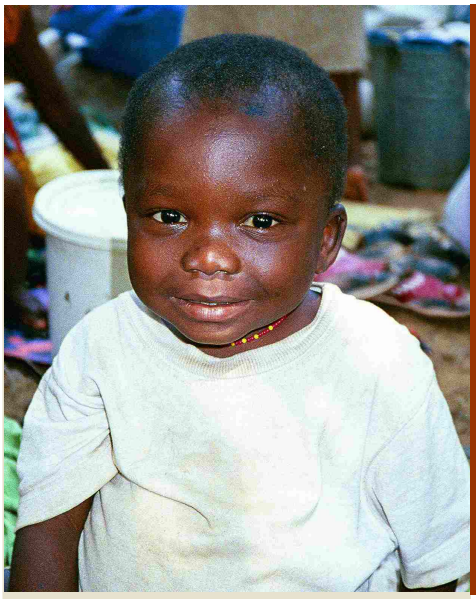

USAID 2008 Annual Report

October 1, 2007–September 30, 2008

Cooperative Agreement No.
GHS-A-00-04-000 16-00
November 17, 2008

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mvi PATH
MALARIA VACCINE INITIATIVE

Table of contents

Proposal summary information 3

Executive summary 4

Science and technical 7

Identification of optimal *Pf*CSP formulations for advancement to human clinical studies—circumsporozoite conjugation 7

Rhesus model using transgenic *P. knowlesi* expressing *P. falciparum* CSP on sporozoite surface 8

Address AMA1 polymorphism and optimization of AMA1 as a vaccine candidate/component 8

Human blood-stage challenge model 10

Assay harmonization 10

GenVec's adenovirus Ad28-CSP 11

Crucell's adenovirus Ad26-CSP 12

Policy and commercialization projects 13

Framing the malaria vaccine decision introduction 13

Social impact modeling 15

Proposal summary information

Date of report	November 17, 2008
Name of organization completing report	Program for Appropriate Technology in Health (PATH)
Address	1455 NW Leary Way Seattle, WA 98107 USA
President	Christopher Elias, MD, MPH
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Any changes to non-profit status?	No
Project name	PATH Malaria Vaccine Initiative
Brief description	USAID funding supports science and technical activities related to the development of a malaria vaccine as well as policy activities in endemic countries
Location of project	Global, including the United States and sub-Saharan Africa.
Grant amount	US $23,000,000
Grant period	October 1, 2007–September 30, 2008
Type of report	Annual report

Executive summary

The PATH Malaria Vaccine Initiative (MVI) carried out the following activities from October 1, 2007 through September 30, 2008. The cooperative agreement between MVI and the US Agency for International Development (USAID) was signed on October 8, 2004. On September 17, 2008 a cost extension was granted which extended the term to September 16, 2013 and increased the ceiling from $8 to $23 million.

During the 2008 fiscal year (FY), USAID funds supported science and technical activities and policy and commercialization activities. The highlights of each are summarized below.

Science and technical

- **Identification of optimal *Plasmodium falciparum* circumsporozoite formulations for advancement to human clinical studies—circumsporozoite conjugation**
  Malaria Vaccine Development Branch (MVDB) generated a circumsporozoite protein (CSP) which is full length, except for the N-terminal signal sequence and the glycosylphosphatidylinositol (GPI) anchor. They will conjugate this circumsporozoite protein to itself and to carrier proteins to improve the magnitude and duration of immunity. Additionally, a transgenic *Plasmodium (P.) berghei* parasite expressing *P. falciparum* CSP (*Pf*CSP) has been acquired from Imperial College by MVDB. Studies are underway to characterize the parasite and establish a robust mouse challenge model for eventual evaluation of *Pf*CSP-containing immunogens for protective efficacy.

- **Rhesus model using transgenic *P. knowlesi* expressing *P. falciparum* on sporozoite surface**
  An initial *P. knowlesi* transgenic parasite construct was produced and is being characterized. This will be a valuable reagent for preclinical evaluation of human candidate vaccines in non-human primates.

- **Address AMA1 polymorphism and optimization of AMA1 as a vaccine candidate/component**
  The Walter and Eliza Hall Institute of Medical Research (WEHI) group has constructed and expressed in *Escherichia (E.) coli* several antigenically distinct AMA1 variants, one of which—3D7—has been purified, refolded, and shown to elicit the expected antigenicity. The development of several AMA1 transgenic parasite lines has been initiated and one—3D7 transfected—has been shown to successfully express 3D7-AMA1. Progress toward the goal of defining the antigenic diversity in AMA1 has been made— to date, 15 of 30 planned *P. falciparum* polymorphic variants have been cultured and sequenced. Initial phylogenetic analysis of available AMA1 sequences has been completed for the regions believed to be targeted by inhibitory antibodies.

