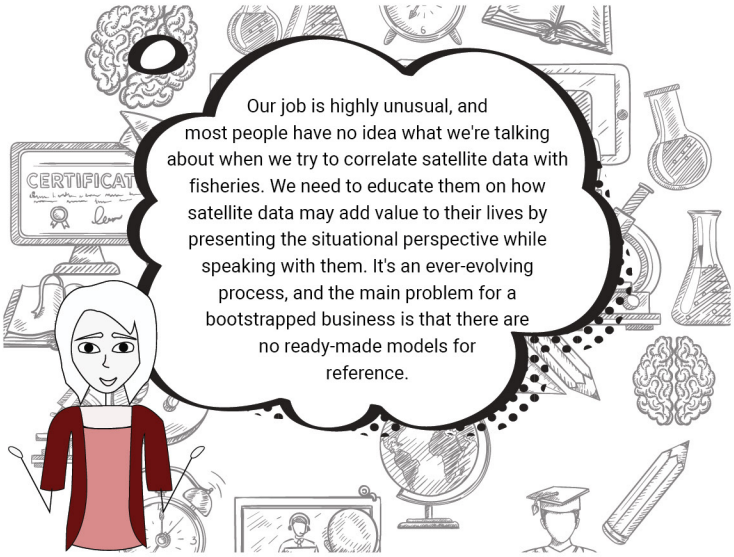
Our job is highly unusual, and most people have no idea what we're talking about when we try to correlate satellite data with fisheries. We need to educate them on how satellite data may add value to their lives by presenting the situational perspective while speaking with them. It's an ever-evolving process, and the main problem for a bootstrapped business is that there are no ready-made models for reference.

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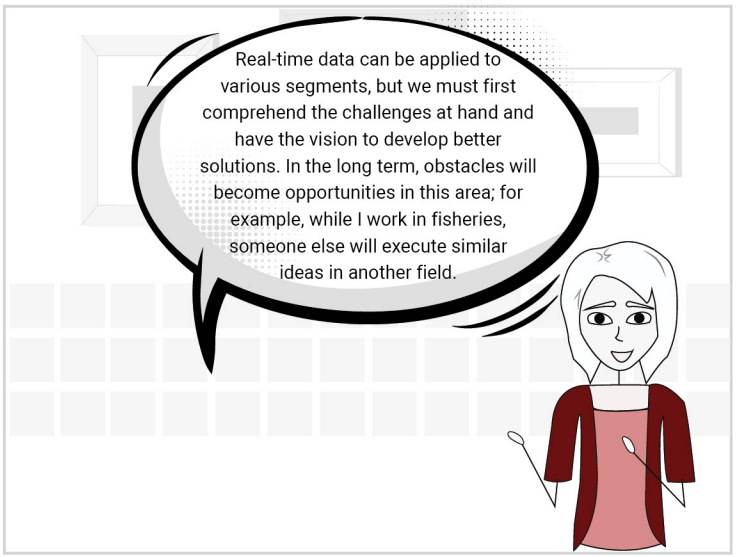
Real-time data can be applied to various segments, but we must first comprehend the challenges at hand and have the vision to develop better solutions. In the long term, obstacles will become opportunities in this area; for example, while I work in fisheries, someone else will execute similar ideas in another field.


Future of
Geospatial Industry

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Can geospatial data likely become an essential aspect of policymaking in future, and if yes, to what extent?

