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Research Article

An IVRS System in health care for Elderly in Rural India *A study on CSR Initiative by TCS*

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ABSTRACT

An Indian traditional family system had been designed to provide socio-economic security to the elderly family members. In today's scenario where we see a drastic shift in the family structure due to education, occupation or otherwise witnesses a sharp rise in the difficulties faced by old age people. The elderly is now more prone to social insecurities be it psychological, physical, or financial. Moving from a joint setup to nuclear families in recent years have further fueled the problem. Through my paper we suggest a viable solution to an extent for reducing the hardships faced by elderly, especially in far flung remote areas. The focus is on such people who are not very well-versed with the technology, so are non-digital in the digital India. We propose a IVRS (interactive voice response system) based model which can be very easily implemented, with the existing infra-structure, by the collaboration of local NGOs, telecom service providers with our team of highly dedicated professionals.

Keywords Interactive voice response system in health care, rural elderly India, digital India, Information technology

1. Introduction

As the Head of CSR unit of TCS India, taking our motto of philanthropy to a step higher, we intend to serve the elderly community of rural India through a unique proposal, details of which are as under:

a. We (CSR division, TCS) shall provide financial and technical support (actual device, operating system, networking APIs, hardware, and software components etc.) for the free, basic handsets for the rural elderly in the selected villages of the country, which would have an inbuilt IVRS facility. There would be an easy-to-use mechanism, like a big red button on the phone which the users would press to access an IVRS system with voice-based menu options.

b. The IVRS system would be operated by an NGO working for supporting the elderly in rural areas, in the local dialect. Some of the services planned include:
•Counseling for loneliness, depression, and mental health issues
•Arranging helpers for different purposes like accompanying the old to hospitals, help in buying necessities, medical care at home etc.
•Technical support in operating phones, making digital payments, using the internet, doing online business, online shopping etc.
•Providing guidance related to insurance/health/ pension policies etc.
• SOS alert feature
c. The networking capabilities shall be offered with the help of our partnership with Telecom provider
In this paper we present the Implementation strategy, Benefits to users and Benefits to TCS.

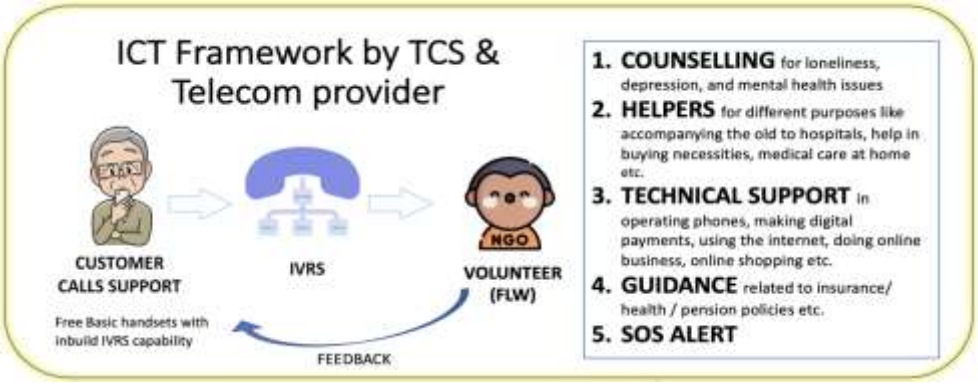

Figure 1 TCS ICT framework and telecom provider

2. ICT Framework by TCS & Telecom provider

Elderly people when contacts support via Free Basic handsets, with inbuilt IVRS capability, by pressing the red alert button, it contacts the IVR system connecting to a volunteer Front line worker with whom they can interact and talk for their issues which can be as described below

1. **COUNSELING** for loneliness, depression, and mental health issues
2. **HELPERS** for different purposes like accompanying the old to hospitals, help in buying necessities, medical care at home etc.
3. **TECHNICAL SUPPORT** in operating phones, making digital payments, using the internet, doing online business, online shopping etc.
4. **GUIDANCE** related to insurance/ health / pension policies etc.
5. **SOS ALERT-** When they have dire need help

3. Basic architecture of the concept proposed

The building blocks of the theme will be (figure 2)