- **Human blood-stage challenge model**
  MVI and partners plan to convene a workshop in March 2009, as the first step, to elicit expert opinions on how best to approach the development of a robust blood-stage challenge model to test blood-stage vaccine candidates' efficacy.

- **Assay harmonization**
  Specific activities at the National Institute of Biological Controls and Standards in the UK (NIBSC) were initiated at no cost to the Funders Alliance. A scope of work (SOW) and budget is being developed for follow-on activities. NIBSC will distribute rabbit reagents to the participating labs for evaluation in the growth inhibition assay (GIA) pilot proficiency panel. Patrice Dubois, the lead coordinator on the cell-mediated immunity (CMI) and antibody-dependent cellular inhibition (ADCI) components of the Initiative on Optimizing Malaria Vaccine (OPTIMALVAC), developed work plans that will soon be finalized by the European Commission.

- **GenVec's adenovirus Ad28-CSP**
  Initiation of this work is pending, due to associated delays in execution of a larger contract focused on clinical evaluation of a multivalent Ad5 malaria vaccine. We anticipate completion by the fourth quarter (Q4) of 2009.

- **Crucell's adenovirus Ad26-CSP**
  Crucell successfully achieved the first two milestones: 1) selection of, production at lab scale of, and characterization of the Ad26-CSP construct; and 2) completion of mouse immunogenicity studies. Based on this, Crucell was invited to submit a proposal on the merits of developing this vaccine strategy for clinical testing.

Policy and commercialization

- **Framing the malaria vaccine introduction decision**
  Achievements include holding consultations in four countries—Burkina Faso, Malawi, Mozambique and Ghana—to consider the data and processes needed to take a decision on malaria vaccine introduction. MVI also convened consultations—with the Roll Back Malaria Partnership (RBM) and World Health Organization (WHO)—to validate the regional framework with countries of central, eastern, and southern Africa. The first draft of a regional strategy document for the validated framework was developed and should be in final form by early 2009. This activity builds upon the collaboration between MVI, USAID, WHO, and developing countries that began in 2005.

- **Social impact modeling**
  This work is intended to estimate the public health impact of malaria vaccines. Since its July 2008 launch, the project management team (PMT) defined and documented model components and developed an analytical framework. The team deconstructed a previous model to ensure the current work builds upon the strengths of past efforts. MVI staff collaborated with representatives of the Swiss Tropical Institute (STI) to receive feedback on the design of the social impact modeling. The PMT negotiated a tentative agreement with the Malaria Atlas Project (MAP) to use its malaria

transmission data for incorporation into the model. An independent review committee (IRC) has endorsed the work completed to date.

Science and technical

Identification of optimal *Pf*CSP formulations for advancement to human clinical studies—circumsporozoite conjugation

This contract is still being executed but work has begun in the meantime. MVDB generated a CSP which is full length, except for the N-terminal signal sequence and the GPI anchor. They will conjugate this CSP to itself and to carrier proteins to improve the magnitude and duration of immunity. Table 1 below outlines the activities, deliverables, and timelines.

Activity	Deliverable	Timeline
1. Production of conjugate vaccines	• Production of conjugates • Establish quality-control (QC) parameters	Q4 2008–Q3 2010 Q2 2009–Q3 2010
2. Immunogenicity in mice	• Conjugates: Antibody (Ab) levels/longevity • ELISpot • Inhibition of sporozoite invasion assay • Develop in vivo model for protection (P. berghei)	Q1 2009–Q3 2010 Q1 2009–Q3 2010 Q4 2009–Q3 2010 Q4 2008–Q3 2010
3. Cellular responses in rhesus monkeys	• Formulation with CpG, GLA, with QC • TLR agonist adjuvant in rhesus, challenge study • Cellular assays • Develop in vivo model for protection (P. knowlesi)	Q2 2009–Q1 2010 Q3 2009–Q3 2010 Q4 2008–Q3 2010 Q4 2008–Q3 2010

Table 1. MVDB circumsporozoite-conjugation activities, deliverables, and timelines

MVDB is establishing methods for the use of Imperial College's *P. berghei* transgenic parasite expressing *P. falciparum* CSP in their lab, as well as developing a transgenic *P. knowlesi* parasite expressing *P. falciparum* CSP. This is expected to be an extremely valuable reagent for preclinical evaluation of human candidate vaccines in non-human primates.

