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The U.S. Government's Global Hunger & Food Security Initiative

Information and Communication Technologies for
Agricultural Extension and Advisory Services

ICT – Powering Behavior Change for a Brighter Agricultural Future

By Mark Bell, University of California Davis

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for Agricultural Extension and Advisory Services

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Executive Summary

Of the world's 1 billion plus poor, seventy-five percent live in rural areas and most of these people depend on agriculture to survive. Enhancing farmers' and agricultural workers' livelihoods is therefore a key element in addressing global poverty. While farmers are faced by many problems, three are regularly cited as amongst the most important, namely: 1) access to credit, 2) access to better market prices, and 3) access to credible, relevant information.

In terms of information access, there has been increasing attention given to the potential of Information Communication Technology (ICT) to better connect farmers with the information they need. ICT has the capacity to dramatically expand communication between people and to improve access to information (and money). The question has been how can this promise of ICT be realistically harnessed to help the world's rural agricultural poor?

Since the birth of the internet in 1994 and the dramatic spread of cell phones from the mid-1980s on, many "ICT for Agriculture" (commonly referred to as ICT4Ag) activities have been initiated and many are tracked on webportals such as www.e-agriculture.org or <http://ictupdate.cta.int>. Many ICT4AG initiatives have seemingly oversold themselves in terms of success or they ceased as soon as project funding dried up. Despite these many apparent false starts, there is a growing body of experience providing lessons on factors required for successful ICT applications in agricultural extension and on how ICT can lead to beneficial behavior change amongst poor farmers.

Of the various ICT options, the expansion in internet access and the growth in the availability of mobile devices (especially cell phones) drives much of the optimism for ICT applications in extension. Related to the growth in cell phones are the interesting partnerships beginning to emerge between the cell phone companies (or MNO's - mobile network operators) and the emergence of suites of services. For example, financial services, such as mobile money, may also have associated service options to access market information and even agricultural (farming) information. In fact, the bundling of services was suggested by some of those interviewed as perhaps the only way for pay-for-services cell phone initiatives to successfully provide agriculture information. Related to this, recent feedback from a number of cell phone service providers suggests that providing agricultural information as a stand-alone pay for service is unlikely to be sustainable.

Methodology. This paper looked not just at how to provide information but how to use ICT to provide information in order to facilitate behavior change. To do this, we looked at lessons learned from health, business, advertising and agriculture. In addition, we compiled lessons learned from various ICT for Development (ICT4D) reports (Appendix 1). Based on these studies, conversations and reviews, we drew out principles and then as a further check had leading members of various organizations review them against their ICT in Ag implementation strategies. As a result, we feel we have identified a robust set of principles.

Using ICT for behavior change in Agriculture. In general, initiatives are successful in promoting behavior change when they consider three factors summarized as "AID", namely:

1. **Awareness. – Do people know about your information?** You must you're your audience and use multiple channels to make sure they can readily and easily know about what you have on offer.
2. **Interest – Do people want to learn more?** You need to link with your audience; to respond to their interests and needs, build trust, make an emotional connection¹ and be responsive to their feedback.
3. **Doable– Do people want to try it?** You need to provide information such that the audience
 - i. want to try your information (there is obvious benefit and responds to their interests) and
 - ii. can easily test the product or information. (The provided information is practical and simple.)

Each of these factors is expanded in the full text below.

What else? As well as the factors described by “AID,” three additional factors were highlighted by organizations who are successful in using ICT, namely:

1. An initiative must have acceptable upfront costs
2. An organization needs to be flexible and agile, and
3. The implementing team must have competent team members.

While issues of sustainability of ICT in Ag initiatives remain, people are beginning to learn how to apply ICT to better meet the needs of their audiences and thus promote behavior change.

Introduction and Objectives

Many farmers – especially those in developing countries regularly identify three major farming challenges 1) affordable credit, 2) good market prices and 3) access to good farming information. Of these challenges, agricultural extension systems (in their pluralistic form spanning public, private and civil organizations) seek to help farmers especially in relation to providing actionable information for crop and livestock production, farm management, and marketing.

In lesser developed country contexts, there has been an increasing awareness of the many challenges agricultural extension systems face (e.g., low capacity of service providers, funding uncertainty, high client numbers, low client literacy, poor infrastructure, as well as constrained market, credit and input access). In association with this growing interest in extension systems, Information Communication Technology (ICT) is increasingly seen as holding great promise to improve farmers' conditions by significantly helping overcome many of difficulties faced by traditional extension systems. And there is good reason for such optimism. ICT is an increasing part of peoples' lives all across the planet, and it has the capacity to dramatically increase both person-to-person connections and their access to information. Already there are clear examples where cell phones provide simple opportunities for farmers to move money (e.g., m-Pesa in Kenya), to call local markets for prices and input availability, or even to just talk with their farm labor about on-farm tasks. However, despite the promise and some encouraging initiatives, many of the

ICT projects to date have either showed limited benefit or the activity closed once project funding ended. As a result, these initiatives not only died, but they didn't reach the scale needed for widespread impact. The landscape is changing quickly, however. Practices are evolving, and we have the opportunity to learn from what has been done and so provide input to help enhance on-going and future ICT in Ag extension efforts.

While Ag extension covers a wide range of activities, we focus here on those elements that are looking to use ICT to result in **behavior change in agricultural production and management**. Thus, while recognizing there are many ICT-enabled agricultural services (e.g., digital financial and market services), this paper focuses on those ICT uses most closely related to helping 'farmers farm better'. To do this, we consider:

1. Challenges in extension today,
2. The potential role of ICT,
3. The theory and business of behavior change, and
4. How some of the more mature ICT in Ag services² include the identified elements to promote behavior change. In consideration of "mature" services, we also looked at aspects of organizational and financial sustainability that will help the service scale to reach more farmers and continue.

Challenges in Extension Today

Public (and private) extension services (especially in many developing countries) face tremendous challenges to not only reach the many and varied farmers that need their services, but to reach them when and where the farmers want need the services. Many of the reasons behind these challenges are clear:

- i. Farms are often resource poor,
- ii. Client (farmer) numbers are very high (especially in relation to the number of extension agents),
- iii. Access, security and infrastructure can often limit extension worker mobility,
- iv. Farmers are often illiterate,
- v. Extension workers may lack the technical knowledge, diagnostic skills and appropriate extension methodology skills needed to effectively communicate, and
- vi. Extension systems, even when relatively well staffed, often lack the institutional motivation or resources needed to effectively reach farmers.

So given the many challenges, how many farmers can public sector extension expect to reach? Informal discussions with a number of public extension programs in various countries (including those that are considered to have relatively strong extension programs) suggest that often just 10 percent of the farming population can be reasonably reached directly (Javier Jimenez, personal communication, 2014; Babar Shahbaz, personal communication, 2015). Such numbers may be even less when operating funds are limited. As a result, some farmers may rarely, if ever, see an extension worker. From here extends the hope that ICT can expand the reach.

² That is, some of the services or initiatives that are emerging as successful "leaders of the pack".

The Potential Role of ICT as a Tool in Extension

ICT is changing the capacity of people to communicate and access information. For example, the number of cell phones now exceeds the number of people on the planet (Table 1a) (although gaps still exist). However, as phones become more affordable, these numbers increase each year in both developed and developing countries. At the same time that cell phones become ubiquitous, phones with broadband internet access) continues to rise - now reaching an estimated 32% of the world's population (Table 1b).

