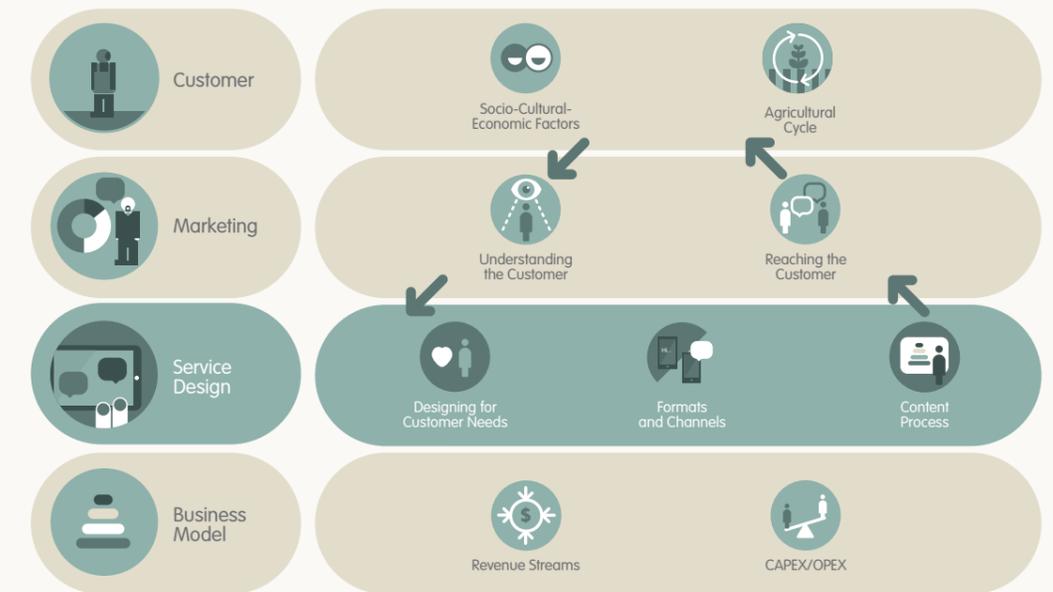




Chapter 4 Service Design



Characteristics of Successful Service Design

Irrespective of the nature of the target market, a successful Agri VAS design will always endeavour to provide information that is timely, actionable and relevant - (TAR):

- **Timely** In order to satisfy the challenge of providing users with the information they need when they need it, consideration must be given over to appropriate delivery channels. Services designed in an “on-demand”, or “pull” fashion, for example call-centres with advertised opening hours, are well-placed to serve ad hoc user needs as they emerge. They also reduce a technological barrier to adoption since they only require a customer to be able to use a telephone to dial in. Conversely, those services designed around ‘Push’ architectures should poll their target communities to identify which time is best for services to be delivered. A contingent benefit to Push services are that the information relayed can be consumed at a time of the user’s choosing and can be replayed to others.
- **Actionable** The advice or information delivered has value when it can be acted upon. This means that the methodologies and tools expounded by the information services should be locally available and practical. Farmers are more likely to act

on information when it’s reliable, feasible and trustworthy. Reliability of the service is achieved through robust service delivery and accurate information provided. Quality assurance processes need to be in place to ensure this.