The group made significant inroads into optimizing the *P. berghei* transgenic parasite. They have confirmed that the construct contains the *Pf* CSP transgene and that it expressed on the sporozoite surface. They established a reproducible transgenic parasite stock and are now in the process of establishing the parameters for the rodent challenge model. They challenged BALB/c mice but found that inflammatory responses particular to this strain of mice requires a higher dose of sporozoites for infection. Therefore, they switched to C57CL/6 mice and injected them the week of October, 14 2008.

Rhesus model using transgenic *P. knowlesi* expressing *P. falciparum* on sporozoite surface

MVDB has completed generation of the *P. knowlesi* transgenic parasite construct and has confirmed the sequence of the *Pf* CSP transgene. They are establishing stability of the clone and whether large scale production of the linear cassette is possible. Table 2 below outlines the activities, deliverables, and timelines.

Activity	Deliverable	Timeline
1. Rodent challenge model		
1a. Polymerase chain reaction (PCR) analysis	Presence of transgene confirmed	Completed
1b. IFA	Expression of *Pf*CSP on sporozoite surface confirmed	Completed
1c. Passage between mosquitoes and mice	Reproducible transgenic parasite stock established	Completed
1d. Challenge naïve mice	parameters for challenge model established	Ongoing
1e. Two challenge studies in mice	Potential candidates to move to monkey studies selected	Q4 2008–Q3 2009
2. Rhesus challenge model		
2a. Molecular design and construction	Gene-replacement vector for transfection	Completed
2b. Infect monkeys, transfect, in vivo selection, cloning	*Pf-Pk*CSP transgenic parasite obtained	Q4 2008–Q1 2009
2c. PCR, immunofluorescence assay (IFA), monkey/mosquito passage	Reproducible transgenic parasite stock established	Q1 2009
2d. Challenge naïve monkeys	Parameters for challenge model established	Q2 2009
2e. Two challenge studies in monkeys	Determine whether conjugates provide superior protection	Q4 2009–Q3 2010

Table 2. MVDB challenge-model activities, deliverables, and timelines

Address AMA1 polymorphism and optimization of AMA1 as a vaccine candidate/component

As proposed in the 2008 work plan, MVI planned to use USAID funds to support the work of three investigators at WEHI, La Trobe University and Walter Reed Army Institute of Research (WRAIR). On July 18, 2008, an addendum to an existing agreement was signed with WEHI to initiate studies towards the strategic development of a

multivalent AMA1 vaccine. MVI expects to receive a formal report from WEHI on November 30, 2008.

A summary of the status of the work at WEHI is summarized in three main areas below.

1. **Protein expression**
   - Genes for five different AMA1 variants were synthesized with codon usage optimized for *E. coli*. These variants were 3D7, HB3, FVO, W2mef, 7G8. The selection of these variants was based on the expectation that they are antigenically-distinct from each other and are representative of global diversity in AMA1. Published data and our own sequence analysis were used to guide this selection. Parasites for culture *in vitro* have been established for each line.
   - These five genes have been expressed in *E. coli* to produce recombinant protein. Data indicates that codon optimization greatly increased protein expression.
   - One variant, AMA1-3D7, has been purified and refolded. Analysis demonstrated a very high purity of the protein and it showed the expected reactivity against human serum from exposed donors. Rabbits and mice have now been immunized to generate antibodies for studies in the project. Purification and refolding of other variants is ongoing.

2. **Generation of AMA1 transgenic parasite lines**
   - Vectors were constructed to transfect different AMA1 variants onto the W2mef genetic background.
   - W2mef parasites have been transfected with vectors containing AMA1 variants 3D7, FV0, HB3, or 7G8 (corresponding to the recombinant proteins expressed above).
   - Transfected parasites are presently undergoing drug cycling to obtain integration of AMA1 genes at the target site. Investigators have confirmed that parasites with the 3D7 plasmid are expressing 3D7-AMA1 when under drug selection. Further analysis will determine whether the plasmid has integrated; however, this is an important first step.