- An elderly equipped with a cellular unit with a specialized/preferable 'red' colored button, which an elderly press whenever he needs some type of assistance.
- A very alert dedicated and responsive NGO Unit, which can respond to calls from needy people.
- A tie up with the units from
  - ❖ socio-economic sectors like for entertainment, festivities, banks etc
  - ❖ Volunteers for a SOS call for ultra prompt response at the site
  - ❖ Health sector for health-related issues and
  - ❖ Police /civil protection units for the safety concerns

The proposed process which is fully based on cloud will be highly efficient and effective looking at the present scenario in this sector. Moment an elder person presses a distress button, his/her call is connected to the NGO, which after authentication and locating the person will route the request to the four units mentioned. This will ensure the safety and need of the person, as a dedicated team with the assistance of a very efficient local NGO and other partners. This will bring down the mis happenings and inculcate more trust amongst the people by sensitizing the society for the cause. Local NGO is stressed for the basic reason of local dialect which can be an amazingly fast method of communication between the needy and assistance provider.

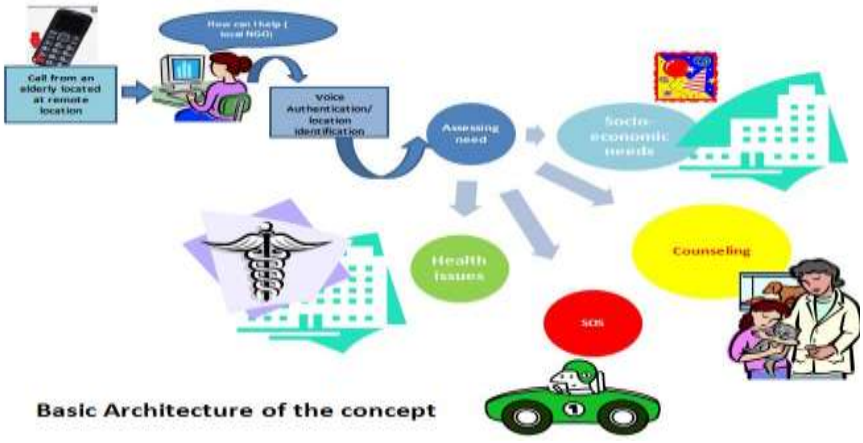

Figure 2 Basic Architecture required for the execution of the proposal

4. Cloud Architecture for IVR

An IVR has made of the following elements:
1. A TCP/IP network to connect the internet with intranets.
2. Databases that provide pertinent data to IVR apps
3. The IVR software apps will reside on a web/application server. This server can run numerous Voice-XML-based apps at the same time. Contact centers, outgoing sales calls, and speech-to-text transcription are just a few examples of uses.

Three IVR systems that often we heard off:
Touch based: This system is via touching a selection in keypad as per the IVR responses where it will ask press 1 for option, press 2 for option 2
Dialogue based: Callers are given customized verbal prompts based on the nature of their questions in this sort of IVR, where IVR will ask for response, and you verbally say the response.
Language based: The language of nature: Sophisticated speech recognition technology aids in the comprehension of user requests in this IVR system. Callers may respond with "I'm looking for store hour's information" or other similar phrases when the system prompts them: "what are you looking for today?"
Amazon Connect will be at the heart of our IVR solution for the elderly, allowing customers to instantly connect with customer service representatives. The design supports voice authentication utilizing Amazon Connect Voice ID, which allows users to easily enter the relevant information online while the IVR is on standby. As a result of the solution, customer support employees now have the tools they need to better comprehend and respond to their customers'.
We built our IVR utilizing Amazon Connects Contact Flows and the following services:
1.The voice-based intent analysis is provided by Amazon Lex. The practice of determining the purpose of customer interactions is known as intent analysis.
2.AWS Lambda is used to combine Amazon Connect with other AWS services.
3.Amazon DynamoDB holds customer information.
4.Customers are notified by Amazon Pinpoint by SMS and email.
5.AWS Amplify creates the interactive voice response (IVR) gateway and the customized agent dashboard.
Figure 3 depicts the architecture's call routing:
1. To use Amazon Connects interactive voice response system, users must first call the main number.
2. New callers can use Amazon Connect Voice ID to create a voiceprint, while returning users can use it to authenticate their voice.
3. Upon successful voice identification, callers can proceed to IVR self-service functions like checking their details, Amazon Lex performs the voice intent analysis.
4. As an option, callers can be transferred securely to a visual IVR gateway to process their personal information.
5. An agent's dashboard will display the customer's information and IVR interaction details if a caller wishes to be connected to an agent.