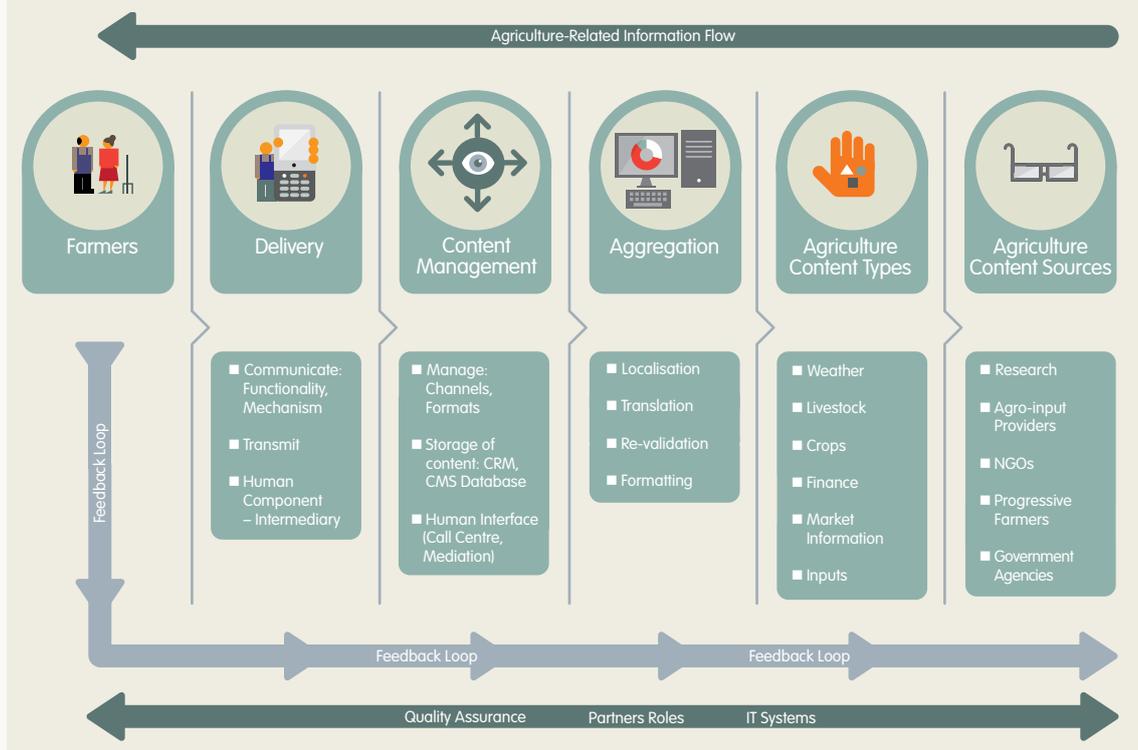
- **Relevant** Information needs to be relevant to the farmer’s location, climatic zone, current position in the agricultural cycle, income level, farming activity and native language. To make sure that the service is valuable and usable, it must be customised to meet farmers’ local needs and translated to local languages.

Co-creative Approach to Design

Understanding all the needs and requirements of farmers and designing sophisticated mobile services is a difficult undertaking. Thus, a co-operative approach to design can help ensure the service maintains focus on and relevancy to the farmer. Co-creation is a design methodology, which incorporates the consumer in the design process. This includes iterative designs shared with consumer focus groups, prototyping with consumers and pilots, all incorporating feedback. Additionally, live Agri VAS should include an on-going, hard-wired feedback loop to ensure the changing needs of farmers are reflected in the revised service design and further product development.

Components of service models

The following diagram depicts the service design process. Further below is a detailed explanation of each stage beginning with delivery, (working from left to right).



1. Delivery

Communication

This is the layer that faces the user. When working on this component, it may be useful to consider various use cases of the service and in particular how the user will interact with the device.

Examples of use cases are:

1. Information requests.
2. Asking specific questions.
3. Receiving information and answers.

Key considerations:

- What is the handset functionality required to access the service? What are the technological functions of the user's phone?
- Could the service be accessible from the most basic handset available on the market?
- What are the user's preferred channels of communication - text or voice?
- What language does the user speak? How comfortable is the user with written information?
- What is the user willingness and ability to pay for the service?

Transmission

The ability to transmit the information to the end users' devices depends on the network quality in critical areas. Although 3G is a regular standard in urban areas, and affordability of smartphones is improving, the target customer for the Agri VAS is still facing the realities of remote areas and doesn't benefit from technological advantages of developed areas. Service design should incorporate the answers to a range of questions:

- What is the availability of the data network in the target area?
- What is the quality of the network? What is the working standard? Is it sufficient to retrieve data-based services?
- What is the data service pricing model? How does it fit with user's ability to pay and the revenue model?

