



2009-10



ANNUAL REPORT

Digital Green works to build technologies and to serve as a resource agency to maximize the potential of the partners and the communities that we work with. The last year has been one of great learning and progress in the field and as a team.

We spun-out of [Microsoft Research](#) and came together as the Digital Green team for our first [orientation boot camp](#) in May 2009. Our operations team laid the groundwork by working closely with our partners: understanding local contexts, cultivating relationships, and developing a framework for ensuring quality. Initially, our team members were embedded in the field offices of our partners. This proved useful in providing on-site training for our partners as well as ourselves. As the work gained traction in the field, we entered into new partnerships through a rigorous due diligence process that emphasized our role as "trainer of trainers" and focused on improving the cost-effectiveness of our partners. Our team transitioned to this model by relocating to offices in the state capitals of Madhya Pradesh, Orissa, and Karnataka and providing support to our partners from these hubs.

The Digital Green system now extends to over 400 villages and involves over 26,000 farmers. During the last year, over 700 videos have been produced of farmers, by farmers, and for farmers; 8,000 mediated screenings of videos have taken place in these villages; and 6,500 better agricultural techniques have been taken up by farmers on their fields. As the system has scaled, we have encountered challenges and gained some important [learnings](#). A key focus area is quality assurance. We have developed standard operating procedures and are strengthening mechanisms for internal audits and third-party certification reviews. Our technology team has built the software platform that powers Digital Green with an open-source data management framework, called COCO, which enables rural areas that often have limited Internet connectivity to exchange data with the world and an Analytics suite of dashboards to better coordinate our operations and to analyze our progress across the country based on time and location. We also launched a new website and an interface to sort through the expanding library of videos that our network of partners and communities is producing. And in the field, we replaced bulky and expensive camcorders,

TVs, and DVD players with low-cost, high definition pocket video cameras to capture videos and increasingly brighter, battery-operated pico projectors to disseminate them.

We are collaborating with researchers from UC Berkeley to design a large-scale evaluation of the Digital Green system and are piloting an interactive voice response system accessible by phone which supports the community members involved in our work.

The Digital Green team has grown to nearly five-hundred people supporting our efforts on the ground. Our eighteen core team members now work with seven partners across four states in India. Eighty-one staff members of our partners run the Digital Green system with the four-hundred members of the community who create and distribute locally relevant videos on a day-to-day basis. We have learned and shared much with one another and are gearing up for our second partners' meet and team retreat next month.

Along the way, we have generated some buzz in the media, garnered awards from MIT's Technology Review and Fortune Magazine, published a paper on COCO at the ACM Symposium on Computing for Development, and connected with networks like TED and Ashoka. We even had the extraordinary opportunity to share Digital Green with President Obama during his recent visit to India.

We are exploring collaboration possibilities with several civil, private, and public sector organizations to extend our work, in sectors like public health and skills development, and in forums of mass and social media to engage different audiences.

We are excited by the progress that we've made so far and look forward to bringing about an even greater change.

Field Developments



Partnership

Model partnering is central to our ability to successfully achieve our objectives. We not only aim to enable our partners to deliver on Digital Green's technical package, but also to build institutionally strong and empowered partners that will continue building the system even after the project duration ends. We consequently had to develop short- and long-term strategies with each of our partners, each of which are diverse and heterogeneous organizations. Digital Green's role then is essentially to raise the technical capacity of our partners and then provide supportive supervision. A national-level workshop with all of our partners and several state-level workshops have been held to orient partners on the Digital Green system and its technology platform. Some of the specific training sessions have covered topics including: (1) video production and dissemination, (2) standard operating procedures and mechanisms for quality assurance and internal audit, (3) institution guidelines for partners to prepare and submit implementation proposals and budgets, and (4) data validation and management using the COCO framework.

Standard Operating Procedure

As we scale the Digital Green system, quality assurance has become increasingly challenging and critical. We have developed Standard Operating Procedures (SOPs) to provide a framework for the end-to-end Digital Green system to ensure consistency in operational processes and outcomes: from best practices in sharing the concept of Digital Green with a community to video production and dissemination to capturing and analyzing the community's feedback. The SOPs initially served as reference guides for Digital Green team members involved in executing project activities. As the organization's role evolved, the SOPs were reworked and translated so that they could be used by our partners directly. The SOPs are publically accessible via our website: <http://www.digitalgreen.org/sop/>.

