Sattva Knowledge Institute SKI perspective

DECODING IMPACT PRESENTS

DIGITAL ECOSYSTEM FOR SKILLING AND LIVELIHOOD (DESH STACK) WITH SATISH MOHAN

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Acknowledgements

Contributors

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Disclaimer

About Sattva Knowledge Institute

Sattva Knowledge Institute (SKI), established in 2022, is our official knowledge platform at **Sattva.** The **SKI** platform aims to guide investment decisions for impact, shedding light on urgent problems and high potential solutions, so that stakeholders can build greater awareness and a bias towards concerted action. Our focus is on offering solutions over symptoms, carefully curating strong evidence-based research, and engaging decision-makers actively with our insights. Overall, SKI aims to shift intent and action toward greater impact by influencing leaders with knowledge. All of our content proactively leverages the capabilities, experience and proprietary data from across **Sattva**.

Introduction: *From Sattva Knowledge Institute. This is Decoding Impact, the podcast where we apply systems thinking in conversation with extraordinary experts to understand what it truly takes to scale solutions in the social sector. Decoding Impact is hosted by Rathish Balakrishnan, a co-founder and managing partner at Sattva. Welcome to today's episode.*

Rathish Balakrishnan (RB): [00:00:38] India has over 390 million individuals who have acquired skills informally through varied means, such as self-learning, on-the-job learning or inherited skills. Several issues continue to plague the existing skilling landscape, including supply and demand mismatch of skilled personnel, limited training facilities and a lack of effective credentialing systems. In the Union Budget 22-23, the Finance Minister announced the launch of a new digital ecosystem for Skilling and Livelihoods, DESH Stack e-portal. DESH Stack aims to bring together stakeholders in one digital ecosystem, enabling easier discovery of opportunities and services and improving verification credibility through the digital skilling credentials of citizens. In today's podcast episode, we have Satish Mohan, the CTO and co-founder of Dhiway. Dhiway was founded in 2019 with a singular goal - the autonomous control of authentic data, relationships and interactions. This unlocks transformative solutions for people, businesses and machines to easily and securely prove things about themselves without intermediaries. He is a member of the Technology Committee of MOSIP, a digital identity platform. He brings 20+ years of experience in developing digital technologies and has worked in Red Hat in various engineering roles. Satish, thank you for joining us today.

Satish Mohan (SM): [00:02:03] Pleasure to be here. Thanks for having me Rathish.

RB: [00:02:15] Excellent. Satish, before we get into DESH stack, I'd love to know your journey of how you went from your days in education right to here at Dhiway. It'll be great if you can give us a quick summary.

SM: [00:02:28] So I've been a mid-90s open-source guy. During my studies, I got involved with open-source movement and then that became a passion. And I started my first company, along with two friends, to create open-source solutions, or at least help institutions to migrate into the open-source ecosystem. And those are the early days. And then we were fortunate to become part of Red Hat in 2002. And from there on the journey was all about building enterprise product, using open-source technologies or starting new projects that actually commoditise a certain part of the system. All of the experience we got being part of the open-source community, it is great in terms of bringing a new model of co-creation, but mostly it was kind of being limited to software or building technology stack. One of the reasons we started looking into Dhiway as with a goal of like giving control back to the users apart from the technology, we also had a goal in terms of, can we really elevate the community into running services, right? Let's not stop at creating repositories of code, but how about communities coming together and start running services that can then be used to deliver consumer benefit? And that's kind of the short of the journey that we had so far.

RB: [00:03:41] Two questions here. One is, how have you seen this open-source movement evolve in India itself? You know, from a very early stage in one of the early adopters of that entire ecosystem, where are we today? And two, how is the current discussion on delivering services to delivering repositories different? So like what is different in what was happening in the nineties to what is happening now?

SM: [00:04:03] So in terms of open-source, I think we are one of the largest consumers of open-source because mostly every project, every initiative that has great roots, into the open-source ecosystem. And over the years we are also having now good projects that is actually contributing back to the open-source community. But I think that the scope to increase the contribution part a lot more given the capacity or capability that we have in terms of the adoption curve, we kind of see it as like when you talk about just the open source communities, the open source communities come together to solve a particular problem and that might end up in creating code or documentation or these kinds of artefacts that help others to actually build on it. So it becomes the building blocks like you architect something, you can kind of figure out what are the different building blocks again, I can reuse. And these building blocks mostly are from different open-source communities. And, and then the, the community that is creating the system has interaction with this wide range of communities to make sure that whether they need a new feature or whether it needs support on something. So it's a large-scale coordination effort. Whereas when we talk about a service, it is all about the people who are creating this. Today, the challenge in a community to run a particular service is it takes a lot more effort to run a 24x7 service and that and also give confidence to the people who are going to build on it to say that this is a viable platform to build, and they can be assured of its availability, or I could actually provide my customer the kind of experience we need.

So today, because of the way open-source community creates code, not many had actually ventured into the part of providing services and it is also we believe that if we can elevate it to the level of providing services, it also become a lot more viable for people to take this as the way for the career. Right, because one of the common complaints that we get from most of the open-source contributors is like they struggle to meet the ends because there are great, great repositories, great code building blocks there, but not many are getting benefited for their creation or for the maintenance effort they put in there. Whereas the moment it becomes a service, then we can actually have economic models because there are people getting benefited directly and there are incentives for the creator to offer it as a service and as a service provider. What we're trying to do is not kind of bog down the creator with a lot of requirements in terms of what it needs to run a service. So everything getting linked, and it start becoming like an ecosystem of itself. It Is resilient because of everybody coming together and anybody who is consuming it is not only consuming, but also the contributing factor will come into the ecosystem. So it's an experiment, but we are seeing this up and running in various platforms like blockchain being or most of the distributed ledger project is being a prime example of how the communities can run a service, but how do we expand it to other components that actually powers the real-world use cases, right? So, so that's the outcome we are chasing.