Mediation

In the case that Agri VAS are too technologically advanced, or expensive, the 'last mile' of service delivery may need to be more closely managed. Exclusion from the service will occur when it is:

- Accessible from advanced or smartphones only.
- Targeting regions with low mobile penetration or ownership rates.
- Not provided in the local language.
- Dependent on text in areas of low literacy rates.
- Out of the financial reach of the farmer or dependent on cost sharing models.

In each of these cases, a mediator is required to ensure 'last mile' delivery. The role of the mediator is to fill the gap between the factors of exclusivity and the excluded consumer. Building and maintaining the network of mediators and agents to provide this 'last mile' of service delivery needs careful planning and continuous management.

Example

Grameen Foundation's Community Knowledge Worker (CKW) project in Uganda relies on their network of on-the-ground that operate Android-based smartphones to retrieve information on farmer's requests, translate them and explain them back to the farmer during face-to-face consulting visits. Community knowledge workers operate as individual micro-entrepreneurs within a franchise model, with monitoring, support and supervision from the service provider. (See more at <http://www.grameenfoundation.applab.org/section/community-knowledge-worker-project>).

Key considerations for the design of mediation components:

- An incentive system for mediators/field agents can help to motivate them to deliver a high quality of service. Incentive systems can also mitigate the effects of agent churn which can afflict Agri VAS deployments.
- A minimum level of education and/or experience needs to be applied to determine the eligibility and qualification of agents. Continuing education and training must also be in place to increase the quality of agents and customer service.
- Quality assurance practices must also extend and include the mediator/field agents.

Partnerships and Roles

Possible ways of creating a network of 'last mile' mediators include:

- **Build from scratch** This option is timely and expensive, however it confers full ownership and control over the network.
- **Build with a partner organisation** An existing organisation's asset can be leveraged, such as existing distribution network or Community Phones operators. In this case, additional investments are only needed in selecting from, and educating, existing agents up to the required level of proficiency.
- **Leverage existing partner network** A partner's network, such as existing private or public extension agents may be the best option. This may be cheaper and faster to implement, however, this requires a high level of trust and commitment between the partner and the Agri VAS provider.

2. Content Management System (CMS) Management

This stage in the service delivery process deals with how information is managed, processed and redirected. Decisions on channels and formats for information distribution should be based on user preferences as well as the potential for scale and automation. While technology allows high-scale customisation,

balancing these two attributes (high-scale and customisation) is best done through a mix and match of different channels within a single service design.

Voice, SMS and data communication are the main media for delivering information to mobile users. The selection of media will be determined by the nature of the information to be transmitted and the audience. For example, simple weather information can be delivered via SMS, but detailed advice on crops would not be, due to the message's length limitations. With regards to the audience, literacy levels need to be taken into consideration when choosing communication channels.

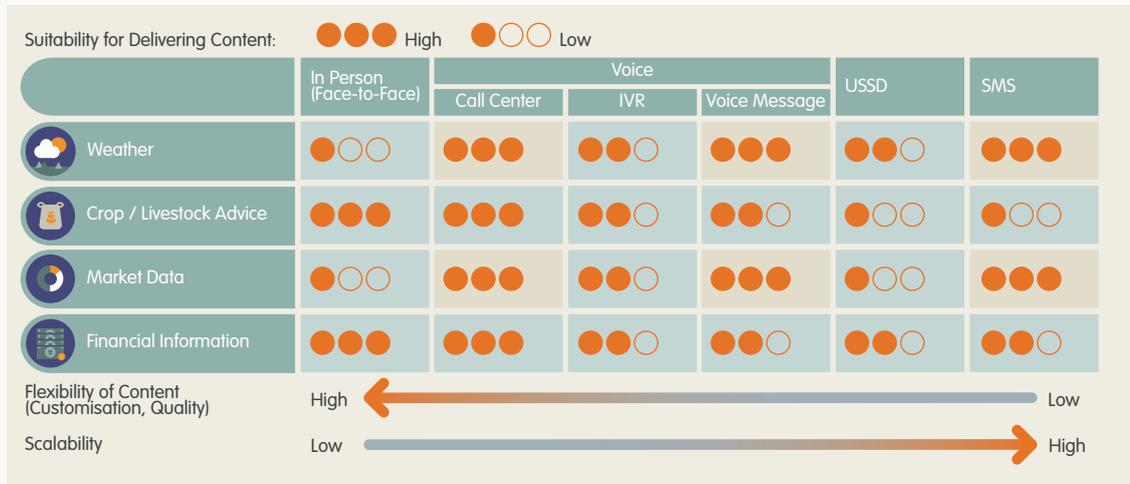
The complexity of the information service is another critical factor to consider when selecting media to use. Farmers' questions could be classified into two broad categories:

- 'What' type queries asking for standard information, e.g. weather, prices, input supplier contacts etc.
- 'How' type queries can be further classified as:
 - Asking about standard practices, e.g. how to take a sample for a soil test.
 - Asking about specific issues that need further assessment.

The 'What' type queries, regarding standard practices and data collection, lend themselves best to automated mobile services. Alternatively, 'How' type queries may need solutions ranging from voice (helpline), or demonstrations.

Example

Agricultural tips delivered via voice message are a priority format used by IKSL in India. The use of voice overcomes low literacy level and automates information distribution for the millions of subscribers. In the event that a user has specific problems or questions, they can access agricultural experts via the farmer helpline.



Service providers must also decide whether to leverage push or pull models or structure both in complementary ways. Push services allow service providers to establish an on-going presence and thus command a higher degree of loyalty. Alternatively, pull models allow for more specific queries and two-way interactions leading to more valuable information exchange. The combination of both functionalities can leverage the positive qualities of each resulting in a more robust service (high-scale automation and individualised services).

Key considerations when designing the information management process:

- Is it a mass (more suitable for automated SMS) or a niche service (farmer helpline)?
- What is the future scale of the service and what channels could maintain it?
- What is the balance between customisation and automation of an information distribution process; how is it going to be achieved?

Store

Agri VAS should maintain a database for both agricultural content and user profiles and queries.

The content database houses the agricultural data queried by service requests. The software solutions would vary depending on the service needs and complexity. However it should always allow quick access and navigation, categorisation, tagging and monitoring, as well as support multiple formats of information.

The customer relationship management (CRM) system stores information about users and their requests as well as information received via the service. A comprehensive CRM system allows for a detailed segmentation and data collection, which leads to a better understanding of the customer needs and, eventually, a more targeted offering. Additional revenue opportunities exist in the sales of the dataset to third party stakeholders.

Important factors to consider when designing the databases:

- Scalability of the database with increased numbers of users and complexity of the service.
- Integration with the data sources and distribution platforms.

Interpret

Not all types of information are suitable for automated delivery. A helpline component allows Agri VAS to bypass the literacy barrier while providing more comprehensive, customised, and, consequently, impactful services. To develop such helpline services, helpline agents will need content management systems containing full fact-sheets on agricultural information. For agricultural advisory on pests and diseases, however, additional decision support tools need to be developed. The quality of any given helpline service is highly dependent on the operators' level of expertise and knowledge. Factsheets simply back-up the advice provided, but can rarely be used without interpretation or case-by-case adjustments to farmer's situation. The operators must be in a position to think on their feet and adapt their knowledge to the particular questions put to them.

Example

M-Kilimo, a pilot helpline service run by Kenyan call-centre KenCall, employed agricultural experts that hold a minimum of a bachelor's degree in agriculture and at least two years of field experience. Farmers, typically, have a range of information needs and the team was recruited to cover this spectrum bandwidth. Thus, M-Kilimo could provide advice on horticulture, aquaculture, climatology, pests, plant disease, animal husbandry, agricultural engineering, market advice, and environmental and veterinary issues.

Requests for all sorts of expert advice may come from farmers even when the information required is not part of the value proposition. Trust in the service, if established properly, eventually leads to a demand for other types of information beyond the service's initial scope.