Table 1 (a). Mobile-cellular subscriptions (ITU 2015)

	Per 100 inhabitants									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Developed	82.1	92.9	102.0	107.8	112.1	113.3	113.5	116.0	119.2	120.8
Developing	22.9	30.1	39.1	49.0	58.2	68.5	77.4	82.1	87.6	90.2
World	33.9	41.7	50.6	59.7	68.0	76.6	83.8	88.1	93.1	95.5

Table 1 (b). Active mobile-broadband subscriptions (ITU 2015)

	Per 100 inhabitants									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Developed	N/A	N/A	18.5	27.5	36.6	44.7	56.8	66.4	75.1	83.7
Developing	N/A	N/A	0.8	1.6	3.0	4.5	8.3	12.4	16.8	21.1
World	N/A	N/A	4.0	6.3	9.0	11.5	16.7	21.7	26.7	32.0

Fortunately, affordability of ICT devices continues to improve; device prices are dropping and poor people will often share hand set access. Thus, ICT is expanding the ability of people to communicate and to access information.

While ICT has the capacity to expand information access, it may do so through different mechanisms and with different goals in mind. For example, in the case of agricultural extension, ICT can be used to as a resource for the extension agents and other information intermediaries, and/or to provide information directly to the farmers.

In terms of potential ICT application in Ag extension, Bell and Payne (2014) summarized the major applications for ICT (Table 2) in relation to three aspects of agricultural work:

1. Identifying farmers' problems and opportunities – What do they need and want?
2. Promoting behavior change – What is practical and relevant to meet those needs?
3. Collect feedback – How can each step be improved?

Before looking at the issue of behavior change, we briefly below look at how ICT can help with #1 and 3 above – namely: identifying farmers' problems and needs and collecting feedback.

Table 2. ICT can be used in a range of forms to support extension. The best use will likely involve integration across a range of options combined with traditional approaches (e.g., field demonstrations). Options in green (shaded) are considered the most promising

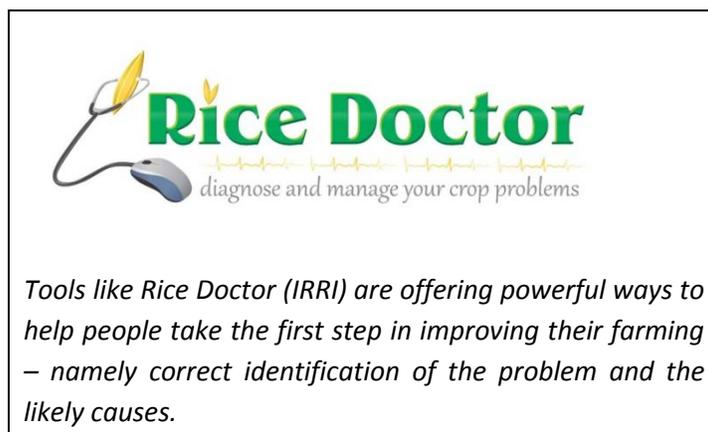
	Information communication technology and tools*				
Extension function	Radio	TV and videos	Cell phones (text, voice)	Feature and Smart devices	Computer + internet
Identifying farmers' problems and opportunities – What do they need and want?					
Diagnose problems	Some potential if dealing with general problems, or if capacity for interaction and expertise available	Visuals are very helpful as “seeing is believing.” Even better if combined with ways to receive feedback.	Some potential if farmers can call or text in and sufficient expertise is available.	Additional potential to a simple cell phone as it enables web or App access to special diagnostic tools.	Good comprehensive diagnostic tools are available
Collect information	Some potential if capacity for interaction		Can use for data collection.	Good for data collection with GPS.	Some potential if internet available.
Promoting behavior change – What is practical and relevant to meet the needs?					
Raise aware of general opportunities or needs ; convince farmers to try something new	Very good especially with persuasive programming	Visuals are usually very helpful as “seeing is believing”	Is an option if users are registered to receive such messages (SMS)	Is an option if users are registered to receive such messages (SMS, email)	Is an option if users are registered to receive such messages (email)
Provide specific information needed for change. What is involved? What are the benefits/ Demonstrate or train?	Some potential – but limited information delivered. Can be enhanced with call in.	Good option as “seeing is believing”	Potential if farmers can call or text in and sufficient expertise is available	Additional potential to a simple cell phone as it enables web access and plays videos.	Good option for intermediaries to seek information and videos.
Facilitate access to credit and inputs	Can be used to inform of available services, but one-way communication	Can be used to inform of available services, but one-way communication	Mobile banking and negotiate directly with the suppliers	Mobile banking and negotiate directly with the suppliers	Online banking

	Information communication technology and tools*				
Extension function	Radio	TV and videos	Cell phones (text, voice)	Feature and Smart devices	Computer + internet
Link farmers to markets	Good for providing general price reports		Access to price information (call in, subscription)	Can bring potential buyers and producers together; access price information	Can bring potential buyers and producers together; price info.
Collect feedback – How can each step be improved?					
Collect and respond to farmer feedback	Good if producers can call or text and sufficient expertise is available	Good if producers can call or text and sufficient expertise is available	Some potential if farmers can call or text in and sufficient expertise is available	Good option for intermediaries to seek information (if optimized for smart devices)	Good option for intermediaries to seek information
Assist with business planning	Some potential	Some potential		Simple farm management “Apps”; record keeping	farm management tools; record keeping

* From Bell and Payne 2014

ICT in identifying farmers' problems and opportunities – What do they need and want?

Diagnostic skills are widely acknowledged as an area of need across countries. Tools like the web-based “Rice Doctor” offer powerful ways to cover a wide range of possible problems while also offering linkages to information on how to overcome the problem(s). As these types of tools become cell phone compatible, they become even more widely available. As we crystal ball gaze in to the future, one can envision a time when farmers will be able to take a picture of their problem, upload it and through photo recognition be linked to not only the likely causal factor(s), but also linked to the relevant information for addressing the problem.



ICT and collecting feedback – How can each step be improved?

There are a number of powerful tools emerging that allow data collection while also providing swift uploading and geo-positioning.



While ICT can increase access to information, clearly not all information is useful and so access to information alone does not necessarily equate with increased action or behavior change. So how can this potentially powerful tool better lead to positive behavior change? To pursue this, we look at the factors involved in behavior change (both from the theoretical and business world perspectives) and relate this to how ICT is and could be better used to help people change their behavior.

The Theory and Business of Behavior Change

What can we learn about behavior change from Health, the world of business and the agricultural extension literature? In each case, behavior change is the goal although the actual desired change varies. For example: in the health world, behavior change often relates to personal habit change; whereas, in business (sales and marketing), behavior change typically involves the purchasing of a product, and in agriculture, behavior change is usually associated with the adoption of an innovation (or a change in farming practice).

The Theory of Change in Health

One thing to take away from the health world is the realization that behavior change is a process. It is not a single action, but rather a series of steps. These steps have been presented as the “Stages of Change” model (Table 3). Of course, this change process is predicated on the person having heard about and learning about the desired change.