RB: [00:07:43] Two thoughts there. One is I can totally relate to the question of can we move it from a resource to a service and viability? Because I've always asked that question saying, what is the incentive for a lot of people to contribute to the open-source community? Because the commercial transaction seems very clear. I give you money, you write code. Here, it seems like there is a greater motivation and I think community is a huge part of it, but unless it sort of pays the bills over a period of time, it becomes harder. Two is, I also feel maybe the timing is right, like we're doing a service like this. Maybe five years ago this sort of looked like a pipe dream. But given where we are going right now, I think it seems intuitive for people to say, listen, I trust the service that I can sort of call and use. And right now this entire orchestration of services becomes easier. For the benefit of everyone who is listening, can you give us examples of services? You know, what could a service be?

SM: [00:08:31] If you dissect an enterprise architecture today, there are multiple services running behind the scenes to provide a seamless experience to a customer, right? A customer might be only seeing a mobile app which is helping him to do certain transactions. But that experience is powered by a lot of different components. It starts with maybe the core components in terms of maybe operating systems or databases or searches or graph queries or various different other components that comes in or payment. If you start kind of looking at us like these are all different building blocks, I'm going to leverage, and as a creator of this mobile app, I'm not going to reinvent the wheel of creating everything by my own, but I will be more focused on leveraging services that has been done by the creators because it helps me in two things. One is the time to market is first, and second is I'm leveraging what has been created by someone. And it also gives me choices because most of these platforms that get created or get accepted within the builders' ecosystem are the ones that are based on certain standards because that gives people the choice, right? If I'm starting to build on something and it is not meeting my requirements, I should be able to move to something else without losing a lot of things that I created. So that gives an incentive for a creator to kind of say that I'm going to use the reusable components. Right? This brings the other side of the question about how do creators run the services? You hit the nail on that in terms like, I think the most significant part of having this network is trust, because when you talk about this kind of a community or a community-led service, discovery is definitely part of it.

RB: [00:09:58] You know, I want to come to credentialing because it's so related to trust. But before that I want to also share some reflections. This trust is also power, you know, saying the person who brokers trust automatically receives power. Today I buy from absolute strangers in Amazon. That is because I trust Amazon and say that, hey, listen, you know I trust you. And if he's on your platform, I assume he is a safe seller, you know. If the same person had a shop in a traffic signal, I'd never buy from them. But because they are on Amazon, I buy from them. And I know that because we offer Amazon that power, they wield that power in the ecosystem. But in a distributed model like this, where one organisation does not become the purveyor of that trust, how this will influence power being shared across diverse stakeholders I think is going to be a very interesting experiment. I don't know, and you can correct me, don't if anywhere else globally this has been tried before where commerce happens on a distributed model, where the central platform does not hold all the

power, you know, because every everything we know from Airbnb to eBay earlier to now, there is one platform that builds the trust and enables a transaction. Over time they monetize that trust in different ways. But with ONDC, what we're aiming to do is to create an ecosystem where the ecosystem will enable the trust to the norms and registries and standards that we do. But then how does that change power equations? Because I was talking to somebody recently who said that if at any point in time there is need for brokering, somebody will come and own that power, you know? So I don't know if you have any thoughts on that.

SM: [00:11:33] The way we should actually look at is there will be brokering of powers. But the new infrastructures like ONDC or decentralised infrastructures, what it aims to do is like break down those silos in a way that the brokering of power then becomes dependent on certain level of service. For example, like the search is a service that is being provided by someone within the ONDC ecosystem. Now search can be used by both seller application as well as the buyer application, because that pretty much drives the usability of especially the buyer application. Like people always search to find something. Right now in the traditional model, we cannot say that either I build everything by myself, or I have somebody who is providing me a service, but it's not followed by any particular standard or anything. So it is more like you use it, you pretty much get locked into that infrastructure. Whereas when we have standards defining how the search should be functioning, what are the attributes that should take in or what are that which you're showing, they can always be innovations in that. There's a Search A today which is powering the ecosystem. Some of the innovators can come in and say that I build something even better which can reduce the time to search, which can give much more personalised results. So the consumers, like a person who is creating the buyer app, has a choice now to say that I can move seamlessly from search A to search B. So the power centres are the power provided by different services in this model also need to make sure that they keep on innovating, they keep on innovating. They need to go to that additional mile of retaining the customers. And it is everything based on the value, right. If people are not seeing the value of what they are providing, they might even switch to a different infrastructure. So it helps us to avoid this kind of notions.

RB: [00:13:21] And you are absolutely right that I think removing lock ins actually then provides agency to the customer. We're saying, listen, I always have a choice. You know, I'm not stuck here. But I think it's an interesting experiment. I think we can all watch how it plays out as it goes.

RB: [00:13:48] But I want to stop to come back to credentialing, specifically, Satish, because I think all conversations on DESH Stack that we want to talk about, I think starts from the idea of understanding credentialing very well. And in my mind, I've always assumed that credentialing to be a certificate I get after I pass an exam, you know. But if you can broadly just define what credentialing is, how should we see it? I think that will be useful.