Key considerations when establishing a helpline component:

- The qualifications of agricultural experts are crucial, and should ideally be augmented by field experience.
- Having highly qualified experts as a front-line support is expensive, and this OPEX might be mitigated by establishing a second and third line of support for highly complex queries that can be accessed on an ad hoc basis.

Partners and Roles

Considering their existing infrastructure and readily available platforms, MNOs are best positioned to manage the technical components of the service. However, in some instances, it makes sense for the content provider to undertake a role of managing and interpreting the content, as well as collecting user profiles.

3. Aggregation

Aggregation of agricultural information is one of the main bottlenecks for many service providers. Although there are numerous sources of information, their formats are not always suitable for distribution via mobile networks. Thus the role of an aggregator is a challenging one, as the MNO remains a gate-keeper of both the information and of access to the end user.

Localisation

For information to be valuable, it must be localised to the environment, geography and other conditions. The complexity of the agricultural sector, even within one country may require localisation at the sub-region level (dependent upon the agro-climatic zones).

Translation

Translation of content into local languages can be expensive, but is necessary to provide customised offerings. At the same time if information requires additional manipulation or interpretation, it could be handled by the agent in each particular case.

Formatting

Once information is identified, it has to be reformatted according to the delivery channels chosen. Short or full information pieces, voice or text based, need to be recorded and categorised.

Re-validation

Content coming from reliable sources is considered valid when received. However, after it is manipulated, to be localised, translated or reformatted, it needs to be re-validated by an agricultural expert organisation.

Partners and Roles

An independent content provider, that works across multiple mobile networks, might take the aggregation role. At the same time MNOs see the value in investing in an aggregation component to maintain ownership over the valuable asset.

Example

HandyGo in India is an experienced content provider with expertise in sourcing and aggregating a variety of content for mobile channels. HandyGo aggregates content from dozens of sources and prepares it for mobile distribution. The company works across multiple mobile networks, capitalising on assets developed in-house.

4. Source

Most Agri VAS will begin with a limited scope and then broaden from there. Focusing content on a few crops will make development and management easier at the start. When selecting content areas, it may be useful to keep in mind the agricultural life cycle (for the crops you are focusing on) and match the content accordingly. Please see the Agricultural Lifecycle diagram on page 11 and 12.

- **Plan**
 - Market price and demand forecasts.
 - Seasonal weather forecasts.
 - Advise on crop and seed selection.
- **Buy Inputs**
 - Input availability and prices (seeds, fertiliser, equipment, etc.)
- **Plant**
 - Short-term weather forecast.
 - General advise on the focus crops.
 - Soil preparation.
 - Pest management.
 - Fertilising.
 - Irrigation.
- **Harvest**
 - When to harvest.
 - Updated market price and demand forecast.
 - Storage.
- **Sell/Market**
 - Advise on processing.
 - Transportation availability and prices.
 - Live market prices.

Partners and Roles

Given the complexities and varieties of local agricultural environments, finding a reliable and thorough source of localised agriculture data can be difficult. It may be valuable to incorporate established and experienced agriculture partners responsible for the population and quality assurance of the agricultural database (agricultural institutions, NGOs, universities, research entities, meteorological department).

Example 1

IKSL service in India has partnered with the CABI agricultural consultancy to develop their management process whereby they source an aggregate content from multiple high-quality sources across India. CABI also manage the quality assurance process.

Example 2

CKW Uganda works with dozens of content partners, who provide the agricultural data, while AppLab aggregates and formats the content in-house in accordance with the designed format.

Another method of sourcing content is the peer-to-peer model. This involves farmers reviewing and endorsing or rejecting pieces of advice. The main challenge with user-generated content however is the quality assurance process that is needed to maintain the quality of the information disseminated.

Gender Inclusion

To ensure equal access and utility of Agri VAS to women farmers, their specific needs and barriers must be considered. Specifically, service designers should consider women-specific needs related to the type of commodities and tasks they are involved in. For example, the type of content, content formatting, as well as gender split within a human component of service design.