The SOPs have played an important role in ensuring quality in our operations. We have instituted an internal control system to audit and certify our interventions based on the SOPs. This includes a checklist-based review at regional meetings on a monthly basis on 21 priority areas that we have identified as crucial to assuring consistent and successful outcomes. In the next year, we intend to transform our written SOPs into a video-based curriculum for broader accessibility.

Monitoring and Evaluation

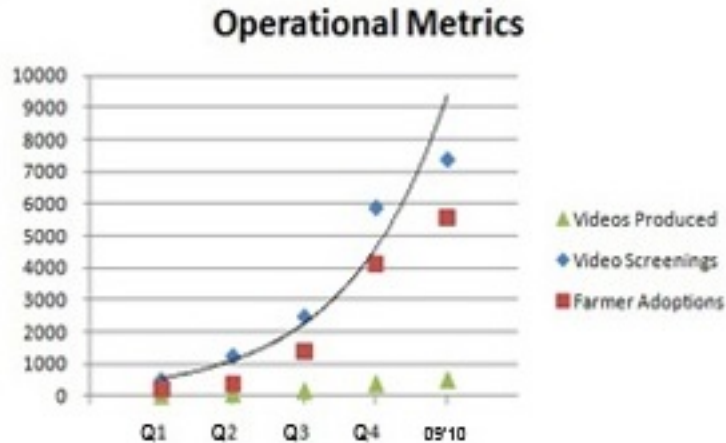
Data is central to our ability to achieve the qualitative and quantitative outputs and outcomes that we seek. Our systems engineering team developed an open-source enterprise resource planning (ERP) system, called COCO (Connect Online, Connect Offline) to manage and support our operations teams' activities across India. The Analytics suite of dashboards that serves as the front-end of our monitoring and evaluation framework. These dashboards give rich, near real-time insight to our work in the field on time-, geographic, and partner-specific dimensions. The dashboard allows us to better sort through our growing library of videos, target interventions based on historical trends, and allows for data exchange among our partners and team members who often operate in areas with limited or no Internet connectivity. Partner staff members and community intermediaries at block- and district-levels input data into this system. Digital Green and partner staff members use control mechanisms to review and verify the accuracy of inputted data through cross-validation of reports as well as random sample inspections in the field. We have observed that the transparency of our data management framework creates a positive tension amongst the partners that

motivates them to ensure the accuracy of the inputted data as well as to do well with respect to their peers.

Village Certification

We developed an internal control system to certify villages in which the Digital Green system has been operationalized using the framework of our standard operating procedures. Since we work with a variety of partners across a diversity of locations, the aim of these internal audits is not to find faults with our partners or team members, but rather, to identify ways in which we can better target our intervention as well as to capture learnings that might improve the SOPs. These reviews are conducted by Digital Green team members not directly associated with the area in which it is performed. At the community-level, three types of metrics are used: (1) logical parameters to measure compliance to SOPs; (2) quantitative parameters to measure cost effectiveness; and (3) qualitative parameters to measure community empowerment. At the district-level, the processes and outputs of video production are also certified.

Progress



Digital Green transitioned from a learning and planning phase to a scaling-up execution phase. This involved a transformation of our role as an organization that would jointly execute activities in the field with our partners to that of a technology development and support provider to existing agricultural extension systems. Our operations expanded from a small-scale research pilot in one state and with one partner to operations that extended to four states in India, including Karnataka, Orissa, Jharkhand and Madhya Pradesh, with seven partners.