SM: [00:14:11] I think a very simplified one-liner could be like credentialing is the way to capture your journey. The journey then consists of various micro journeys because your education could be a micro journey within your larger journey. Your work is another micro journey that is happening, but all those journeys produce a lot of data with the proof of

achievements, be it the proof of education. There could be different things that get created, right? Even these data also go through the transactions. So when I look at these data points and if these data points really articulate the journey so far, and if we think of like each of those data elements are credentials, if it is a reusable component, it always proves something in say, that I have this achievement, I am the owner of something I have, I have worked at certain places and then think of what outcomes this can lead to. You combine certain things for a particular context, and you don't need it to share everything of your journey to everyone. If you are getting if you're applying for a new job, there could be a section of those credentials or a journey you share with that context. If you are a sports guy, sports, as a passion, you might be using a different set of credentials. Maybe there could be some common things, but there is a different image you create based on your achievements. Are there? And same with the things that you own, like the assets you own. Each of this becomes easier to kind of build on if you start thinking these as credentials because it's a common myth of like, okay, or people always get credentials attached to the formal certificates that we get. I think, yes, those are absolutely credentials, but those are not the only credentials if you really need to kind of document our journey.

RB: [00:15:56] Yeah, I think, I really like the idea of this whole life journey capturing piece that you're talking about, right? Because I might have gone somewhere and done a camp, but that camp is probably also a life experience that can be captured and might be relevant in certain places. You know? I mean, um, and what is the problem with credentialing today in India? Like, if you had to step back and say there is a credentialing ecosystem, right? What, is the problem we are trying to solve?

SM: [00:16:21] I'll not say that the problem is limited to India? It is global because the way we have been producing data or we have been sharing data all the time because yes, today also we have ways of sharing data. We always get data in digital or physical formats, but it lacks verifiability, right? You can present something when it has been presented to a verifier or relaying party. They need to figure out a way to get things verified. So they might need to get another third party to actually get this verification now. And those are like time-consuming process, and it costs money. So, it kind of limits the kind of services the enterprises can deliver, or the service providers can deliver because the cost of delivering those services could be very high. Right. I think those are those are some of the common challenges that comes in and then like we end up sharing more than what is required for a particular contract. We don't have a capability to share what we call as selected disclosure. For example, like in some contexts, like people only want to have an assertion to be verified saying that I worked at Red Hat. They really don't want to know that I can look what all different positions I worked on and what are things, what assignments I led.

SM: [00:17:33] That context might not need all those. They only need to assert that as I worked on Red Hat. So I have, say, the credentials that explain or credential that I received while working at Red Hat. But I can use that credential to create a, what we call as a sort of knowledge proof that can also be called as a selected disclosure, saying that I'm always giving them that much data that can assert that, yes, my claim is genuine, that I worked at Red Hat. So these kind of models are really, really powering the next level of interaction when you talk about autonomous control of data or how do we establish a relationship

between various data elements that actually come from different endpoints than that articulate something, and then the choice of interaction in a way that whether I want to participate in an interaction, even if I want to participate in an interaction, what am I willing to share? And if I don't want to participate, I should have the choice to kind of say no to it and maybe try for some other opportunities. Right? So some of these things that what we're trying to do with verifiable credentials as a format, as a data model, a format so that yeah, things can be much more frictionless.

RB: [00:18:39] I just want to add one more point here is when I went on the ground, one of the other challenges that I saw was that you're named differently in your Aadhaar card, and you're named differently in your birth certificate. And because of that change, they will not accept your document. So the point about automation for me is also that if I, if I have a foundation ID, every subsequent credentialing I have has consistent details about me, you know, saying that this is my name, this is my father's name, it doesn't change. And honestly, the amount of friction that this causes on the ground, especially in rural India, is significant because sometimes it takes up to three months for you to change the spelling. And till you change the spelling, you cannot go ahead and get your benefits and so on. Right? So just automating this removes the human error saying, so I'm a Rathish with a 'H' without a double 'E,' because when I go to Kerala, I'm "Rathish" (pronounced differently) or you know, somewhere else in North India, they leave out my 'H'. So all of that goes away because there is some of that benefit as well.

SM: [00:19:35] That is where I think the focus on relationship and our goal, I think it's basically focused on this particular area. For example, there are elements in our data that will not change and then there are pieces of data that can go through a change. For example, the name or the parents' name, the birth details. I mean, those things won't change, whereas things like an address change, like one of the good examples of like that, I think pretty much impacts everyone who is moving from one house to another especially, or if somebody is moving from one state to another. Right. One of the biggest challenges today is about making sure that the addresses are updated with all the bodies that I'm interacting with. And it's a serious process today, right? It takes months to kind of complete those things. But whereas if you start establishing relationships or links between credentials, we say that my credentials are linked to, say, a foundation ID or something, some base identities. And if I make a change there, for example, like I updated my Aadhaar address, everybody else should be leveraging that same that because every other certificate has been linked to this and say that go there is an address operation.

SM: [00:20:41] So automatically all the services should be able to leverage it rather than the citizen going to different windows to change the data. So those kinds of transitions can happen. And that's an area that we are also focused on in terms of how we build these kinds of relationships. And building these relationships also means that if we need to do it in a privacy-friendly way. We don't really need to expose, say, my Aadhaar data into every interaction point I'm doing. But there are certain elements of that, that data that can be shared for a particular context. For example, like Service A saying that 'name as in Aadhaar' and 'address as in Aadhaar' right? Yes. I share these two pieces and whenever there is any change, any updates to either of these elements at the Aadhaar level, I think every service

that is consuming it should also get notified about the change and they should be able to use that change.

RB: [00:21:43] Satish, we spoke about credentialing, and you explained how it's the life journey. Tell us a little bit about DESH Stack. Where does DESH Stack come into this entire conversation of credentialing? What is it trying to solve?