3. **Defining antigenic diversity in AMA1**
   - A panel of *P. falciparum* isolates, having different polymorphic variants of AMA1 that can be cultured *in vitro*, is being compiled. Investigators presently have 15 different isolates and are aiming for a panel of around 30 isolates. These presently include 3D7, W2mef, HB3, 7G8, and FVO, corresponding to the AMA1 sequences selected for protein expression and transfection. They also include parasites from different geographic locations and four recently adapted clinical isolates from Asia and Africa.
   - All isolates have been cultured to obtain a repository of sufficient stocks for each. AMA1 has been sequenced for each isolate to confirm their identity.
   - Investigators commenced studies which examine the ability of antibodies raised against a single isolate to recognize different polymorphic variants of AMA1. In initial studies, we tested antibodies to three AMA1 variants (3D7, HB3, and W2mef; obtained from Robin Anders at Latrobe University) for reactivity to

native AMA1 extracted from our panel of 15 isolates. Studies to examine the specificity and cross-reactivity of invasion-inhibitory antibodies will commence soon.

- Investigators have performed initial phylogenetic analysis of available AMA1 sequences. This was performed using ClustalW with AMA1 sequences corresponding to the whole ectodomain, domain 1 only, and the short polymorphic sequence believed to be targeted by inhibitory antibodies. Other approaches to phylogenetic analysis are being explored. Data on the isolate-specificity or cross-reactivity of antibodies between different AMA1 variants will be used to validate or modify the phylogenetic analysis as this data becomes available. This will enable the investigators to more accurately group related and distinct AMA1 sequences to inform vaccine development.

Initial work with WRAIR and La Trobe University has been delayed due to the complexities of negotiating a three-way CRADA among the institutions. The final CRADA was signed on October 16, 2008 instead of August, as initially predicted.

In the meantime, plans are underway for the annual AMA1 consortium, scheduled for December's American Society for Tropical Medicine and Hygiene Annual Meeting. MVI will get an update from investigators on ongoing activities at this meeting.

Human blood-stage challenge model

As the first step in developing a robust blood-stage challenge model to test blood-stage vaccine candidates' efficacy, MVI and USAID, in partnership with the Bill & Melinda Gates Foundation (BMGF), WHO and the European Malaria Vaccine Initiative (EMVI), plan to convene a workshop to elicit expert opinions on how to best approach this activity. The workshop, originally planned for fall 2008, has been rescheduled for March 2009 due to MVI clinical staff turnover and the confounding results from the Nijmegen sporozoite challenge trial analysis. Activities, deliverables, and timelines are presented in Table 3.

Activity	Deliverable	Timeline
Meet with USAID to determine meeting objectives, draft agenda and participants	Completed draft agenda, participant list, and workshop objectives	Q4 2008
Meet with USAID/BMGF to finalize agenda and pre-read package for participants	Final agenda and pre-read documents for workshop	Q4 2008
Blood-stage challenge workshop	Final meeting report	Q2 2009

Table 3. Human blood-stage challenge-model activities, deliverables, and timelines

Assay harmonization

NIBSC is playing an increasingly central role in assay-standardization activities. Work already underway for malaria assay-harmonization activities includes two proficiency

panel studies—one testing an Intracellular Cytokine Staining (ICS) and acquisition standard and one testing rabbit GIA standards. These studies will be conducted at no cost to the Funders Alliance.

Further involvement of NIBSC in proficiency panel testing and other activities—such as repository and distribution services, development and production of reference reagents, maintenance of the Malaria Assay Resource website hosted at NIBSC, and performance of data analysis—will require additional funding. We are developing the scope of work and budget for these activities. This process has been delayed by the turnover of NIBSC's commercial officer.

The rabbit reagents to be evaluated in the GIA pilot proficiency panel were received by NIBSC and these will be distributed to the participating labs (National Institutes of Health, WRAIR, and the Biomedical Primate Research Center). NIBSC will coordinate a more comprehensive proficiency panel evaluating human reagents for use in both GIA and antibody-dependent cellular inhibition (ADCI) assays in the near future. Table 4 shows the deliverables and timelines for the assay standardization activities.

Activity	Deliverable	Timeline
Web site	Web site in place (pilot version)	Q1 2008
GIA pilot proficiency panel	Study report	Q2 2009
ADCI/GIA proficiency panel	Study report	Q4 2009

Table 4. Assay-harmonization activities, deliverables and timelines

In addition, Patrice Dubois's consultancy is vital to the success of assay-harmonization activities. He is lead coordinator on the CMI and ADCI components of OPTIMALVAC and developed the work plans. USAID and MVI are supporting his involvement in the project. The European Commission is finalizing the work plans..