Table 3: Stages of Change in the Transtheoretical model (Prochaska, DiClemente, & Norcross, 1992)

Stage of change	Description
Precontemplation	The individual has no intention to take action within the next 6 months and is generally unaware or under-aware of the problem.
Contemplation	The individual intends to take action within the next 6 months. He or she is aware that a problem exists but has not yet made a commitment to take action.
Preparation	The individual intends to take action within the next 30 days and has taken some behavioral steps in this direction.
Action	The individual changes his or her overt behavior for less than 6 months
Maintenance	The individual changes his or her overt behavior for more than 6 months and works to prevent relapse and consolidate the gains attained.
Termination	The individual has no temptation to relapse and has 100% confidence in maintaining the change.

ICT Lessons from “Alive and Thrive”



Alive & Thrive (funded by the Gates foundation and the governments of Ireland and Canada) works to enable children to lead healthier and more productive lives by ensuring good nutrition in the first 1,000 days (from conception to two years of age). Currently active in Bangladesh, Burkina Faso, Ethiopia, India and Vietnam, they have used various types of mass communication to promote their messages, including broadcast radio and TV (spots, music videos, dramas and animated videos for children); out-of-home (billboards, posters, ads on buses, neighborhood loudspeakers and TV spots displayed on LCD screens in hospitals, health centers and supermarkets or shown by mobile vans) and digital (dedicated website with interactive forum, online advertising or placement, and social media).

“Alive and Thrive” are enjoying success. For example, they have reached 2.3 million mothers in Vietnam and in the study areas in Vietnam, exclusive breastfeeding rose from 25 percent in 2011 to 51 percent (in 2013) in areas exposed to the Alive & Thrive TV spots. Adoption was even higher (60%) in areas with both the TV spots and counseling at a social franchise or community-based support group. Table 4 summarizes their approach and what they found useful.

Table 4. Summary of elements that contributed to success of the “Alive & Thrive” Mass communication campaigns. (<http://aliveandthrive.org>)

Factors	“Alive & Thrive’s” approach
Clear focus on audience and their need	Focused on mothers, the challenges mothers face and motivating factors. Focused on the behaviors with greatest impact on health Conducted studies to clarify priority behaviors and their determinants, audiences, effective communication channels, and communication placement
Raised broad awareness and used multiple channels	Campaigns were sufficiently intensive to be memorable. Impact on behavior was highest when mixed approaches were used (e.g., mass media plus interpersonal communication).
Credible clear information	Consistent messages pretested and revised until the intended audiences understood, responded emotionally, and retained the key messages. The program promoted a small number of consistent doable actions highlighting behaviors as beneficial, convenient, feasible, and as the “new norms.”
Make the message appealing	Materials developed by media professionals to be emotionally appealing.
Responsive	Programs were frequently monitored to evaluate and adjust the message and promotion strategy in response to audience feedback.

Take home message from Health: Behavior change is a process involving a clear understanding of the audience and their motivations and involves a series of steps.

Change in Business

We review below three elements often promoted in relation to business sales and marketing:

- **The four “P’s of marketing”**
- **The “purchase funnel”**
- **The “tipping point”**

We then look at some observations gleaned from discussions with practitioners in the private sector.

The four “P’s of marketing”:

One of the older marketing concepts which is still highly promoted are the 4 “P’s” for successful marketing (below and Figure 1) (McCarthy, 1975):

1. **Product:** An item that satisfies a customer need or want
2. **Price:** The amount a customer pays for a product or service
3. **Promotion:** Communications used to tell customers about your product or service. Includes advertising, public relations and personal sales and promotion.
4. **Place:** Broadly defined as distribution. Place is where transactions take place and how customers access your product or service.



Figure 1. The 4 P’s of successful sales and marketing (Xerox.com)

Australian wine as an example of the 4 P’s: Australian wines – almost unknown in the U.S. during the early 2000’s – have grown to hold a greater than 20% stake of the US wine market³. This success, which

³ Adam Teeter. 2015. “The Yellow Tail Story: How Two Families Turned Australia Into America’s Biggest Wine Brand.” <http://vinepair.com/wine-blog/how-yellow-tail-gave-america-australian-wine>

started with the Yellow Tail brand, was by design. They ensured the product was readily accessible (in terms of location, price and branding); they provided a product that their target consumers immediately enjoyed; and they had a clear promotion plan to gain market share.

Take home message. The 4 P's teach us to 1) know the audience and their needs, 2) provide a product that appeals to them (both in terms of price and straight appeal), and 3) make sure your audience are aware of and can access your product

The “purchase funnel”

You find the basic principles of marketing presented in a range of models; principles that have often been discussed and promoted for a long time. For example, the “purchase funnel” or “customer funnel” (Figure 2) is based on work from 1898, when E. St. Elmo Lewis developed a model showing a theoretical customer journey from the moment a brand or product attracted consumer attention to the point of action or purchase (St. Elmo Lewis 1898 – wiki; Edward Silva pers comm 2015) This staged process is summarized below:

- **Awareness** – the customer is aware of the existence of a product or service
- **Interest** – the customer is actively expressing an interest in a product group
- **Consideration or Desire** – the customer is aspiring to a particular brand or product
- **Purchase or Action** – the customer is taking the next step towards purchasing the chosen product



Figure 2. Purchase funnel

Used in a number of professional settings (e.g., The UC Davis Graduate School of Management Entrepreneurship Academy), the model highlights long established elements required for success in business and marketing.

The “tipping point”

While the “4 P’s” and the “purchase funnel” tell us about how to approach marketing, an analysis of the pattern of technology adoption (Figure 3 from Rogers, 1983) can also be instructive. When a new technology is introduced, we see initial uptake from a small group of innovators, followed by the early adopters, and so down the line. Based on this pattern of adoption, Gladwell (2000) popularized the concept of the “tipping point” – the point at which wider scale social change occurs. The key points here are:

1. some early adoption (by the “innovators”) will typically occur irrespective of whatever else happens
2. wider adoption relies on attracting “early adopters” up to around 15% of the target population,
3. At around 15% of adoption by the audience, wider adoption tends to follow.

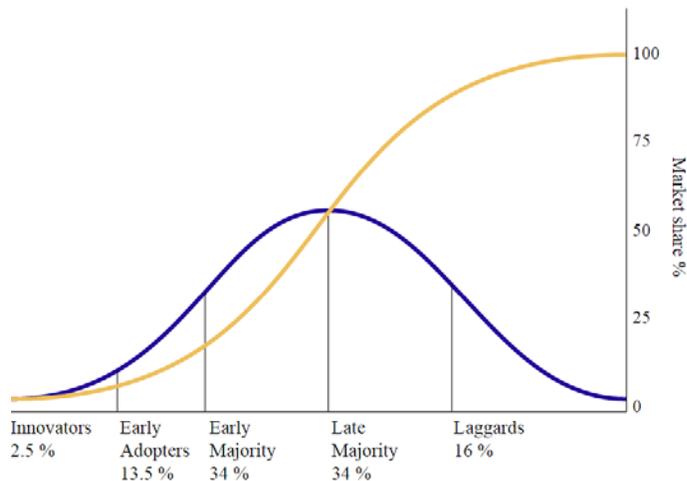


Figure 3. The diffusion of innovations according to Rogers (1983).

Take home message from business models: You need to focus on the early adopters to get adoption to the tipping point (around 15%).