SM: [00:21:53] DESH Stack is an attempt to transform. One is to transform the credentialing of certain things, in a way, how the data is being created, shared or exchanged. But more than the credential, because credentialing is one piece of this, but the larger part is about how do we make things discoverable between the provider and the seeker? How can they discover each other, how can they transact, how can they access different conditions of services part of it. So it talks about an infrastructure or an ecosystem where the credential is the word that is moving to establish certain facts. When we talk about a service discovery or service provider, kind of putting out the details of service, credentialing can deal with how someone can come and make some claims, like, 'I am eligible for the service. These are the claims that I make.' And how do we make sure that, again, that can be processed quickly to say that, again, these claims are legitimate. Now, there is also another part to this because the first two things to think of as like, I'm a provider and I'm a seeker and somebody is a seeker who is availing a particular service. The credentialing, one, it checks the eligibility for you to consume that service. And once eligibility is being asserted, it also creates a data point saying that it is another credential that gets created from the interaction which says the seeker has been given a service. Now that also becomes a credential which can be used in some other context. Now in that role we start to build on things. So DESH is really focused on education, skills and workplace.

And these are the places where it generates a lot of data. And this data can be used in different contexts in terms of getting a new job or getting some financial products, maybe getting a passport, different things that can happen there. Right. So DESH Stack elements also help us in that how do we build relationships. If I combined that an example of, say, a gig worker - if they want to start capturing their data as various credentials that originate from various engagements they've had, how do we help them do that? Because the issue is, or the people who are providing the services, they are only providing a particular piece of data in a traditional format to the gig worker. Now, the gig worker should have an ability to collect those in one place, and then they should have the ability to say how do we exchange it to another opportunity or another provider who is giving an opportunity in a way that is easy for them to check the claims. So DESH is about one, having this vision of like, how do we transform the documentation or the documents of our education and skills in the workplace? And then it also builds a seamless interaction model in the way that how does the issuer, holder, verifier, all those people come together in a way that we don't expect everybody to be a deep tech expert to kind of drive this kind of interaction.

RB: [00:25:11] So I want to take three use cases to sort of humanise this entire effort. And all three are based on the work Sattva is doing right now. And I'm actually sort of thinking whether some of this will play out. Right. So and you can tell me where DESH does play and where DESH does not play. The first use case is actually of a migrant worker. Imagine

somebody who is a migrant worker, about 19, started working in a brick kiln in Jharkhand, got a skill training programme in Jharkhand - there is a residential programme that one very good skilling organisation runs. Let's say, moves to Bombay and works in some of the large-scale builder projects today. So they worked in a Shapoorji, then something else. And so there are these big builder models that they worked in. And now when they go to the next particular site, ideally the fact that they've actually gone through a skilling programme in Jharkhand, which is a residential programme, the fact that they worked in a Hiranandani project or let's say a Brigade project or any of that, I think is something they should be able to carry there. And potentially also the fact that they might have worked on some of the new plumbing technologies that have come up in these projects because there's a there's this whole green plumbing type of work that is happening where only very few people have had a chance to work. Perhaps this person has worked on that. But when they, as of today, when they go and say this, they only make an assertion. They're saying, I worked in Hiranandani. No way to try, no way to test. I've worked in some of these Brigade projects extra or I worked in green plumbing. Will DESH help solve this problem for this migrant worker, and how would it be helpful?

SM: [00:26:53] The problem solving is all about the adoption to different levels. There could be certain kinds of credentials that are mandated by the law. You create an employment letter, or you create an identity card, or you have the proof of salary. Those are some of the things that has been mandated by the system. Any employer will provide certain things that can be used to assert the higher level of agency that, yes, this person worked at this place or a skilling agency giving a skill certificate services that accept that, yes, he got trained on this particular skill. But the detail that you spoke about in terms of how we actually expand the usage of DESH to capture the journey. Say that he has is an expert on this new plumbing technology. He has worked on the new thing. There are different models that you can think in a way. It could be, one, driven by the employer, say the employer is giving him badges or certificates or something of a reward based on his performance. And that can be used as a proof. It can also be thought of as a way to say that it can be a request-based thing as well, where the request to get a certificate can originate from the holder as well as kind of saying that he completed something at the request and the request can go to the employer or the request can go to his supervisor.

You cannot give an assertion saying that, yes, he has completed this. So the different ways we can construct those credentials and different engagement models, I think more and more models that come in, or the more detail we are able to capture, that adds value to the entire ecosystem in a way. How much of the interactions can be modelled around the more detail? I think this is something that we even talked to, say many of the educationists providing credentials to students. I think the same model is applied there in terms of capturing the student journey. Most of the credentialing even there, is really, really focused on the year-end marksheet or certificates like that really don't help an industry to differentiate between Student A and Student B, and they really want to know what's the journey of the student on campus? You participate in various things, be it hackathons or speakathons, that the various things you participate in, you get rewarded for these things.

And if you capture those kinds of elements, it kind of help the provider to get a better view of the employee I'm looking for or somebody else.

Because if it is only marksheets then that becomes a very, very difficult decision-making process where you say that somebody's got X and somebody's got Y, but you really don't know what they did. So this detail will really help. And this is something that we kind of feel that this is not a top-down implementation. The initiative is something that's been put together by DESH. And now when it comes to the implementation, I think the implementation should be driven by, say, ecosystem governance in a way that, for example, like a construction industry dealing with migrant laborers, I think they can have their own governance in a way that what are the different kind of data proofs, the data that will make sense for their ecosystem so that they should be able to capture these kind of details, like who trained and who was skilled on the new plumbing system, who knows about the new concrete mechanisms that all will be defined by the governance within that ecosystem. So that's the way it should be, because that gives them the flexibility, rather than saying that everybody should be creating these ten documents. It might not be the right way to implement such changes.