Key questions to consider when designing a service with equitable access:

- What is the gender split between the agents/ mediators/ helpline experts? How does this influence the gender split among users?
- Do the collected farmer profiles offer any insight into female user preferences and how these might best be served?
- What are the women-specific services and content for the service model? Is women specific content tagged accordingly?
- What are the potential partners from whom to source the women-centric content?
- How often is the female voice used for the provision of information?

Example 1: CKW Uganda recognised that using female community workers increases the number of female farmers that subscribe to and use the service, as women farmers find it more comfortable to speak to female agents.

Example 2: IKSL created a gender strategy to help increase women's use of the IKSL service. It included measuring male and female usage, identifying and delivering women-centric agriculture content and marketing and distributing via existing women's agriculture groups.

Quality Assurance Summary

Maintaining a high degree of service quality requires transparent targets for each of the service components as well as the regular monitoring of each component.

Quality assurance should assess and monitor:

- **Accessibility** technological constraints for the user to access the information service (coverage, phone functionality, etc.)
- **Accessibility** how long does it take the user to access the information he needs?

- **Usability** of the information in relation to its format, language, channel (can the farmers understand and act upon the information received?)
- **Timeliness** of information delivered.
- **Quality** of all types of human interaction with the customer under the service model, levels of proficiency of the human component (how do different agents effect the service adoption?)
- **Scientific accuracy**, relevance and diversity of both new and existing content.
- **The changing information needs** of farmers and the relevance of the existing content database.
- **Adoption indicators** for the services within the portfolio offered, and how they change over time.

Additionally, developing (or investing in) a Quality Dashboard which indicates the key quality metrics, targets and their timeliness is a useful tool to incorporate for the on-going assurance process.

Providing weather forecasts to small-holder farmers

One of the most crucial types of information required by small-holder farmers in developing countries is accurate, relevant and localised weather forecasts. Unfortunately, this is also among the most challenging to provide. Here, we take a look at some of the drivers and challenges around this topic from a service design point of view.

Accuracy

Accuracy of the weather forecast is an area of the most concern for service providers, as the wrong information could mislead the farmer into undertaking harmful activities which may damage the inputs as well as existing crops. One of the reasons for the low accuracy of weather forecasts is a lack of meteorological stations in the developing countries. Kenya, for example, with a total area of more than 580,000 sq km, has only 33 meteorological stations operated by the Kenyan Meteorological Department (KMD)⁸ that are used for developing the official country-wide weather forecast.

The geographical spectrum of data available is not sufficient to provide relevant and accurate weather predictions for most of Kenya's rural areas due to its disparate topography. Still, the KMD is the main source of weather data in Kenya, partly because it provides government sanctioned information. At the same time most of the countries in sub-Saharan Africa also have non-government operated weather

stations, as stakeholders reliant on this type of data sometimes find it easier to build their own capacity for collecting and analysing the weather information, than to work with existing providers. This approach is well illustrated by the Kilimo Salama service that provides crop-insurance services via mobile to small-holders in Kenya. Heavily dependent on quality weather data, Kilimo Salama has built 30 meteorological stations of their own. Even with the availability of independent weather recordings, the interpretation of the data and actual forecasting is still an issue as it has to be performed by a credible institution.

Another challenge in providing weather forecasts to small-holder farmers lies in ensuring they are localised and relevant. Where the topographical characteristics of the region are highly diverse, the climatic conditions of two locations separated by as little as 50km could be significantly different. To provide a useful forecast, the service provider should store the information about the exact location of the farm. Although relatively easy to collect by smartphones with GPS functionality, this information is difficult to collate on a large scale, as most of the small-holders own very basic phones. Community Knowledge Worker Uganda uses roving knowledge managers operating the android devices to geo-locate the users of the service. This collection of the geo-location data can easily be gathered during the user registration process, especially if done via call-centre functionality. Using the closest market centre, or a village with known GPS coordinates, might be the best possible

⁸ Kenya Meteorological Department
<http://www.meteo.go.ke/customer/farmer/stations.html>

⁹ <http://searchengineland.com/cell-phone-triangulation-accuracy-is-all-over-the-map-14790>

approximation to each individual farm's coordinates if the farm itself is without known coordinates.