Observations from Practitioners

What else can we draw from the business world? Conversations with successful private sector people indicate important additional (but related) aspects of success. These discussions detailed below especially highlight the need to provide a product with the right appeal.

- Taro Araya is CEO of Miaki, Bangladesh. Miaki started business in May 2011 with a vision to provide the best user experience for mobile value-added services; providing content and services for health, education, entertainment and agriculture. Araya highlighted that success in providing such services depends in part on the extent to which the customer has a sense of “instant gratification.” In terms of their health, education and entertainment services, gratification is essentially instantaneous. You call, pay for the service and then potentially have an “instant” sense of fulfillment. By comparison, the agricultural service has a built in delay – i.e., advice now, implementation of the service in the near to mid-term future and then results and possible gratification sometime in the future. Thus, Araya highlighted the challenge of implementing a pay-per-call agricultural service.



So the lesson from Miaki is that in addition to knowing your client and having an easily accessible, well known and trusted service, there is a time-related element in terms of the product and gratification – when a sense of gratification is experienced matters.

- Nikki Abrenilla is Associate Creative Director, Publicis JimenezBasic, Philippines. The Publicis Groupe is one of the most successful advertising companies in Asia and offers a complete range of communication services to local, national and global clients. They provide traditional advertising services, digital and interactive communications and consulting through a worldwide network of agencies. Abrenilla indicated that a key factor in successful advertising is appealing to a higher need or desire of the audience. He highlighted the need for an appreciation of consumer/audience “life insights” in order to provide a product and a message that is highly relatable and rooted in cultural nuances. With an initial training in agriculture and development communication, he observed that the equivalent in agriculture would involve considering “*the needs and motivations of the target audience that relate not only to their agricultural practices but to their life as a whole – e.g., ‘I want my yields to increase so that I can send my kids to school or buy that new tractor or replace my hut with a concrete house, etc.’*”.



- Mridul Chowdhury (CEO mPower). – mPower is a leader in the use of ICT in ICT4D and M4D (Mobile for Development) in the areas of health, research, program management and agriculture. They are based in Bangladesh, which, like Kenya, is a veritable hot spot for ICT activities. Chowdhury, as Abrenilla, stresses the need to have the audience have some form of emotional response. Mridul provided this advice:



- “Make the target audience feel “important” like you know them personally - I believe one key component of Behavior Change Communication (BCC) is the ability to personalize information. It is human to react positively to a message that seems customized for just you.”
- BCC content is much more powerful in influencing change when it enables learning through interactive means as opposed to passive, one-way approaches.
- Use content that showcases approaches tested and proven by “other farmers like me” rather than some esoteric farmer somewhere in the world.
- Melinda Gates gave an interesting Ted Talk on “What Non-Profits can learn from Coca-Cola”. In summary, companies that successfully market themselves as aspirational maintain a relationship with their clients that goes beyond brand loyalty. Aspirational brand strategy is concerned with creating a dream and generating positive emotional reactions from consumers (Hill 2010)⁴. Aspirational brands inspire, guide, and motivate beyond product benefits alone (see Table 5)⁵.



Table 5. Some major brands and the aspirations they tap (from Hunter 2012a based on some of the broad aspects of self-concept (Hunter 2012b)⁶)

Brand	Image and Emotions Associated with brand
McDonalds	Family enjoyment and togetherness around a fast food meal.
Nike	Transformation on the sports field
The Body Shop	Social equality and justice in business
Disney	A magical world of fantasy for the family
Air Asia	Now everyone can afford to fly
Apple	Transforming how people use technology
Amazon	The largest range of reasonably priced books available
Google	Making the world’s information accessible

Take home message from business practitioners. You are more successful when you provide a product that creates an emotional response on behalf of the audience and when you are linked, listening to and engaging with them. This is what “aspirational marketing” aims to achieve.

⁴ Hill, D. (2010), *Emotionomics: Leveraging Emotions for Business Success*, London, Kogan Page Ltd.

⁵ Hunter, M. 2012a. *What’s with All the Hype – a Look at Aspirational Marketing*. The Nordic Page.

⁶ Hunter, M., (2012b), *Opportunity, Strategy, & Entrepreneurship: A Meta-Theory, Vol. 1*, New York, Nova Scientific Publishers.

Change in Agriculture and Development

Pannell et al. (2006) provide a useful summary of the key points associated with adoption of an agricultural innovation. They concluded that adoption is much more likely to occur when innovations are 1) perceived to be superior to the idea or practice that it supersedes, and 2) when the innovation is easy to test and learn about before adoption.

In addition, 7 case studies and reviews of lessons learned in the use of ICT in Ag and development were reviewed (Appendix 1). Observations ranged as there were lessons on policy and infrastructure etc.. Common lessons highlighted the need to focus on the audience, provide needed content, respond to the users and make information widely and easily available.

Take home message from Agriculture and Development. Technology adoption in Agricultural extension is more likely to be successful when the technology is 1) perceived to be superior to the idea or practice that it supersedes, and 2) when the innovation is easy to test and learn about before adoption. Focus on the audience and respond to their needs, making information accessible.

Principles for Promoting Behavior Change – The “AID” Model

Combining the various aspects of introducing behavior change across the above areas (health, business, development and ag extension) and gleaned from the business experts, we can summarize what emerge as the key points required to successfully introduce behavior change. For simplicity, we suggest three focal elements:

- 1) **Aware** Do people know about your information?
- 2) **Interested** Do people care and want to learn more?
- 3) **Doable** Can people easily do something with the information if they want?

We expand on each of these factors below, and then in the next section, we see how some of the more successful ICT initiatives match with these principles and the extent to which they agree.

1. Aware. Be clear on who your audience is, what their needs and interests are, and how to reach them

- Be clear on your audience and how to reach them.
- Provide information that is easily and widely available and accessible.
- Use multiple channels to provide reinforced messaging (i.e., use a range of relevant delivery channels – both new and traditional) to have greater impact. Linking one delivery approach with other forms of delivery to “reinforce the message” builds greater confidence in the message.
- Keep in mind that the power of “seeing” is particularly strong in influencing behavior change.

2. Interested. Connect with your audience to appeal to their interests, to build trust, and be responsive to their feedback.

- Provide information that responds to the interests and needs of the audience. Or if they are not yet that interested in what you have to offer them, package it in such a way that will make it more interesting (whether in layout, color, channel, etc.) and make them say 'Hey, I want in on that approach!'
- Establish trust in both the message and the messenger. Ensure the message (content) is always correct and present it in a way that showcases approaches tested and proven by “other farmers like me” rather than some esoteric farmers somewhere in the world.
- Make a personal (emotional) connection. Make the target audience feel important like you know them personally and the information is just for them. It is human to react positively to a message that seems customized for just them.
- Provide content that viewers identify with. Use consumer/audience life insights to make information highly relatable and rooted in cultural nuances. This approach makes for more compelling message formulation and delivery.
- Instant gratification. If you want people to pay for a service, willingness to pay is higher when gratification is immediate. Thus, consider how the product can be delivered under such conditions.
- Interact with your audience to further build trust; collect feedback in order to modify the approach, the message and the packaging; and identify emerging needs.

3. Doable. Provide information such that the audience want and can easily test the product.

- Have recommendations that are proven, clear, concise, show clear benefit and are easy to test. They should be relevant and practical. Provide the information in ways the audience can easily understand and act upon.
- Provide content that enables learning through interactive means (rather than passive, one-way approaches) to provide more powerful messages in influencing change.