RB: [00:30:13] And I'm building on what you're saying. And as you're talking, I'm thinking there are four things that we have to solve for, right? One is who's issuing the credential. The second is, what is their incentive to ensure the credential? Because it cannot be coercion, because then they will always fudge it. The third is, what is the action that they will use to create the credential? Like you said, is it paying the salary? Is it worker entering a site, so that you know, the friction is as limited as possible. And the four is the level of detail in that credential, like what are you filling in? And ideally this will work if the credential provides an incentive for the construction builder to say, I have to offer a credential because it is in my interest to do it, because it cannot be, as you said, maybe there is a government coercion saying, you have to do it, but that will be difficult. And also the transaction friction has to be as low as possible. So literally it means like in the site, if I put a QR code or something and you scan it as a construction worker and so this builder can say, listen, this person came to work for 21 days and that's part of my credentialing. Like whether he worked well, whether he didn't work well, I don't know. But I can safely say that for 21 days this person came to work because it's very low transaction friction for them. But I guess the solution also is to find such examples of where credentialing can be low-friction and has an incentive for people to work. Does it make sense?

SM: [00:31:40] That makes sense because it has to give benefits to both sides because both provider and seeker are both getting benefited, I think that's the only way we can drive this system forward. And when we really deal with some of the ecosystems, the interaction barriers need to be lower because we need to make sure that people can participate in this kind of stuff. Like what you said is a good example, right? Rather than we explaining, say, a migrant worker scanning for attendance is also having these other attributes to assert, and it's creating data and it's going to give you more opportunities that I think there could be to explain it. But the more technical details do not matter there, because for them, is like, yes, I'm entering a site, I'm leaving a site. Right. And these two data points have been captured and then and that data is also being shared to the migrant worker, which then he can share

with somebody else of his choice. Right. So that is true for every industry or ecosystem, right? Because you get experience letters. And those experiences letters are valued and they're going to say what you're doing, where you work and those kinds of things. But yes, this new ecosystems, introduction of this kind of credentials into the ecosystem, it benefits the provider as well.

But then there need to be a level of evangelism or education. And second is helping this ecosystem to create the governance. Because you touched upon an important topic in terms of how do you assert issuer? It could be how do we actually verify the issuer is a genuine entity? Because I think those are the areas where it needs a larger discussion. Because it was one of the challenges that we see in kind of identifying or verifying the identities of institutions or companies, it's still a bigger challenge in a way that how do we automate that process in a way that I guess somebody is coming to a service that I'm offering for credentialing and they can put in the data saying that they claim to be, say, X Organisation. Now how can we actually quickly verify that this is X organisation is as they claim to be. There are different solutions I can recommend, like I mentioned that you can verify by email, but the challenge with the email is like the moment you get to the unorganised sectors. I think almost every email ends up with this particular service or they don't have the domain names and other things to do those kinds of things. But there are ways we can think of in a pure credentialing format in a way that can we actually turn the company databases that is, that has been maintained by the registrar of companies in the verifiable format so that that becomes a registry of verifiable information so that every other service can actually leverage that information to make sure that I'm dealing with a genuine entity.

And that creates some kind of an identity, a verifiable identity for the issuer which can be used to verify. Yes, the certificates are really, really issued by this entity. So they need to be some of the structures that need to come in. And until maybe the sectors like the sort of companies database that comes, that becomes real, it is more to the ecosystem. Governments kind of figured out how do they trust; how do they actually implement that trust. And so that they maintain a registry as part of their ecosystems in that all approved issuers as a registry within this network, and they talk about this network, these registries, what I'm talking about is these registries in a codified format so that it does not end up in the paper format, so that this can be leveraged by the applications that the ecosystem is going to use it. So that way, yes, we can begin can address each of these elements.

RB: [00:35:22] And I mean, I think the question also is, you know, to your point around the whole new technology for plumbing, whose interest is it to certify this person? I'm thinking the construction builder clearly does not have the incentive, but perhaps a technology OEM that actually builds this plumbing thing will say that, listen, I have so many people who already know how to use my stuff. So, for example, like Cisco did with their Cisco network engineers, etc., just to create a pool of enough people who know how to work on Cisco technologies really made a difference. You know, the CCNA programme, I remember, and the CCMP. Similarly GE did that in healthcare because they just wanted to train enough people to use their complex medical equipment. So similarly here they can say that, listen, I have introduced a new plumbing technology, but I have hundreds and thousands of workers

who have already been trained in this plumbing technology. So you can always hire them, so they know how to set it up. They know how to run it. So maybe it is in their interest to actually set this up. That's number one.

But I think the second point you're making, which is I think important, Satish, is that there is a ton of social, sort of structural issues that are underlying this technology platform, right? One is, who do I trust is an important question. So if some random realty guy in some town I've never heard of provides this guy a certificate, will I trust him or not? That's number one. But second is also the agency of the worker to demand the certificate saying I deserve a certificate because I've worked here. But today they are not able to. You know, the most construction workers don't have experience certificates. Most micro contractors actually just get a *parchi*. They don't even get a formal work order. They're not listed in the ERP systems for them to know. I don't know if when we design DESH, will we be able to shift some of those social structural challenges that exist as well, like saying, do I have the agency to demand something? Which is where I think of designing systems of low transaction friction, because getting an experience certificate for an informal worker is always going to be hard.