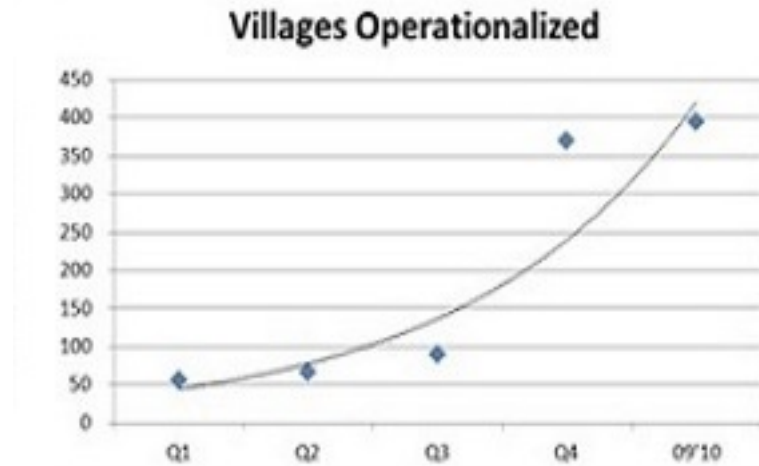
The learning and planning phase provided opportunities for our team to assess the contexts in which we operate and to bootstrap the integration of the Digital Green system with our partners - from identifying packages best agronomic practices to ultimately improving the livelihoods of smallholder farmers on a sustained basis. To this end, Digital Green's partnerships were competitively selected and formally defined to build upon established foundations of domain expertise, scale of operations, and community-level rapport to accelerate the scaling-up of the system.

We focused on initiating project activities with our partners, developed institutional backstopping measures to support these partnerships, and refined and standardized the Digital Green system based on the experience of working with a variety of partners and communities. We worked closely with partners to ensure that the system was grounded with strong linkages at the village-level, like with Self Help Groups, at the block level, like with agro dealers, and at district- and national-levels, like with government officials and schemes, that would provide sustain the interest and the livelihoods of smallholder farmers throughout the year. To support these interventions, we built a novel monitoring and evaluation system to track and analyze progress across the distributed rural areas in which we operate.

The Digital Green team was formed in May 2009 and, by September 2009, project activities had been initiated with four partners. The initial planning phase involved the development of detailed execution strategies; definitions of roles and responsibilities for Digital Green, our partners, and community members; implementation timelines and deliverables; framework for best practices and quality standards; and linkages with key

institutions at village-, block-, district-, and nation-levels. Together, this blueprint provided the structure to accelerate the scaling-up of the Digital Green system.

Digital Green's team of trainers worked closely with its partners and community groups to enable them to integrate and execute the components of the Digital Green system within the framework of their existing extension systems. Most partners began with limited to no experience in using information and communication technologies in their operations, so our team conducted numerous training programs, workshops to share best of practices and tools, and direct support in the field. Over 165 workshops were organized on a variety of subjects with a diverse set of stakeholders across our operational areas.



The agricultural practices and technologies that are exchanged across the Digital Green network vary based on the local needs and interests of the communities that our partners are working with, but we work together using the data that we capture to focus on those practices provide long-term socioeconomic gains to farmers that adopt them for themselves. For each practice, checklists are used by select members of the community and our partner staff to verify the adoptions of practices by farmers in the field. For example, for a video on chemical treatment of tomato seedlings in a nursery bed (see: YouTube video), an adoption of that practice might be considered if the dimensions of the nursery bed are maintained, a drainage system is used, and the chemical is applied in the correct quantity and manner.

We defined a standard operating procedures and internal control system to assure quality throughout our interventions and instituted a robust monitoring and evaluation system to track and analyze progress on a daily basis as well as to capture learnings and best practices for further replication. Through the Agricultural Technology Adoption Initiative (ATAI), researchers from the University of California, Berkeley and Yale University initiated consultations and field visits in preparations for a large-scale, randomized controlled trial evaluation of the Digital Green system in comparison to the traditional extension approaches practiced by our partners.