Additional Factors for Success. As well as the factors described under “AID,” we identified three institutional factors needed to be successful in using ICT:

4. Flexibility and agility.

- Successful initiatives use the principles outlined above, but they also typically show remarkable flexibility and agility of effort. They quickly change and adapt – responding to and building off both their implementation experiences (what worked and what didn’t work) and on emerging promising options.

5. Acceptable upfront costs if wanting to sell a service.

- The company’s marketing model is important. One observation related to people’s hesitancy to buy a service when costs were upfront versus “pay as you go”. For example, it was shared with the authors that while customers may hesitate to buy an on-line game up front, they will then spend much more while actually playing the game (e.g., paying to get a service to speed up part of a game).

- **Competent teams.**
- Success will depend on competence throughout the team – where members understand the audience, their needs, what is appropriate and how best to communicate with them.

ICT’s Role in Behavior Change in Agricultural Extension

The issue is then how can ICT better meet the requirements for each of these steps to more fully encourage behavior change? We look at this in two ways. Firstly, we look at the general opportunities for ICT to strengthen each step (Table 6) and then we worked with specific “successful” ICT initiatives (Table 7) to review with them how their efforts fit with the AID principles. The goal was to establish a set of robust and inclusive principles.

Table 6. General considerations in the use of ICT in the “AID” model.

“AID” Model Factors	ICT options and considerations
A - Awareness. Do people know about your information?	
Be clear on your target audience.	ICT (especially the web) dramatically expands potential reach and access. However, promotion through multiple channels is typically needed so the audience knows the resource exists! How can ICT better help identify the audience in need and their interests? While “Push” SMS are often promoted to directly reach the farmer, risk of being viewed as spam is an issue. Example of application: Farm Radio International works with established, trusted programs and so quickly gains access to a wide audience.
Use a diverse and relevant range of communication channels to make sure your audience(s) is readily aware of your product/service.	
I - Interested. Do people want to learn more?	
Provide proven information that addresses specific needs and interests of the audience.	ICT (especially the use of video and visuals) dramatically expands the potential to build both trust and an emotional connection with the audience. Example of application: Digital Green (DG) and Shamba Shape-Up (SSU) feature people “just like me” so the audience can easily relate to them. Mobile based GPS systems allow real-time, in the field feedback. Example of application: DG and SSU have feedback mechanisms to quickly collect and monitor feedback and so adapt their message and approach to better connect with their audiences. Two-way communication, especially interaction through cell phones, helps build trust. Example of application: Farm Radio International
Become or work with a trusted source of information (credible proven content).	
Have your message appeal at an aspirational (emotional) level.	
Build in feedback to respond to emerging needs and audience responses to your information.	

“AID” Model Factors	ICT options and considerations
	Note. While ICT is powerful, farmers often want to see information field validated In their regions.
D - Doable. Can people easily try it?	
Provide information that is easy to apply and has obvious benefit	Interactivity on a web site enhances learning for ease of implementation, but connectivity can be a limiting factor.
Provide information which can be easily understood and tested.	The use of video and other visuals presents powerful ways to deliver information so potential users can easily see what the end product looks like and make implementation easy. Example of application: The proliferation of “how to” videos on Youtube . Also DG and SSU use their videos to show how farmers can quickly and effectively implement a practice. Their messages are backed up with instruction through other media.

Table 7: ICT in Ag initiatives used to compare AID principles with their approaches in introducing behavior change in agriculture*.

ICT media used	Example of “successful” initiatives*
Video	Digital Green
TV	Shamba Shape Up
Radio.	Farm Radio International
Cell phone.	ATA call centers (Ethiopia)
The internet as a source of focused knowledge.	The Rice Knowledge Bank
Social media	Facebook

* **Note:** The above table is not exhaustive in terms of successful ICT in Ag initiatives. It just selects a subset of ICT in Ag initiatives dealing with extension topics. Omission from the above table in no way indicates that other efforts are not enjoying success.

While many ICT programs or initiatives may raise awareness of “new” farming practices, we look here at a subset of ICT initiatives whose approaches seem to be more successfully leading to behavior change in Agriculture.

Digital Green

Primary contact. Rikin Ghandi.

About. Digital Green is a not-for-profit international development organization that partners with local public, private and civil society organizations to share knowledge on improved practices in agricultural practices, livelihoods, health, and nutrition, using locally produced videos and human mediated dissemination.

digitalGREEN

To date, Digital Green have produced over 3,700 videos in more than 20 languages, reached 7,448 villages and over 640,000 community members. They are active in eight states in India and in select areas in Ethiopia, Ghana and Tanzania in Africa. They are working with over 20 partner organizations.

Impact and Indicators of success: In a controlled evaluation, the Digital Green approach was found to be 10 times more cost-effective and uptake of new practices seven times higher compared to traditional extension services. Since inception in 2008, there have been over 520,148 adoptions.

Table 8. Digital Green. How their approach fits into the AID model principles.

Factor	Digital Green (Video). Their approach
Awareness. Do people know about your information?	
Be clear on who the audience is	Partner with public and private agricultural extension systems that are already working with rural communities
Raise Awareness widely.	Open-source videos, impact data, and software technology on the web to gain more partners; Institutionalize approach across multiple levels of existing extension systems
Use multiple delivery channels	Link videos to extension partners' training programs and exchange content with complementary broadcast radio and mobile-based interactive voice response system programs where possible
Interested. Do people want to learn more?	
Clearly identify audience needs	Begin by building on extension partners' existing interventions and experience; Iterate content based on farmer feedback and adoption data
Have a clear message with obvious benefit	Short videos feature fellow farmers demonstrating or testifying their experience with an agricultural practice; Videos are screened by extension agents at times and locations appropriate for farmers to adopt them
Build Trust	Work through extension partners' existing village-level agents that have mobilized farmer groups; Engage farmers by screening videos during regularized meetings;
Appeal at an emotional level	Feature local trusted farmers in the videos that viewers identify with
Interact with the audience and collect Feedback	Support extension agents with videos that spur discussion among audiences during village meetings; Collect data on farmer attendance at video screenings, interests and questions expressed, and technology adoption
Doable. Can people easily try it?	
Have a message that can be easily tested	Videos draw on local practices and local practitioners and are synchronized with existing extension interventions to target the field follow-up of extension agents and give audiences access to products and services that might be needed to take action on the information

Farm Radio International



Primary contacts: Dave Mowbray, Bartholomew Sullivan, Mark Leclair, Kevin Perkins

About. Farm Radio International (FRI) has three primary services – providing Broadcaster resources, Broadcaster training and Impact programming.

Broadcaster resources. They develop radio scripts, information packages, a weekly electronic news service, and a special on-line community called Barza, and share them with thousands of African broadcasters. Aimed at Agriculture, health and nutrition, these resources research, produce and present relevant and engaging programs for their audience of tens of millions of farmers.

Broadcaster training. FRI train broadcasters, including direct in-station training, distance education and custom workshops to help them meet a higher standard of farm radio services.

Impact programming. FRI partner radio stations to plan and deliver special radio campaigns and programs that have a specific impact on a development challenge such as soil erosion or banana bacterial wilt.