SM: [00:37:18] Not every case will end up with having formal credentials for a particular interaction. It might happen later. But if you look at how this ecosystem behaves today, it might be very difficult for even the employers to issue experience certificates because, one, they deal with a large workforce. And second, this workforce keeps changing, maybe on a weekly basis or monthly basis. It can be quite challenging for them to get to that process. I think this is where the technology side of the stack or the innovators around this, this ecosystem can bring in solutions which can say that again, the customer will continue to do the things that will provide some benefit to them. For example, that doesn't have to track attendance like with or without DESH, attendance will be tracked but like they need to make sure that the salary has been paid. And now with the digitisation of payment that are also digital records that been created now. I think part of it is like, how do we bootstrap this ecosystem by leveraging what exists today and converting that into a verifiable format and then start deriving things out of it. For example, like you have like the payment information itself, like if can be captured to kind of say that it can, you can lead to creation of an automated credential which says this person worked in this organisation for so-and-so time from this period to this period because you have the back-end things.

So within the ecosystem, we say we are not adding additional layers of complexity for the employer. You just continue doing what you want, but you're just transforming those data into verifiable data sets. And that transformation is also not something they have to manage with them. So that is an enablement that happens, but they continue to do the same thing they were doing as yesterday. And then once we bootstrap with these kind of things, I think when the industries start seeing the benefit, they might say that there can be more things that we can do, as I said, in terms of how do we capture the trainings that's been done to my employees because one, it is providing credential to the worker and it also might be important for the employer to get to say that, look, X percentage of my workforce is trained on certain things. So, they also need that information to showcase something, which says

that this is what the talent force looks like. So I think mapping those benefits and bootstrapping with what exist today.

RB: [00:39:37] Now I completely see what you mean. And you know, I think it's also about bringing in some level of digital observability to what we are doing today. Anything that can be captured like payment - and I can give you the second example I had in mind. Today in the construction industry, a lot of the pension funds fund the infrastructure projects and realty projects, and they want to make sure ethical treatment of workers happen. And one part of the ethical treatment is workers getting paid on time, you know. So potentially we can create a whitelisted set of contractors who pay workers on time, and payment is a digital transaction. So even if you enable a way to capture the fact that payments were done digitally to the workers on time every month, etc., and the contracts will consistently maintain that, for example, can be shortlisted as whitelisted contractors. I have spoken to banks and lenders and construction companies. Their question has always been how can you create those whitelisted contractors? Because if you do this and if you establish this as a standard, I can use it to show my lenders and my investors that I'm actually following ethical practices. You know, and that's an example of A) a credential being an activity that is not a certificate, which is that I pay workers on time. B, it is digitally observable. Three, there is incentive for the contractor to record a transaction because he gets more deals and there is an interest in the company to see it because they will be ethically responsible, higher ESG controls. And today, because there is a lack of a system, none of this is possible. It's all storytelling, you know, and I don't know if that's a good example to highlight this entire piece.

SM: [00:41:10] So there's two things. One is the data or the movement of data that allows people to interact with it through missions or services or different things. The second is how do we actually leverage this data to do different things? For example, like how can I create the right set of figures out of it or derive an assertion out of it which says this contractor could be placed in a whitelist or a blacklist because that data is giving me the ability to say that he pays on time or there's a delay in payment or similar things that can be leveraged to create different kind of registries or experiences and these could be different kind of services somebody can offer, which say, 'I will interact with the data and I can create these outcomes based on those abilities'. And those services are available to the ecosystem for different people to consume. So say somebody is offering that service within the ecosystem and that service is not accumulating data as services do today. It is more like, yes, that service might be registering, say the labourers or the workers to their site and having the ability to kind of read their data based on their permissions. Either it could be that way, or it could be doing the same thing with the employer data to say that you can do this thing. So, these different services can actually produce different systems and they can all start interacting with the same set of data. So it is not a single monolithic service that needs to be built from issuance of service to verification or to managing data. That can obviously be done but a much more sensible architecture nowadays could be like kind of compartmentalise whatever you can into, into microservice. And so that it gives the ability for us to quickly innovate on certain things. So that if the financial guys say that is there a way to automate this blacklist, right, this process, yes, we can do that.

RB: [00:43:20] I think it goes back to something you said, which is the fact that the credentialing is almost always composite. Now, you know, it is financial information plus some worker feedback plus this. So it is not a linear sort of an activity. And hence and that's something that digital can allow you to do, unlike, let's say, a paper-based process. So we are not just taking a paper-based process and moving it digitally, we are actually making it infinitely more effective. You know, which I think is interesting. And the last case I want to give before I come to our next question. In a bunch of models, Satish, that we are doing in education right now, we are trying this model of getting somebody who's a compassionate adult to help young people pass an exam, do well in their test preparations, etc. And these people are not the best teachers, but they just care about the children a lot. And one of the questions we always ask ourselves is how do we incentivise them to do this more? Because, you know, you can be an extremely compassionate person. You got like 100 girls to pass tenth grade, but there is no verifiability of that information because it's not like the community will attest for you and give you a certificate or anything like that. If we can create a credentialing approach where let's say they run a camp or they provide some support and every girl who passes becomes recorded under them and over a period of time they can go for teaching positions in multiple places to say, 'Hey, listen, I have actually worked on this. I have enabled these career opportunities for these girls,' etc. And again, digital observability of information, which is verifiable, that the fact that this girl passed tenth standard is verifiable, gives them an opportunity to record these life events, to actually unlock career opportunities, which means that more people have incentives to be more compassionate, caring to the girls in their community and actually get better jobs and so on.