GenVec's adenovirus Ad28-CSP

The initiation of this work has been delayed for several reasons. The Ad28-CSP feasibility study is part of a larger scope of work that includes a clinical test of concept Phase 1/2a trial of our multivalent Ad5 malaria vaccine. The execution of this contract has been delayed due to business development and budgetary discussions that are ongoing. Table 5 lists the deliverables and timelines for these activities.

Activity	Deliverables	Timeline
Construct generation	Report	Q1 2009
Immunogenicity studies	Study report	Q3 2009
SOW completed	Final report on immunogenicity, vector growth, construct generation	Q4 2009

Table 5. GenVec's Ad28-CSP activities, deliverables and timelines

Crucell's adenovirus Ad26-CSP

Crucell will develop the replication-deficient Ad26 with the insert of the full length CSP for the heterologous prime-boost delivery of an Ad35-CSP/Ad26-CSP vaccine candidate. The scope of work under the second letter of agreement (LOA) is nearing completion. Crucell achieved the first two milestones of the LOA—selection, production at lab scale and characterization of the Ad26-CSP construct; and completion of the mouse studies.

The preclinical studies in BALB/c mice have been completed and a preliminary slide set of the results have been presented by Crucell. The first study was a small dose finding study to determine the best dose that would induce the highest antibody (ELISA) and T-cell (IFN-ELISPOT) responses in mice. A single injection of three doses of the Ad26-CSP was tested alone. Based on these results, the dose selection of 10^{10}vp was selected for the second mouse study that evaluated prime boost with Ad35-CSP, using the Ad35-CSP/Ad5-CSP as the benchmark control. Again, the readouts were antibody (ELISA) and T-cell (IFNγ ELISPOT) responses. ICS for IFN-γ, IL-2 and TNF-α also was used to measure T-cell activity. Additionally, selected sera will be tested to determine neutralizing antibodies against the adenovector and IFA will be performed. To demonstrate immunogenicity in another animal model, a rabbit study was performed and was completed in October. The primary readout is antibody (ELISA). Samples of sera from these immunized rabbits will be also sent to the ELISA service center at WRAIR for evaluation at the conclusion of the study.

Crucell could not agree to the proposed interim Go/No-go criteria at Milestone 2 to add an additional arm (Ad35CSP/Ad35CSP) to the design of the prime boost study in mice, because the studies had already been initiated. The proposed criteria were:

- T-Cell: statistically significant increase of IFN-γ ELISPOT of Ad35CS/Ad26CS vsAd35CS/Ad35CS
- T-Cell: increase in proportion of poly-functionality as measured by ICS of Ad35CS/Ad26CS vs Ad35CS/Ad35CS

In addition, it was later reported to MVI that Crucell's immunology lab did not have the capability to measure poly-functionality of the T-cell response. However, the results of this prime boost mouse study did indicate that the CSP specific T-cell and antibody responses were comparable to the Ad35-CSP/Ad5-CSP control. The analysis at the 12 week readout indicates that the Ad35-CSP/Ad26-CSP seems to induce a more balanced T-cell response, as measured by IFN-γ, IL-2 and TNF-α, than the Ad35-CSP/Ad5-CSP control. Based on these preliminary results, an interim Go was given to Crucell to develop a proposal for submission to MVI for a TAG review on the merits of developing this vaccine strategy for clinical testing. In addition, an amendment to the LOA was executed to schedule early current good manufacturing processes (cGMP) production of the Master Viral Seed (MVS) based on Crucell's availability of the cGMP facility with equal risk sharing. The timelines and deliverables for the Crucell Ad26 activities are shown in Table 6.

Activity	Deliverable	Date Expected	Date Received
Ad26 construct	Report on Ad26-CSP construct characterization	August 31, 2008	September 8, 2008
Mice studies	Immunogenicity report (T-cell and antibody) *Interim Go/No Go based on results	October 15, 2008	September 24, 2008
Rabbit studies	Immunogenicity report (antibody)	November 21, 2008	Pending
SOW	Final immunogenicity report of pre-clinical studies (mice and rabbits); Final report on pre-MVS bank: specifications and release	December 15, 2008	Pending

Table 6. Crucell's Ad26-CSP activities, deliverables and timelines

Policy and commercialization projects

Framing the malaria vaccine introduction decision

Several retrospective assessments have shown that it takes a number of years for developing countries to be able to introduce a new vaccine in their health systems, even when this vaccine targets a disease which is prevalent in their areas. One of the main reasons is the lack of relevant information to support the decision whether or not to adopt a new intervention.