Impact and Indicators of success: FRI have worked directly with more than 80 radio stations in 10 countries in sub-Saharan Africa in the past 5 years with more than 5 million farm families as beneficiaries. Regular broadcaster services provide content on a weekly basis to 600 broadcast partners.

Table 9. Farm Radio International: a comparison of their approach for each of the identified behavior change principles.

Factor	Farm Radio International. Their approach
Awareness. Do people know about your information?	
Be clear on who the audience is	Prior to every project we do formative research with target audience samples... we do focus groups and baseline surveys -- to determine among other things whether or not radio programs would be a useful approach and find out what times the specific target (for example women bean farmers) are available to listen to radio. Our formative research also assesses current knowledge and attitudes that lets us both plan the most appropriate content for radio interventions and permits better evaluation/measurement of change at the end of our projects.
Raise Awareness widely.	Partner with established radio stations that work in local languages and that audiences already trust. We train the stations to produce the programs that will bring the desired knowledge to the audience that has been targeted and to produce high quality programs that the audience will want to listen to
Use multiple delivery channels	Our partner stations work with national programs to multiply the effectiveness of fields days and other extension services (in fact often extension officers are key members of the audience -- learning as the farmers learn). On the other side, often broadcasters will feature good extension staff as on-air experts. All broadcasts feature the voices of farmers in the field and all broadcasts offer feedback mechanisms for the audience. This can be via mobile phone call ins, beep-to-vote missed call polling and other means.
Interested. Do people want to learn more?	
Clearly identify audience needs	Work with communities to identify topics of interest and focus their programs on what the audiences have indicated they want and need.
Have a clear message with obvious benefit	Our broadcasts encourage farmers and other audience members to make informed decisions and take informed action. Programs are no always 'promotional' in nature but they reflect the audience and its concerns back to itself
Build Trust	Purposely identify and work with trusted local partners from the onset. This is especially important for the radio station partners we work with. The audience must trust them. We also have to select our knowledge partners. They have to be able provide accurate and trustworthy information that is useful for the target audience.

Factor	Farm Radio International. Their approach
Ensure accuracy of content	Each project has a content advisory panel made up of experts from our knowledge partners to help determine the scope of content for a full program season and review the implementation. The panel also monitors broadcasts to ensure accuracy -- and makes sure corrections are aired if errors are made by our partner broadcasters.
Appeal at an emotional level	All programs feature real stories from farmers in the target communities with passion (we do this via interviews and dramas). We also monitor broadcasts to ensure they are following the broadcast plan but most importantly to ensure the programs are accessible and entertaining with high emotional content.
Interact with the audience and collect Feedback	Combine radio programs with field interviews, on-air cell phone call ins, phone polling and quizzes, and local field demonstrations. Feedback is very important because it helps identify where the broadcasts are understood and where they are not.
Doable. Can people easily try it?	
Have practices that can be easily tested against broadcast listening	We design our broadcast delivery to permit post broadcast testing. Using sophisticated signal mapping software we locate 'radio dark' communities to use as controls so we can properly measure the impact of the broadcasts.

Rice Knowledge Bank

About. To bridge the gap between research and practice in rice production, the International Rice Research Institute (IRRI) developed the Rice Knowledge Bank (RKB)—a digital extension service that provides practical knowledge solutions, specialized for small-scale farmers in developing countries. The RKB showcases rice production techniques, agricultural technologies, and best farming practices based on IRRI’s pool of knowledge from research findings, learning and media resources, and in-country projects. To facilitate easy access to information, RKB highlights the Step-by-step Production Stages from pre-planting to postproduction management, Decision Tools, and Agronomy Guides to help people make informed farming decisions. The RKB serves to address the biggest challenge to agricultural development by supporting fast and effective transfer of technologies from the research laboratory to the farmer’s field.



Impact and Indicators of success: In 2014. 364,572 sessions averaging 3.14 minutes = more than 19,000 hours of focused information gathering.

(Bryce Blackman provided input on recent RKB use.)

Table 10. Rice Knowledge Bank. A comparison of their approach for each of the identified behavior change principles.

Factor	Rice Knowledge Bank (On-line knowledge). Their approach
Awareness. Do people know about your information?	
Be clear on who the audience is	Make available through institute web; use in training events; run national workshops. The RKB links to field practitioners to collect feedback on recommendations to refine both the message format, and the recommendation per se.
Raise Awareness widely.	The RKB is an integral part of IRRI and is widely promoted both through its website and its literature.
Use multiple delivery channels	Material is produced on the web and is available in written form. The intent is to ,link information with field demonstrations. The RKB has been branching out to develop tools for select topics using cell phone.
Interested. Do people want to learn more?	
Clearly identify audience needs	While the rice farmers are the beneficiaries, information intermediaries are the primary intended user of the resource. Material is developed for a literate extension worker with at least secondary and possibly university education
Have a clear message with obvious benefit	Package materials in simple language, practical single page fact sheets for technologies validated in the field.
Build Trust	Target the intermediaries who are working with the beneficiaries (usually farmers). Work with trusted national partners; Respond to user feedback.
Appeal at an emotional level	The appeal of the material is really in the hands of the intermediaries who use the RKB information and pass it on to their farmers.
Interact with the audience and collect Feedback	Through its many field programs and training materials, IRRI interacts with users to evaluate and collect feedback.
Doable. Can people easily try it?	
Have a message that can be easily tested	Fact sheets are designed to present information that is simple, clear concise, practical and easy to implement. Messages are tested with audiences.

Shamba Shape-up

About. Shamba Shape Up (SSU) is a TV-show that uses edu-tainment to improve the livelihoods of millions of farmers in eastern Africa through the development of educative, entertaining and effective media. The program empowers people by providing the vital knowledge and information they can use in forms that can be widely accessed and understood.



Impact and Indicators of success: Shamba Shape Up airs in Kenya, Uganda and Tanzania to up to 11 million people each week. Evaluation studies suggest the show is creating lasting impact. Approximately 5 million people in Kenya alone watch SSU at least once a month (Mediae, 2014 Shamba Shape Up KAP Report, 2014) and studies indicate hundreds of thousands of viewers (428,566 households in a 2014 study in Kenya) have made changes in their farming practices based on watching the show and information they subsequently received. (Reading University, Assessing the Impacts of Shamba Shape Up, 2014)

Table 11. Shamba Shape Up. A comparison of their approach for each of the identified behavior change principles.

Factor	Shamba Shape Up TV
Awareness. Do people know about your information?	
Be clear on who the audience is	Small- and medium-scale farmers with recurrent agricultural challenges in Kenya, Tanzania and Uganda.
Raise Awareness widely.	The TV program reaches millions.
Use multiple delivery channels	Series on national TV stations, on national Radio in Kenya. Further information print and SMS facilities accompany all programs, (farmers SMS for a leaflet or ask questions) allowing key messages to be summarized on leaflets and SMS system to manage questions and requests for information. The Internet, social media such as Facebook and YouTube are proving invaluable in creating a two-way relationship with audiences.
Interested. Do people want to learn more?	
Clearly identify audience needs	Topics addressed are those faced by the farmers that are visited in each episode. SSU film on farms in all different regions, cultures, ecological zones and farming types to make sure the different groups in the audience are represented. The annual KAP surveys and the SMS database tell SSU what the farmers want to know more about, and the research sector tells SSU what the audience needs to know about.
Have a clear message with obvious benefit	Solutions are those provided by experts from partner organizations who specialize in the topics to be covered in the episode. Each shape up shows the farmer what the problems they have are caused by, how to fix them and what the benefits are. The show then revisits farmers to see how they have fared with the change and give them additional tips if they need.
Build Trust	SSU have been building a brand over the past several years. The Shape Up team visit a different farm each week in a different area of the country. The team involve the film crew and a number of experts from partner organizations who specialize in the topics to be covered in the episode.