SM: [00:44:57] We have the big picture in mind, which is about credentialing, or the credentialing data flows. But a lot of the things in reality we can call it as micro-credentials, because every credential activity, it deals with an issuer and a holder. And when you issue something, really there's two bodies coming into the picture. Now, when microcredentialing happens or credentialing happens, how do we establish links to various different things rather than making the credential being a large set of data. It carries the data that is relevant for that particular interaction, which says somebody attended a class or somebody scores so much in a particular test. It is that, but that credential has enough links to say that this person, there's an identity maybe attached and then it can be linked, to say that this person is attached to this batch, or this batch is now being run by this teacher. So there is always this link that is getting created. Now, at a credentialing level, we only make sure that I get the data models are stitched together in a way that these kinds of links can be established. And these links become really important when we go through verifications or when we create the credentials out of it for different actors and verticals to say that, as you said, in terms of how do we actually create a credential for the teacher showcasing his achievement so that these achievements could be different things, like, for example, like 100% pass rate, an achievement credential for the teacher, and that is going to derive from the (...) where you issued some credentials. Based on that, there is a rule which says that the teacher can be given recognition. And second is those kinds of data, those kinds of artefacts you cannot link, and you cannot make this composable or derived credential sort of. And the third is I

think we should not discount the capability in a way that this infra(structure) needs to work in both digital and physical parts. Because it is not like every ecosystem is 100% digital ecosystem. So and it can come in at different places in terms of how we are actually defining that experience with something like even the example that we talked about in terms of a migrant worker. One, we can start off with the points that every migrant worker has a smartphone, which they can actually use to do this interaction, but in some cases the workers might be given a plastic I.D. card. And that's the interaction point. So how do you actually make sure that I get this both, actually can be an enabler. For example, in some cases, the interaction might start with a smartphone where the people collect it, they share it and other places they actually provide the proof as the ID card and then the interaction can start from there and that new things can actually build from that point onwards, there are more contributions going.

RB: [00:47:57] So, Satish, at this point, a lot of people who are listening to this, will feel like we are talking of science fiction, right. Like all of this seems up in the air. Seems like at some point in the distant future, all of this will happen. I just wanted to check with you. How far are we from seeing some of this happen? Where is DESH today? When do you see some of these things actually happening in real life?

SM: [00:48:19] Since it's already happening, I think I can talk about Dhiway, what we do. So we launched this stack last year not just in theory, in terms like people can use to create credentials of different kinds. There is a launch in April of last year. And by now we have roughly 1500 organisations using it. And the majority there is our educational institutions. But other sectors are also coming in. And there are some use cases that is coming to that product. It's a SaaS application so people can sign up and they can start creating various kind of documents, like the documents could be say, a recommendation letter, or it could be a certificate, or it could be a marksheet. It could be an I.D. card. So those are the kind of use cases we had in mind when we actually built the application with all the standards and technologies. But we suddenly started seeing that people are using that to assert ownership of certain things like art or music or some of the assets they own. They are kind of innovating with it in terms of the usage, in terms of what more I can create, I think. So in that way we started seeing some action that is through the application point of view. The ecosystems that we collaborate a lot with in terms of the DESH Stack, our collaborator on the Beckn protocol, we work a lot with the EkStep foundation. So many of the interactions happening around there is also leading towards more adoption of the standards. When I say adoption, it is like these are the builders coming forward to kind of start building things because it took some time for the larger ecosystem, to realize what is the benefit of adopting such a data standard and how does it benefit and how does it create new models. Because it's also going to link to the web transformation that we're talking about. I want to give a numeral thrust to the Web in the way that people talk about one, two and three. And now there is Web5 as well. So the basic construct in terms of Web1 really focused on reads. It's all about static information. The (Web2) that we kind of use now, the info is more of a read-write because that's where all these applications are. You can engage with the applications, you can create information, you can consume information. And the next transformation is more about like how do we also implement ownership or control? How do

we actually own things? Because it is our interaction that is creating those data. And we don't mind the service providers having a copy of the data, but as a creator, as somebody who is engaged to create the data, the creator should also have the ability to keep a copy of the data.

So that's the ownership that is coming. The initial friction then got into can we actually create a standard like an envelope which is regular? The cryptographic part or the standard is more focused on creation of an envelope that allows anybody to put whatever data they want to put. And so because of that architecture, you can get it customized for each use case. So you that freedom to the users that then it's an open standard so that if the data moves in that direction, using that format everybody can parse the data or understand the data and then start creating more and more data. So it is not a friction anymore. So there are working systems, there is usage, but I'll say that there is a lot more that we can do because it's the starting phase where a lot of focus is on issuance. Right now the issue and the focus need to move to how we help people to collect things. Right? So that brings the story of wallet adding. Linux Foundation recently announced the intent to set up an Open Wallet Foundation as well. So because the wallet is also going to be a critical piece in this puzzle in a way, because that's going to store the data and people need to have a choice there because I might start with one wallet, I might like it, I'll store it. Maybe tomorrow I see a different option. So you can actually work with that. Or there could be wallets that come with different functionalities. For example, like the things that we are not talking now are guardianship, right? Because when you talk about capturing the journey, it starts from birth. For a long time the kids are not able to operate. They don't have access to phones, or they don't know how to operate it. So guardianship needs to be done. So how do we implement guardianship in this distributed way. Maybe some wallet might focus on guardianship being a differentiator in a way that how it can do. And it also needs to deal with things like delegation, for example. And this is more in terms of, I can talk more from an employer standpoint. If you say that, how do we assert that the person who is signing something is authorized to sign something? So there's a company that has delegated some responsibility and that is a verifiable credential that can get attached to something he's signed. So that is a complete verifiability of the transaction that happens. So there's a lot more places (where) new innovation can come in. And I think in the larger community, we start seeing that people are picking up our various attributes to kind of extend the capabilities of more and more organisations joining. I think there's a lot to do. I think we expect to see a lot more contributions going in.