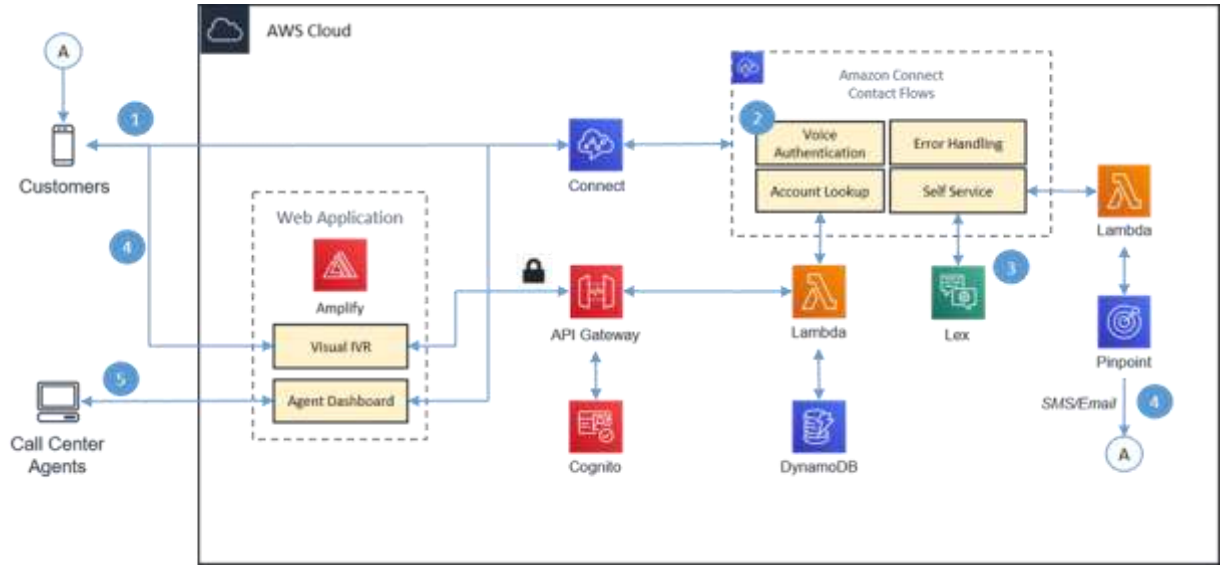

Figure 3 IVR Cloud Based Technical Architecture using the AWS Cloud (Source # Amazon https://aws.amazon.com/blogs/architecture/enhance-your-contact-center-solution-with-automated-voice-authentication-and-visual-ivr/)

5. Implementation Strategy

a. The NGO supported by TCS would have dedicated volunteers who would respond to diverse options selected by the users through IVRS. While counseling or technical support shall be provided online or through a pre-recorded information bank, the
helpers will be arranged from the areas near the location of the elderly user, preferably fluent in local dialect. For this, people will be motivated to register as service providers with different branches of the NGO beforehand, so that appropriate helpers can be contacted in time and timely help can be provided. The helpers will be paid standard rates for their services - subsidized partly by TCS and nominal charges from the elderly users. Users can be encouraged to pay in full if they are not below the poverty-line.
b. Front Line Workers (FLW) of the NGO will be trained on the distribution and usage of the mobile phones. After every call to the IVRS, feedback would be sought from the user as well as the helpers and FLWs involved so that the services can be improvised in accordance with the feedback received.