Factor	Shamba Shape Up TV
	SSU is the most trusted source of agricultural information in Kenya, and over 90% of the audience rate the program as 'good' or 'very good'. This has caused a shift change in the way farmers access their information; in 2012, before the first series, less than 8% of farmers got their most useful farming information from TV. Now, over 50% do so.
Appeal at an emotional level	SSU uses humor and local farmers to build a link with the audience. The audience identifies and empathizes with the farmers in the show and often see farmers struggling with the same problems they have (Reading University, 2014).
Interact with the audience and collect Feedback	<p>During every program, audiences are invited to text-message if they would like a leaflet detailing more information on the key issues covered, or if they wish to interact with the show on other issues.</p> <p>SSU conducts pre and post broadcast KAP (knowledge, attitude and practices) surveys, carried out across the country immediately prior to and post the series' first broadcast run.</p> <p>The show's Facebook site is one of the largest farming social media sites on the continent and sees peer to peer interaction between farmers, runs competitions and quizzes and gathers feedback on the show.</p>
Doable. Can people easily try it?	
Have a message that can be easily tested	<p>SSU provides the critical knowledge and information farmers need in forms that can be widely accessed and understood.</p> <p>All the recommendations on the show are practical, easily understood and applied, and that have been well tested or are in practice (i.e. no gimmicks or fads) and seen to be beneficial.</p>

Agriculture Transformation Agency’s Call Center, Ethiopia

Primary Contact. Elias Nure, Team Lead for ICT in Agriculture;
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About. The ATA call Center uses Interactive Voice Response (IVR) and SMS to provide farmers with best practices information on a range of selected crops (including wheat, barley, and high-value crops like pulse crops, potato, onion, and carrot). Smallholder farmers call a free “8028” number for an automated hotline using IVR. In addition, ATA also use a push-based voice and SMS system to notify farmers of pertinent agriculture issues based on specific characteristics of the farmers which is collected when the farmers initially register on the system. Its content is available in three languages (Amharic, Oromiffa, and Tigrigna) and is updated periodically to cover additional areas.

Indications of impact. After an initial pilot system launched in February 2014 in four regions, the project content was expanded in July 2014, to address the needs of farmers during pre-planting, planting, and post-harvesting seasons. The system presently runs on 90 phone lines. The system (from July 2014 to April 2015) had received over 5,700,000 IVR calls from more than 314,000 registered smallholder farmers.

Table 12. Ethiopia ATA call center. A comparison of their approach for each of the identified behavior change principles.

Factor	ATA Call Center, Ethiopia
Awareness. Do people know about your information?	
Be clear on who the audience is.	ATA focus on poor small-scale farmers (and development agents) with common major agricultural crops facing similar challenges in selected provinces.
Raise Awareness widely.	The system is promoted through radio, and through traveling trucks that broadcast the message about the system.
Use multiple delivery channels	<p>ATA uses IVR and push SMS messages. They are currently working with others (e.g., Digital Green, Farm Radio International) to develop community relevant videos for local viewing.</p> <p>Information is also delivered through traditional mechanisms.</p> <p>The information is consistent with information demonstrated through Extension directorate.</p>
Interested. Do people want to learn more?	
Clearly identify audience needs	Topics focus on best practices related to widely important crops.
Build Trust	ATA build trust by aligning themselves with and working closely and confirming a consistent message share by other trusted government partners (e.g., EARI, extension).
Appeal at an emotional level	ATA focuses on content. The message is scripted to be comfortable (appropriate language and level) for the audience to be able to relate to and thus build a connection.
Interact with the audience and collect Feedback	ATA use a “dashboard” in real time to track callers and their areas of enquiry. (ATA are planning an IVR system to collect feedback and a comprehensive impact system.)
Doable. Can people easily try it?	
Have a clear message with obvious benefit	Solutions are provided by experts from partner organizations who specialize in the topics and have validated the best practices under user conditions.
Have a message that can be easily tested	ATA learned after the pilot to ensure they provide simple, clear messages (e.g., line planting in tef). They found early messages were often a little too complicated. Push messages change according to the cropping calendar.

m-Pesa comparison

For interest, we look at how the above compares with m-Pesa and the factors that are said to be key to their success. In a Bill & Melinda Gates Foundation sponsored review (Mas and Amolo, 2010), the three key aspects of M-PESA's success were identified as:



1. create awareness and build trust through branding;
2. create a consistent user experience while building an extensive channel of retail agents offering cash in/cash out services; and
3. provide a customer pricing and agent commission structure that focuses on key drivers of customer willingness to pay and incentivized early adoption.

These three factors obviously have quite good overlap with the factors listed under AID.

Facebook – an example of social media



Examples of the use of Facebook to connect farmers and extension workers are common. Whether such connections promote behavior change at present is more anecdotal than documented. However, with its clear popularity and its ability to link people, it is at least worth including here to see how it rates against the behavior change principles.

About. Facebook is an online social networking service. Across the USA, and many other countries (e.g., Australia, Pakistan, Cambodia, etc.) virtually every extension service has at least one if not many Facebook accounts.

Indications of impact. Yet to be determined.

Table 13. Facebook. A comparison of their approach for each of the identified behavior change principles.

Factor	Facebook
Awareness. Do people know about your information?	
Be clear on who the audience is.	Groups essentially choose themselves.
Raise Awareness widely.	Facebook (or its equivalent – e.g., “wechat” in China) are becoming ubiquitous in virtually every country
Use multiple delivery channels	While Facebook is essentially mobile based, it can present information in multiple forms, pictures, videos, links, text.
Interested. Do people want to learn more?	
Clearly identify audience needs	Audience needs become the focus of the individual group.
Build Trust	Trust development depends on the group engaged.
Appeal at an emotional level	Features like “like” actually help people make an emotional link leading to release of hormones such as oxytocin.
Interact with the audience and collect Feedback	Facebook is primarily developed to increase group member interaction and feedback.
Doable. Can people easily try it?	
Have a clear message with obvious benefit	This would be dependent on the group members.
Have a message that can be easily tested	This would be dependent on the group members.

Conclusions

Both the reviews and consultations across a wide range of players in multiple organizations and fields of endeavor (health, business, advertising, and agriculture) identified a remarkable consistency in terms of the relatively simple yet common factors that people felt better help “turn information in to action”. For simplicity, these factors were structured as “AID”:

1. Awareness - **Do people know about your information?**
2. Interested - **Do people want to learn more?**
3. Doable – **Can people easily try it?**

It became clear that these factors, while not particularly revolutionary, formed a solid basis for building success. Using these factors as a self-audit of one’s ICT in Ag efforts can help strengthen initiatives in terms of what is needed.