RB: [00:54:03] And building on what you said, you know, it also shows how it's sort of built brick by brick, you know, so one is the issuance part that you talked about. The second is the wallet piece, but it's also about the person who's consuming and using this credentialing to validate and verify. Because I always say that every change in skilling will only happen if the recruitment process shifts. Because you can keep skilling and increasing supply. But if the demand doesn't shift behaviour, right? So there should be somebody on the other side who is actually validating credentials so that the issuance has merit because then there is an automatic incentive to sort of do this. And I know that's probably a little while away as well. And I always think that some of these infrastructures also create opportunities for

entrepreneurship. You know, like what you've done with marksheets is one new context of academic institutions. There should be an entrepreneur who is excited about doing this in construction industry to plumbing to all of that, which is then using this public good to be able to do it. Because unless somebody understands construction and you know, DESH Stack and credentialing, then it is very hard to solve this problem top down, you know, and that's for me the opportunity for entrepreneurship.

RB: [00:55:16] And one last question I want to close with, because I have so much to discuss with you, but I think we are out of time is also this question around philanthropy. Where can philanthropy or social organisations in general add value? Because there are so many social problems where some of this can be extremely valuable, like we even discussed in this podcast. But I'd love to hear your thoughts there. What is it that we can do?

SM: [00:55:37] We don't really capture the outcome in a way that can be reused. Most of the projects are done really well. But the beneficiaries, if we kind of start thinking about, like the beneficiaries have the ability to capture what they actually went through, or there is a proof that has been created saying that. And it could be any site, may not be linked to, say, a job or a skill or even if somebody has been supported for some time, there is reusable proof that is attached to it and that might be useful for that person to get some of the benefit or be part of some of the programmes, because these can work in different contexts. There are many areas that this organisation can contribute to what is different, but from a usability point of view, from adoption point of view, if we have this organisation adopting these standards in that again, I will start documenting these engagements or interactions using this format, and that helps other innovators to build new services. A better way to kind of discover people who are in need, of people who are being moved from one point to another point. So now they can actually look for better opportunities or different opportunities, right? A lot of things that come into mind like upskilling or financial inclusion or different things that are coming in. And the more data that we create in this format also de-risk the providers and will be more confident to provide services to those participants. And because it also lowers the cost of providing the services, because a lot of time the cost is around figuring out or asserting the risk, right to say that and that people spend a lot of money.

And the other part is all about helping the community in a way that encouraging the builders and supporting the builders to come up with new solutions. And the best way is like it is not just about 'funding' funding, but it's also like throwing up the real challenges that I guess you said previously that a challenge like, yes, how can we actually get to a place where an automated blacklist, whitelist or an automated registry process can be in place for a particular request? And this automation actually deals with inclusion or exclusion based on certain criteria. I think these are the kind of challenges that can come up based on various interactions these organisations try. So their participation is key because at the technology, when we build certain things, it is at the very abstract level when you deal with standards or specs or the initial implementations. But the extension always happens when we have the participation of organisations that work at the ground level, organisations who are very close to the use cases or the ecosystem or the regulators who are kind of driving a consortium or ecosystem. I think when this participation from all these institutions comes in, I think that's where we really see the adoption curve going up. And then we see others

also seeing an interest in being part of it or starting to leverage these things. And that's how it can grow.

RB: [00:58:21] Philanthropy's core purpose is building people's potential. We probably have the largest training infrastructure in this country today in terms of the number of trainings that non-profits do, and every training can have a credential that they offer to the people, which they can then use. So then NGOs move away from enabling the opportunity to just providing the credential, which then helps them to actually use it. And I think that's a starting point. And as you said, even just providing context, saying, hey, here is a real problem and I'll be working with an organisation that's working on creating water experts in local communities who can solve for some water issues. Now, that's a context that you can actually provide to a builder, and the builder can actually build solutions for that, and I think that's already useful as well.

SM: [00:59:04] So one of the discussions we had early this year with philanthropic organisations about is to deal with the refugee situation, the people who do not have a foundational ID. So there is a section that still does not have any kind of formal foundational IDs. Part of the discussion is more of an ideation-discussion kind of stuff. One of the things that we proposed is if we start capturing the delivery of aids, right, there various organisations providing different kinds of support to these communities. And if that has been captured in this format, I think even that becomes a base identity for them to start engaging with some of the transactions. Like you don't need to really, really wait for a foundational ID to come in. Because if I am an organisation, I am supporting a hundred people and that record could be good enough for another organisation to say that I can, I can definitely deliver some more services to these people. So you can start building what exists. Than waiting for, we will build the perfect foundation to get everything centred. So it also allows inclusion at a faster pace than waiting for the perfect system.

RB: [01:00:01] I go out of this conversation with a much more broader understanding of what credentialing is, super excited about what DESH can actually do. And like you said, it's great to know that it's already starting. So it doesn't it's not like science fiction. And some of these have a hockey stick growth stage. Once it kicks off, it kicks off really, really fast. So I'm actually looking forward to a future where some of what we discuss today becomes real very, very soon. Thank you so much for your time.

SM: [01:00:26] Thank you, Rathish. I think I really enjoyed the conversation because we never had such a discussion where we actually went through technology to implementation to adoption to the future. I think in most of my discussions, we'll get really, really focused on the tech elements of it in terms of how we do handshaking and other things. But I really enjoyed this conversation. I think it also got me also thinking in different directions and that I can look what are the possible extensions of possible outcomes that we can try collaboratively. So I definitely hope to come back and maybe discuss, very much focused on a particular use case or something that could hold out. Or we come and talk about some of the things that we are doing for a particular use case. Thank you very much for having me.

RB: [01:01:08] Thank you. Pleasure's entirely mine.

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