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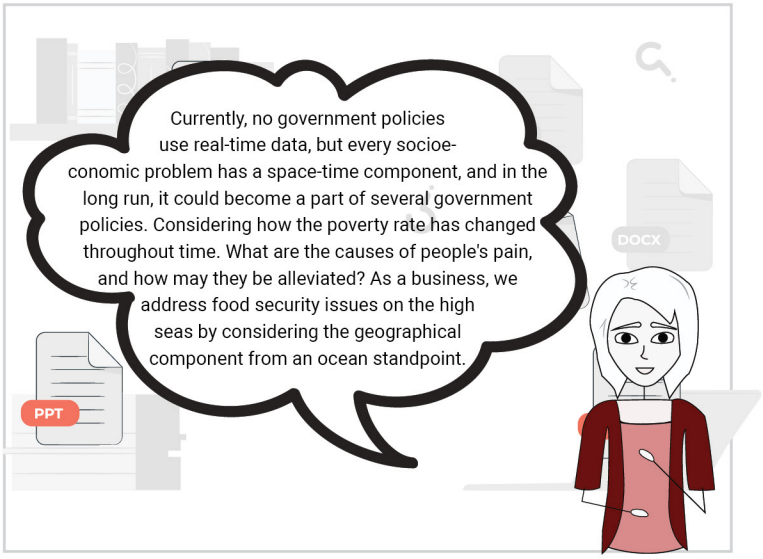
Currently, no government policies use real-time data, but every socioeconomic problem has a space-time component, and in the long run, it could become a part of several government policies. Considering how the poverty rate has changed throughout time. What are the causes of people's pain, and how may they be alleviated? As a business, we address food security issues on the high seas by considering the geographical component from an ocean standpoint.
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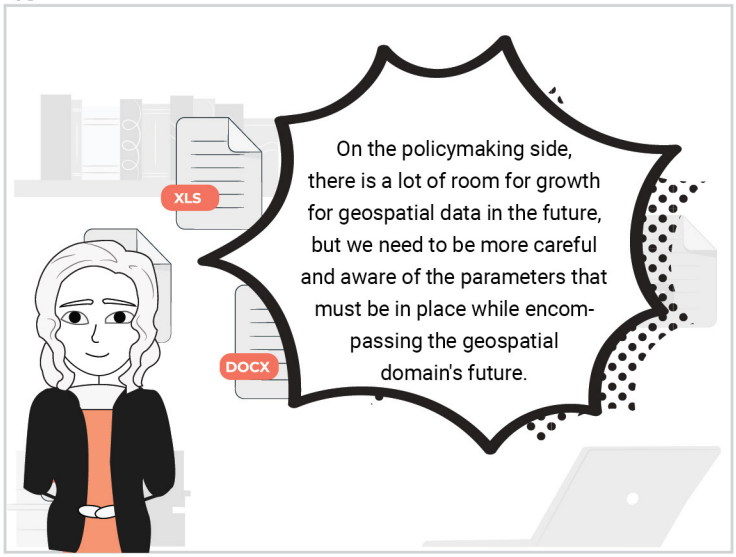

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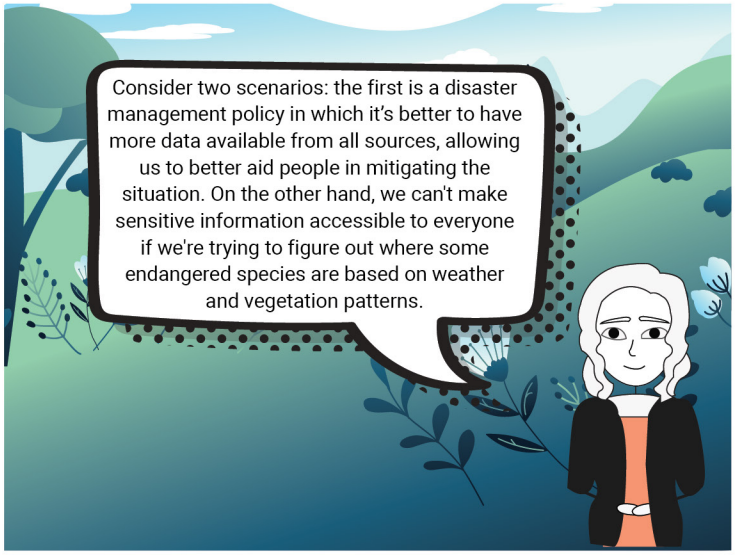