Table 14. The AID model for behavior change in ICT4Ag

Focus	Major points involved
Awareness.	Do people know about your information? Be clear on your target audience Use a diverse and relevant range of communication channels to make sure your audience(s) are readily aware of your “message”.
Interest	Do people want to learn more? Provide proven (credible) information that has obvious benefit and addresses specific needs and interests of the audience Become or work with a trusted source of information (providing credible proven content), Have your message appeal at an emotional level. Build in feedback to respond to emerging needs and audience responses to your information.
Doable	Can people easily try it? Provide information which can be easily understood and tested.

Further, at an institutional level, successful organizations show

4. acceptable upfront costs
5. flexibility and agility, and
6. competent team members.

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Appendix 1: Self-audit or program review

Use the following to evaluate your ICT program. Neglecting any one item can reduce your chances of success.

Major points involved	Self-evaluation	Any actions required?
Awareness. Do people know about your information?		
Do you have clarity of your target audience?		
What range of communication channels are used to deliver your message, and how relevant are those channels to your audience(s)?		
Interest. Do people want to learn more?		
Evidence that the information is proven valid and addresses specific needs and interests of the audience		
How have you built linkages and trust (i.e., are you really a source of credible proven content)?		
How are you appealing at an aspirational (emotional) level?		
What mechanisms do you have to actively collect feedback, and how are you responding to emerging needs and audience responses to your information?		
Doable. Can people easily try it?		
Is there evidence that your information is easy to apply and has obvious benefit?		
Is there evidence that your information can be easily understood and tested?		

Appendix 2. Recommendations and lessons learned – gleaned from various “ICT4D” and “ICT 4AG” reports

A. Melpolder, J. 2014. The Best Practices in the Use of ICTs in Development Are ... ICT works by inveneo. www.ictworks.org/2014/03/28/the-best-practices-in-the-use-of-icts-in-development-are

1. It's about people, not technology.
2. Understand the local environment.
3. Use appropriate tools.
4. Use iterative project planning cycles.
5. Build in monitoring & evaluation from the start.

B. 2011. ICT in Agriculture Sourcebook *Connecting Smallholders to Knowledge, Networks, and Institutions*. The World Bank. <https://openknowledge.worldbank.org/handle/10986/12613>

1. Concentrate on the Demand, Not on the Technology
2. Use Appropriate Technologies
3. Focus on Affordable Access and Use, Not Ownership
4. Be Aware of Differential Impacts, Including Gender and Social Differences in Access and Use
5. Create an Enabling Environment for Innovation in Infrastructure Investment, Business Models, Services, and Applications
6. Promote Leadership and Find Champions

C. Batchelor, S., Evangelista, S., Hearn, S., Peirce, M. Sugden, S. 2003. Mike Webb (Big World) 2003. ICT for Development Contributing to the Millennium Development Goals. Lessons learned from seventeen infoDev Projects. infoDev. Information for Development Program. <https://openknowledge.worldbank.org/handle/10986/14845>

Lesson 1: Involve target groups in project design and monitoring.

Lesson 2: When choosing the technology for a poverty intervention project, pay particular attention to infrastructure requirements, local availability, training requirements, and technical challenges. Simpler technology often produces better results.

Lesson 3: Existing technologies—particularly the telephone, radio, and television—can often convey information less expensively, in local languages, and to larger numbers of people than can newer technologies. In some cases, the former can enhance the capacity of the latter.

Lesson 4: ICT projects that reach out to rural areas might contribute more to the MDGs than projects based in urban areas.

Lesson 5: Financial sustainability is a challenge for ICT-for-development initiatives.

Lesson 6: Projects that focus on ICT training should include a job placement component

D. The UK report: Harnessing the potential: ICTs and Knowledge Sharing in Agriculture www.appg-agdev.co.uk/images/documents/ICTs_and_Knowledge_Sharing.pdf

The All Party Parliamentary Group on Agriculture and Food for Development recommends that national governments, Donors, the private sector, NGOs and wider stakeholders:

1. Recognise that for rural communities and smallholder farmers to benefit from ICTs in agriculture, rural infrastructure development must be incentivised.
2. Prioritise effective evaluation of the impact of ICTs and strengthen the evidence base. A database cataloguing successes and failures should be developed to help with learning and avoid repeating unsuccessful practices.
3. Harness the potential to combine delivery channels, including face-to-face interaction, to reach an even wider audience.
4. Promote user-driven services and supporting government policies. Addressing women's time and financial constraints to access the technology and act upon the services, should be given the highest priority.
5. Harness the potential to combine multiple delivery channels to reach disadvantaged populations.
6. Explore ways to enhance informal farmer-to-farmer mobile supported discussion for co-creation of knowledge and increased behavioural change.
7. Ensure that ICTs are linked to existing extension services, including government-run programs. Engaging national governments in ICT4Agriculture programmes to promote a sense of ownership and to facilitate the development and approval of supporting policies.
8. Ensure that the content of extension messages disseminated via ICTs is based on sound and appropriate science in an open and transparent manner.
9. Promote sustainable and innovative business models, ensuring that revenue models cover real costs.

E. Information and Communications Technology 8 Policy Recommendations For the advancement of Knowledge Societies across Africa. A Product of African Leadership in ICT course. www.gesci.org/assets/files/ICT_leaflet_policy_recommendations%201.pdf

1. Build a solid National Telecommunications Infrastructure
2. Ensure Access for All
3. Provide a Proper Cyber-legal Environment
4. Integrate e-Governance across all Citizen Services
5. Strengthen the ICT4D Value Chain
6. Build ICT Ecosystem Resilience
7. Promote ICT Literacy to all Citizens
8. Ensure Policy Coherence

F. Stienen, J. Bruinsma W., and Neuman, F. 2007. How ICT can make a difference in agricultural livelihoods, International Institute for Communication and Development (IICD). Information and Communications Technologies. The Commonwealth Ministers Reference Book.

1. Foster strategies and programmes with a long-term perspective.
2. Create multi-stakeholder mechanisms for learning
3. Raise awareness on the role of ICT4D in poverty alleviation
4. Ensure availability and access to relevant information
5. Enhance rural access

G. Raftree, L., and Bachan K. 2013. ICT with a youth and gender focus. Integrating Information and Communication Technologies into Communication for Development Strategies to Support and Empower Marginalized Adolescent © UNITED NATIONS CHILDREN’S FUND (UNICEF) August 2013 www.unicef.org/cbsc/files/ICTPaper_Web.pdf

Program Design

- Understand local context.
- Make sure communication channels are accessible
- Use multiple platforms and channels
- Ensure programs are community-driven
- Use real-time feedback from girls
- Conduct a gender analysis
- Provide girls with inspiring mentors and opportunities to lead
- Use an ecological framework to assess circles of influence and program effectiveness.

Privacy and protection

- Conduct a strong risk analysis of proposed approaches
- Establish additional protection measures for adolescent girls
- Build conditions for girls to become self-reliant, independent and aware of the risks

Program Research

- Establish an evidence base for the use of ICTs in C4D strategies with adolescent girls.
- Develop robust indicators that can be measured against program results to determine impact.
- Evaluate, learn and share.

Capacity Building

- Improve management, staff and partner capacity.
- Create an “ICT for C4D Tool Box”
- Acknowledge failures and learn from them.
- Encourage partnership

Policy

- Use open source software.
- Update child protection measures and guidelines.
- Acknowledge failures and learn from them.
- Encourage partnership

Appendix 3. Contributors

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