6.Benefits to the Firm & Society-Social Development Perspective

a) 3 prominent actors for providing IVRs and Healthcare services to Elderly:

- Counseling/Technical support staff: Providing counseling and ICTs related technical support services to Elderly or Frontline Workers (FLWs) or helpers
- Frontline Workers (FLWs): Providing distribution and usage of mobile phones to the elderly people
- Helpers/Service Providers: Helping elders to accompany hospitals, help in buying necessities, giving health care at homes, etc.

b) *The unique initiative shall benefit the elderly community by providing:*

- Employment opportunities for the NGO volunteers and to the people who want to be enrolled
- Helping people/elders by giving community or social support services to them
- Empowerment and awareness to elderly and their families by facilitating ICTs services via mobile phones, e5.g., e-payments, e-commerce, communication, etc.
- Better mobile connectivity in rural or remote areas
- Adult Literacy and e-health services (on the lines of Mobile Kunji introduced by BBC Media Action with Gates Foundation)
- Recreational activities as well to elders, for their mental well-being

Figure 4 Involvement of different units of the TATA group

As a business firm:

• Through this initiative we shall benefit in our public relations, brand image in addition to relations with the Govt of India and media, as a socially responsible firm.
• This initiative will indirectly help in increasing the penetration of our hardware and software technology, besides utilizing our CSR funds meaningfully.

• It will also help us to research and understand usage patterns of the elderly, which will help us design better accessibility features in our product.
• It will help TCS and Telecom network provider limitations and performance of hardware/software components in low bandwidth areas, which will help us design products for such Bottom of Pyramid markets in India and other developing countries.

Revenue potential / Business Perspective

Each business has revenue potential and business perspective that need is strategic view and view business as option, in providing the elderly care via IVR and connecting them to NGO and further services, TCS can earn revenue and huge business perspective which not only will tap the uncaptured market for elderly people via IVR option but will get the direct revenue through intermediaries and related functionaries in rural market penetration , in below figure we can see how TCS will provide license to Communication provider and Power group and provide the app feature and profit sharing that each provider will earn via people utilizing their services in this entire Ecosystem of Rural -elderly – IVR

Figure 5 The Revenue estimation from the project

• What more can be real time feature feedback when you actually get inputs from real time users, using the IVR and our Red button device, TCS will get to know real time feedback how these services are working ,what are the plus and minus and scope for improvement, different scenarios and this will lead to Tata Research Input food for thought that will not only help in resolving existing issues but also view of future visions research that will help in better accessibility design features for entire Tata group of companies to keep view of their products from elderly view functions, TCS will gain immense from this primary data from user that will be Truth of source feedback

Figure 6 Feedback structure (Image courtesy https://tlt.cofc.edu/2019/09/23/top-5-tips-to-get-students-to-read-your-feedback/)

● BOP(Bottom of Pyramid) market enablement for Telecom provider and TCS for elderly people will be seen as the elder needs support in need which our device with red button design approach in collaboration of

telecom provider and TCS Software enablement will open up the pyramid section which remains untapped, unorganized, invisible to companies and can be best serve with the TCS services and a noble care cause for elderly people which will use our phone device and contacts the NGO via IVR and further utilized the services for betterment , our approach will enable accessibility for the elderly services, adaptability , availability to the user and also affordability to the user so as to make the devices and services available at ease which is specific to rural elderly people and specific to that section capturing the idea of Bottom of Pyramid

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Figure 7 Where BOP comes in picture?(Image courtesy https://www.superheuristics.com/bottom-of-pyramid-marketing-detailed/)

• Telecom provider while providing its services will increase average revenue per user(ARPU),monthly churn rate, number of subscribers by migrating elderly people to their network, as we can see that once telecom provider is chosen by TCS , telecom provider will increase its user base as people will recharge the mobile device for using the IVR related services, there average revenue per user will increase with Avg data user per month, there number of subscriber will lead to Net additions, brand marketing and popularity of provider as the reliable and all time available network across the region further capturing the entire belt of rural area and further moving to tier 2 , tier 3 cities and further

Figure 8 Telecom providers [Image courtesy https://studiousguy.com/telecom-companies-business-model/]