To manage the volume and variety of activities, Digital Green evolved from its startup beginnings to a maturing organization with enabling systems and practices in program operations, talent development, financial management and administration. With its senior management and systems engineering team based in New Delhi, Digital Green also

established three regional offices in Bhubaneswar, Orissa; Bhopal, Madhya Pradesh; and Bangalore, Karnataka to develop and support partnerships in those geographies. Thus far, the project has produced over 700 videos, operationalized over 400 villages, screened over 8,000 videos and reached over 26,000 farmers. Over 300 of these videos are available on our website on a Creative Commons license: Digital Green Videos. Some of the most popular videos include azolla cultivation and feeding, maize seed treatment, soil testing, girdle beetle pest management, cattle vaccination, system of rice intensification, and soyabean seed germination test. Please refer to our Analytics dashboards for the latest statistics on videos produced and screening conducted. Digital Green's systems engineering team has developed a robust management information system that tracks these aggregate indicators as well as more detailed qualitative and quantitative metrics in geographic-, time-, and partner-based dimensions. To manage our operations in areas with limited to no Internet connectivity, our team developed an open-source data management framework, called COCO (Connect Online, Connect offline). This platform enables us, our partners, and anyone in the world to analyze our progress and to target our interventions in near real-time using the dashboards in our Analytics suite. We have also introduced an interactive voice response (IVR) system to complement our existing efforts to capture and analyze feedback to progressively better address the needs and interests of the community in a timely manner.

Learnings



Organizational Development

Digital Green's team members were recruited from a variety of backgrounds, including experienced managers from large non-profits to new graduates whose first job is with Digital Green. We have focused on staff and organizational development through numerous initiatives like orientation programs, and retreats. We found that immersing new employees in the rural context is successful means for talent recruitment and development. We launched our first internship program with six individuals; two joined the team as full-time team members upon its completion. The initial learning and planning phase represented not only an opportunity for our organization to learn and plan, but also for our team members to understand the rural context, our partners' existing interventions, and the technology and social layers that Digital Green builds upon these foundations. We experienced some fragmentation in team cohesion while individual team members were embedded within the field offices of our partners; however, as our team developed, we were able to transition to regional offices to allow for greater knowledge sharing and camaraderie within the organization while also providing the type of training and support that our partners needed.

Partnership

Digital Green began under the auspices of a research project, and many of our partners were introduced to Digital Green as a pilot. This provided opportunities to partner with large, well-established organizations, like PRADAN and BAIF. At the same time, this approach limited the ownership that these organizations had over the system and its outcomes. This perception was furthered with our team members embedded in our partners' locations. Consequently, we revised our partnership approach with our new and earlier collaborators through a structured competitive process. Using a request for applications process, we were able to identify those partners that had the motivation and ability to integrate their existing agricultural extension system with Digital Green. Informal agreements were replaced with formal ones that clearly defined milestones, timelines, and roles and responsibilities. In addition, Digital Green assumed a role, reflecting its core competencies, as a technology development and support provider.

Quality Assurance

Digital Green works in a variety of different geographies with a diversity of partners and community members. We drafted and iterated standard operating procedures (SOPs) for the key processes that define our system. We also established an internal control system to that includes procedures for using these SOPs to perform internal audits and to certify our interventions.

For instance, we have focused on ensuring the agronomic accuracy and completeness of the techniques featured in the videos. We initially tried to involve state-level experts from our partner staff as well as State Agricultural Universities; however, the videos were often incomprehensible to these experts because of local language diversity and context-specific agro ecological considerations. To also reduce the logistical bottleneck associated with this process, each partner now maintains a documented process on reviewing and approving content prior to its distribution by subject-matter experts at the district-level. These experts are now involved at the initial stages of the video production process, which includes topic identification and storyboarding, prior to the video being shot. The introduction of these processes has reduced the rate of videos that are rejected from 35% in November 2009 to 20% in August 2010. In the next phase, we will establish a scientific review board to sample a set of videos to provide third-party assessments of the technical and aesthetic qualities of the videos from across our operational areas. The capabilities of those involved in the Digital Green system from our own team to partner staff to community intermediaries have developed over time, and we are progressively introducing more sophisticated, creative processes into the ecosystem. For

example, we recently initiated trials of the Sabido Methodology to introduce dramatic elements into the videos to win over audiences while imparting agricultural knowledge. We have also found that the inclusion of text- and audio-based annotations in the videos can assist facilitators in mediating screenings more effectively.