Offering a choice of weather forecasts for one of the large market centres, is another option if other methods of subscription are used such as USSD or paper-form. However this would impact the relevancy of the forecast provided. Despite these challenges of accurately locating the farms, it's important to note that MNOs have a technical capacity to locate each of the network's subscribers with a triangulation method, using the information about the location of the three closest to the user base stations.⁹ The question of whether MNOs will choose, or be permitted, to start using this data to provide relevant (agricultural) information services to their users, or keep it to themselves, remains moot.

Given that forecasts don't appear to be predictable with much accuracy beyond a few days at most, it is even more difficult to deliver a reliable piece of information to the farmer. However, doing so is critical as climate change is putting a high pressure on the small-holders, as seasons don't follow the traditional rhythm any longer.

Recent findings show that five days is the most reasonable length of a forecast, giving a farmer some opportunity for planning, but not compromising the accuracy of the information provided.

Seasonal vs short-term forecast

Given the low accuracy of week-long forecasts, it seems counterintuitive to suggest that it may be possible to provide forecasts for an entire season. However there are models based on a different source of predictability than weather forecasting, models that assess the likelihood of certain climate conditions. For sub-Saharan Africa, such seasonal forecasts are being developed by Regional Climate Outlook Forums (RCOFs). Ironically the main challenge for RCOFs is in distributing their seasonal forecasts, as they have to reach the end user to make a quantifiable difference in the agriculture sector. One of the initiatives that try to disseminate seasonal forecasts to the farmers is RANET (Radio and Internet for the Communication of Hydro-Meteorological and Climate Related Information) that uses digital radio technology as its primary distribution channel.

Formatting

Once the weather information is sourced and the users of the information are identified and located, there is still a challenge of interpreting the forecast and formatting it to suit the

chosen delivery channel as well as address the usability requirements. Interpreting the weather forecast is important, as small-holder farmers often wouldn't be aware of the meaning of well-accepted weather condition metrics, such as precipitation chances or humidity percentage. The end user may not even be familiar with a Celsius temperature scale. The interpretation of number-based metrics into understandable categories can add value and usability to the forecast. If SMS is chosen as a main channel for weather forecast distribution, service provider will have to face the challenge of matching the length of the forecast within the 160 character restriction.

Below is an example of interpretational forecasts for the SMS channel:

- **ENG** Week starting 25 October. On average warm during the day (22C), and very cold at night (14C). Little chance of rain (49% chance), wind is normal (3 km/h).
- **Swahili** Wiki mpya Oktoba 25. Joto wakati wa mchana (28C), na baridi wakati wa usiku (17C) Kuna nafasi ndogo ya mvua (42% nafasi) upepo wa kawaida (2kmh).

The interpretation of the number-based metrics would vary between the regions, as there is a perceptual difference. It is particularly important to translate the forecast to the local language(s), and in case of a low literacy level among the customer base, vocalise the message and manage its distribution via voice-based channels such as IVR or outbound voice messages.

The next step in the provision of an interpreted weather forecast is to combine it with agronomic advice. The effects on crops of certain weather patterns can be mitigated by appropriate and timely farming actions. IKSIL service in India provides contextual agro-climatic information for several states, and was found to be highly beneficial to the farmers. For example, consistent hot weather combined with high humidity encourages pests and fungal development. An agricultural university is best placed to process the weather information and create the relevant, actionable advice about pest-prevention techniques.

Forecast providers

There are lots of independent forecast providers that develop predictions based on comprehensive modeling systems. Among those providing forecasts for sub-Saharan Africa, some are already working with mobile and radio services to deliver forecast information to smallholders including aWhere, Foreca, and IGNITIA.