• Telecom provider will use TCS software services in collaboration with partners for powering the platforms for its network in Cloud/AI, devices, TCS will provide end to end support for Devices and OS enablement, it will use the Cloud environment for using cloud services and architecture to remove all overheads related to servers and hosting, it will provide the access to big data solutions to handle big user volume data and future scaling, with the advent of new AL/ML/robotics /blockchain and supercomputing all newer cutting edge technologies will be provided by TCS across the end to end eco chain of our model for elderly-rural-people

Figure 9 Collaboration between TCS and Telecom service provider

• Brand image, utilization of CSR funds by TCS

Our initiative will increase the Brand value of TCS across the micro segments of India and non IT savvy elders due to our initiative services of our special device and IVR, in longer run this will spread across India and Global due to the noble cause and services provided by Tata, it will also showcase the CSR utilization of TCS where they will be in compliance as per rules and Laws of CSR and in further gaining momentum in untapped sections of socio-economic-geographies.

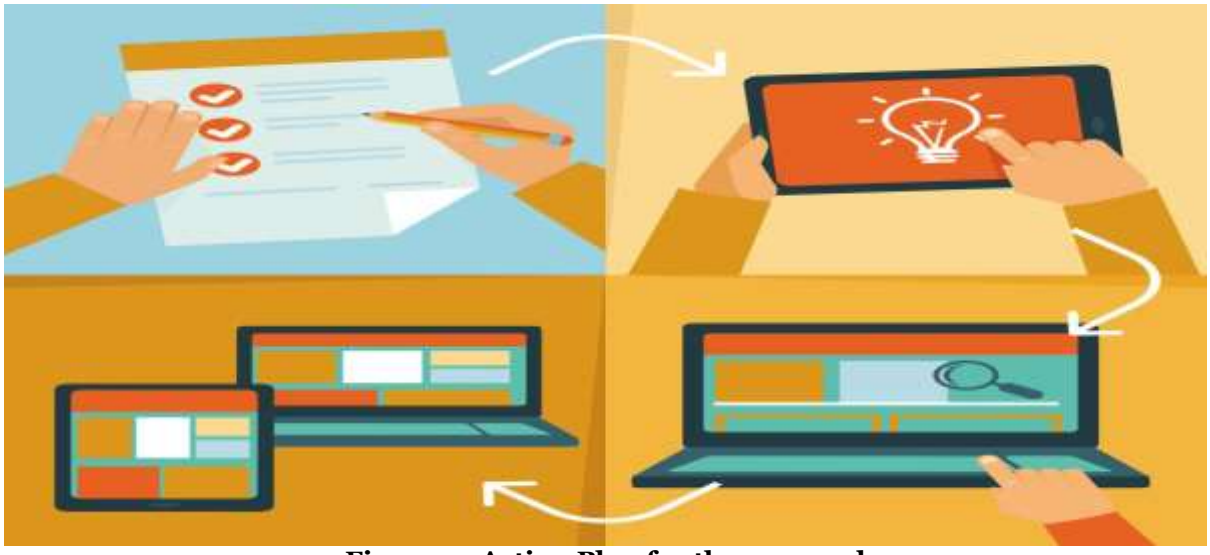

Figure 10 Action Plan for the proposal

6. Action Plan for Team CSR @TCS

7.1 STAGE1:

Keywords: Planning and strategizing, Identification of target population, Discussions and SLA with Reliance, Approvals from Govt of India

Here in the first stage TCS will do the planning and strategizing efforts with identification of target population in rural areas where the implementation can start, once planning and strategizing is finalized next action plan would be discussion with the telecom provider for collaboration and SLA agreements, lastly approval from Government of India for political, social, economy approvals.

7.2 Stage 2:

Keywords: Innovation, set up of the hardware, software and network interface development facility, Pilot testing

TCS will apply innovation in setup and best ideas in collaboration with telecom provider to set up the cloud infrastructure of hardware, software and networking interfaces development and building up the facilities for receiving calls and information processing further, once this is done, a pilot testing will be done using alpha and beta users before society wide rollout so that any initial errors or shortcomings can be identified quickly and resolved before wider launch.

7.3 Stage 3:

Keywords: Tie ups with NGOs, training to FLWs and volunteers, operationalizing IVRS facilities

Once Pilot is successfully tested, the next stage of the big bang approach of expanding will be tying up with localization approach for setting it up with NGO's and providing training to front line workers and volunteers who want to work towards this noble cause and functioning of operationalizing IVRs facilities.