Sustainability

Digital Green works with organizations that operate existing agricultural extension systems to ensure that its program will continue as its system is institutionalized. We have also found that it critical to emphasize the community's involvement in all aspects of the system. It is vital, for instance, for the community to be able to share feedback on its needs and interests for the videos that are produced and screened. As another example, the community must also be involved in identifying those individuals from the community who will be responsible for mediating video disseminations. We found that financial contributions from the community toward the recurring costs of the system could be met when packaged with existing services. A ticket-based payment mode, for example, in which individuals paid INR 2-4 to attend a screening resulted in farmers wanting to increase the number of videos that were shown in a single screening.

The community's ability to pay for agricultural extension services largely depends on a partners' ability to have demonstrated value in their past interventions and to have transitioned to a fee-based model in their existing programs. Our partners are at various

stages of making this transition, which is especially a challenge in areas where fully subsidized interventions have been used in the past. We initially would share the concept of the Digital Green system with the community at higher-level institutions, like farmer federations or panchayats, which are comprised of representatives of grassroots-level groups, like Self Help Groups. We found that commitments made on behalf of their group were often ineffectively passed on to the group-level. Since it is infeasible for us to meet one-on-one with the over thousand groups that are already participating with Digital Green, our partners now meet in person with higher-level groups and share videos with grassroots-level groups to discuss the concept of the Digital Green system and its relation with our partners and the community.

Technology

Digital Green began as a research pilot four years ago using video cameras that cost US\$ 2,000 per unit to capture videos and televisions, DVD players, and batteries that cost US\$ 500 per set to disseminate videos. Over the years, this equipment has become increasingly commoditized and costs have plummeted. At the same time, we began to extend the Digital Green system into increasingly remote areas of rural India which are disconnected from the electricity grid and in which population densities are lower. The equipment used to disseminate videos rotates amongst the farmer groups in a village that share it and we found that it was too bulky to transport by hand.

We experimented with using a tricycle rickshaw, but even pedaling could not be sustained in areas with hilly terrain and poor road infrastructure. We consequently investigated various alternative technology platforms and found that pocket video cameras to capture videos and pico projectors to disseminate videos were well suited for the environments in which we operate. Pocket video cameras cost about US\$ 120 per unit and capture high-definition (1080p) video and have memory card slots as well as connectors for tripods and external wireless microphones, which enhance picture and sound quality. Pico projectors cost about US\$ 150 per unit and in a less-than-one-kilogram, compact form have remote controls, ninety-minutes of battery backup, memory card slots for playing a library of videos, and audio output for enhanced sound and volume from external speakers. Our team works closely with our partners on the optimal usage of these devices, like maintaining small audiences in dimly lit rooms to best view projections from the pico projector, and to define logistics for charging, storing, and maintaining the devices. We have evaluated several different video cameras and pico projectors in the field and have consulted advisors, like One Media Player Per Teacher, and distributors, such as Sima Products, as well.

Feedback Mechanisms

Community members largely share their feedback with community intermediaries at the time of video disseminations, who record their needs and interests on paper forms, which are later digitized onto Digital Green's COCO data management framework and periodically analyzed. Topics that a partner may not have even considered earlier, such as new crops or disease incidences, have often been identified through this approach, but there typically is a lag of 10-15 days between when a farmer voices an issue and when it results in a response in the form of a new video or training program. To mitigate these delays, especially for time-sensitive concerns, we worked with researchers from Stanford University and University of California, Berkeley to deploy an interactive voice response (IVR) question-and-answer system based on the work of the Avaaj Otalo project. Though the IVR system is available to anyone via a toll-free number, it primarily aims to support the community intermediaries involved in video production and dissemination. The IVR system is moderated by the local subject-matter experts of our partners and allows users to asynchronously record queries and to receive responses from an appropriate specialist. We are currently piloting this system at one district-level location in Madhya Pradesh and are looking to extend it going forward. Other researchers from University of Washington experimented with systems to maintain a log of the videos that were screened in villages using acoustic fingerprinting and custom-made remote controls. We found that these pilots were interesting mechanisms for ensuring accountability, but were difficult to use in practice.