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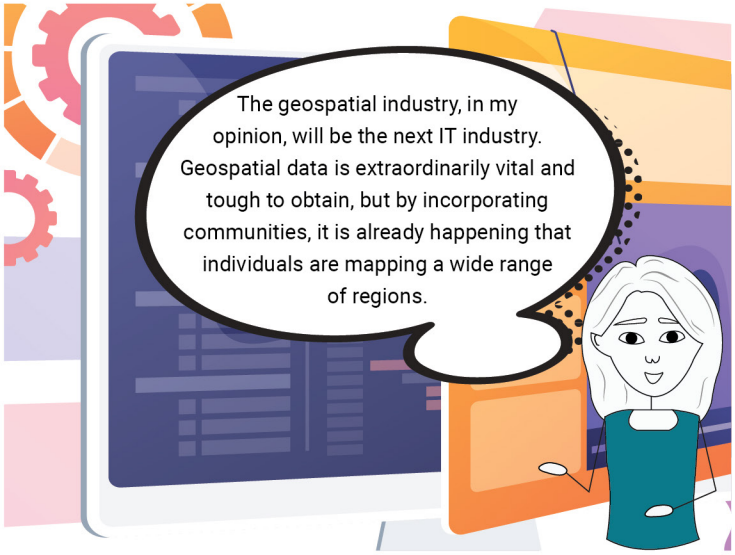

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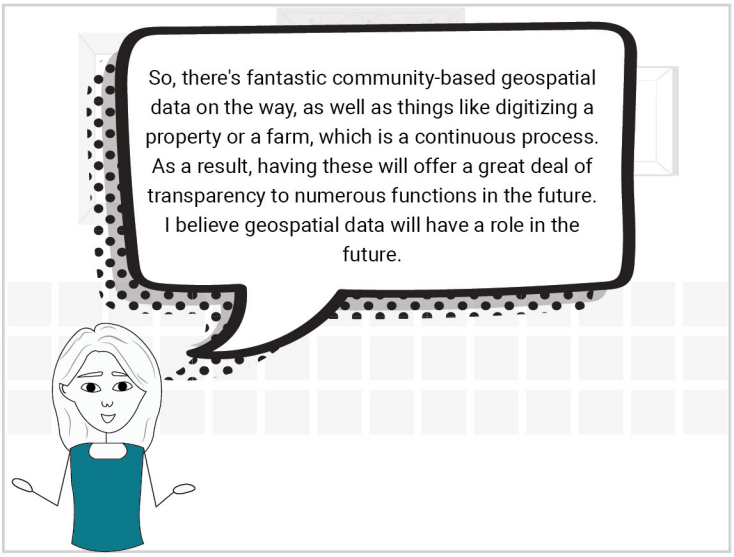
So, there's fantastic community-based geospatial data on the way, as well as things like digitizing a property or a farm, which is a continuous process. As a result, having these will offer a great deal of transparency to numerous functions in the future. I believe geospatial data will have a role in the future.

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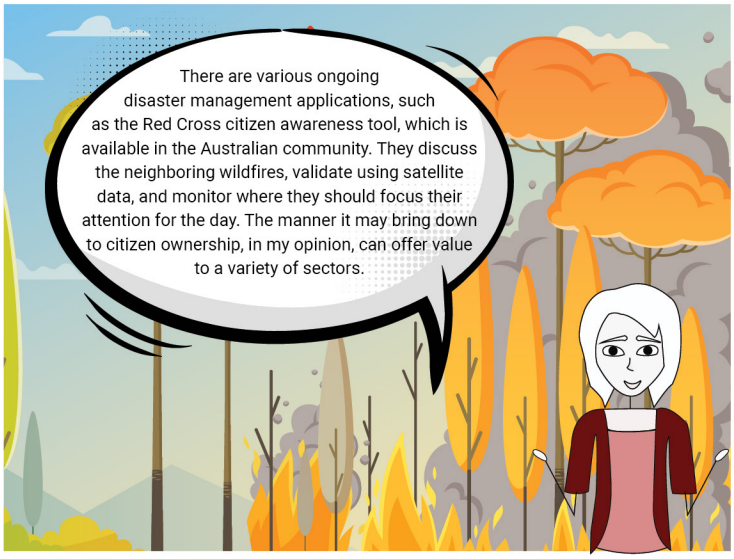
There are various ongoing disaster management applications, such as the Red Cross citizen awareness tool, which is available in the Australian community. They discuss the neighboring wildfires, validate using satellite data, and monitor where they should focus their attention for the day. The manner it may bring down to citizen ownership, in my opinion, can offer value to a variety of sectors.

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