7.4 Stage 4:

Keywords: Awareness programs, campaigns to promote the initiative amongst rural elderly

Once the IVR's facility is up, the next in line will be promoting the initiative and branding via TCS and Tata group channels and create Awareness among the society in various social platforms, phone, local panchayat support and localization effort to grow local being global approach of as one Tata name.

7.5 Stage 5:

Keywords: Operations, Services, Feedback, Sustainability and Process Improvement

Once people start using the services and become aware of our product, next in line will be keeping our operations and services continuous and up 24 X 7, 365 days, get the feedback from users to work on that and improvise on it, keep a close track of our sustainability coefficient to keep sustaining and growing our efforts for wider reach across India and implementing best process and keep continuous improvements to make to next level

8. Challenges to overcome in the model proposed

8.1For Business Firm (TCS)

- Maintaining sustainability in the long term as with the news of our service start and initiative many competitors and new entrants will mimic our approach or try to surpass
- Large scale, continued training to NGO staff and elderly people will be efforts consuming and needs continuous efforts

8.2 For NGO

- Providing service on time to the elderly which is the motto of our initiative
- Regular trainings to FLW so that they can understand the ask and providing necessary help
- Maintaining enough staff to handle all kind of requirements of elderly people
- Handling issues / complaint/ emergency cases with competence

8.3 For elderly

- Physical Limitations / Usage Issues of the service and phone
- Keeping gadget within reach and keep it in a working condition
- Following the instructions of IVR.

8.4 ICT Related

- Acquiring feedback on scope of improvement
- Handling network issues
- Providing technical services, maintenance support for elderly people

9. Conclusion and The Way Forward – Future Scope

We have proposed a viable and efficient model for welfare of humanity with a focus on elderly people in rural settings by amalgamation of technology and workforce. A system which will be cost efficient and easy to use. The whole idea is to bridge the existing gap between the needy and resources.

The future forward looks promising with the need of Indian and global population and going Digital way and Atmanirbhar Bharat direction of Govt of India, we want to make a socioeconomic impact for the upliftment of people with Tata's way of doing work that will fuels us our genuine approach for caring of our elders who need help in distress, below were future way forward:

9.1 Production Planning: The planning and production of handsets that would be cost effective and comes with the red button approach and enabling and reaching them out to the elderly people, since our approach model is one click red button approach we can utilize pre used, existing models or customized phones to operationalized the approach and fit into factory model approach in later segments of production cycle as per the growing projections and need, for this production planning and manufacturing strategy approaches will be used, TCS will tie up with IIT's and GOI for incubations of this approach and also utilize best of Tata group SME's, telecom experts.

9.2Launch of Product: TCS will use the Tata group launchpad for launching the product as people of India believes Tata from Salt to IT conglomerate and trust of providing care to elderly people will catch the attention of every section of society and providing benefits to people, TCS will launch the product in Rural sections and further grow it apart from local to global as it gets matured, and performance is measured and optimized for scaling

9.3Feedback on gadget: Once the product is launched and provided to the section of society and implementing the process, the feedback will play an important role in showcasing the report card of our work and dashboard depicting the progress, success and enhancements from the real time users which will be our real time feedback givers for our product and services that we entail to provide them for the betterment of the society and country and improvise and give excellent care and services

9.4 Cost optimizations: As the timelines passed and people are onboard and starts utilizing their product and services next in line for us as company would be Optimization of the cost and services to minimize the cost to the society for this noble cause as it involves our elderly population who are need and served the society and payback time to serve them and providing care, support and for the upliftment of health and elderly services using IVR and cloud technologies to reduce minimal dependency on physical infra and optimize our running cost of this initiative

9.5 Modifications & Improvements : The important aspect for sustenance would be adaptability as technology changes, modifications as per user needs, localization as per environments and improvisation and sharing the product and services to people, with the new ideation many more players in the industry will running along to tap the uncaptured market as part of their strategic approaches, thus TCS will add the modification and changes as per user needs and adapting the latest technology so that product and services keep improving timely for serving elderly best

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