To avoid these unnecessary delays when a malaria vaccine becomes available, MVI's Policy and Access Unit has been working since 2005 with partners—WHO, RBM, USAID, United Nations International Children's Emergency Fund (UNICEF) and local experts in malaria and immunization—to engage them on a process for early decision-making on a malaria vaccine.

At the end of the 2008 fiscal year, one regional and eleven national consultations have been held in seven countries, to develop and adapt a tool for decision-making called the Malaria Vaccine Decision Making Framework (DMF). The DMF identifies what information will be needed to make a decision on malaria vaccine introduction.

In the 2008 work plan, MVI planned to continue to disseminate the DMF and to support countries starting work on their national data and processes identified in the DMF. Table 7 shows the status of the activities, milestones and deliverables.

Activity	Milestone	Deliverable status
DMF follow-up meetings in Mozambique and Ghana	Meetings held in Mozambique in Q1 2008 and in Ghana in Q2 2008.	• Meeting reports being reviewed by Ministry of Health (MoH), expected Q4 2008
DMF in the new clinical trials countries (Malawi and Burkina Faso)	Meetings held in Burkina Faso in Q1 2008 and in Malawi in Q2 2008	• Meeting reports available since Q3 2008
Support countries which act upon DMF meetings' recommendations	Agreement in place with WHO Ghana to support MoH plan of activities Resource person hired in Burkina Faso to support MoH as they implement their DMF plan of activities.	• 1st quarterly report on implementation of activities in Ghana and Burkina Faso expected end Q4 2008 • Burkina Faso consultant report expected end Q4 2008 • Tanzania and Kenya plan of activities expected end Q4 2008
Attend relevant regional meetings to strengthen communication and information sharing with national and regional stakeholders	MVI attended and gave presentations on malaria vaccines and the DMF at various sub-regional meetings (Annual WHO-AFRO and RBM Malaria planning meetings; and Immunization Regional Working Group Meetings)	
Regional validation meeting for the DMF	DMF sub-regional validation meetings held for Central and East-South African regions (Q1-Q3 2008)	• Two sub-regional meetings reports available since Q1 and Q3 2008 • Final regional report expected Q4 2008, after the West Africa DMF validation meeting.
Publication and dissemination of the Regional Strategic document for Decision Making on malaria vaccine	First draft of the Strategic document for decision making on malaria vaccine developed (Q3 2008)	• Final version expected Q1 2009 after technical experts meeting in WHO AFRO.
Development and implementation of a global and regional advocacy strategy	Not started	• First draft expected Q1 2009

Table 7. DMF activities, milestones and deliverables

Social impact modeling

The Return on Investment Model Update project launch occurred on July 3, 2008. The launch followed a competitive request for proposal process, with USAID staff on the evaluation team. Applied Strategies was selected as the organization to lead the work, based on their outstanding proposal, their experience in building complex—yet user-friendly—disease models and their prior, positive associations working with MVI. Following the launch, the PMT, Project Advisory Group (PAG) and IRC were established and the project activities commenced. These activities included a detailed review of the previous model and development of components and functionality of the new model.

To date, the project has proceeded on track with the original timeline. However, the PMT and the PAG made a decision that will extend the project by several weeks. The original MVI request for proposal required the model to be produced in Microsoft Excel format with an Excel-compatible, add-on program capable of sensitivity analysis (e.g. @RISK or Crystal Ball) in order to run sophisticated analyses. Then, as the project progressed, Applied Strategies demonstrated and convinced us of the added value of creating the model in a .NET platform, with integrated sensitivity analysis. As a result, this will push the project end-date back to mid-February 2009.

Table 8 summarizes the objectives, deliverables and outcomes completed in the four and a half months since project inception.

Objective/deliverable	Date	Outcome
Project launch--first meeting of Project Management Team	July 3, 2008	• Developed definition and documentation of model components • Confirmed vaccine analysis objectives • Reached agreement on analytical framework that will serve as basis for model analysis
Confirmation of composition of project teams	July 11, 2008	• PMT: Vicky Cárdenas, Applied Strategies team • PAG: Carla Botting, Alan Brooks, Carter Diggs, Donald Kelemen, Christian Loucq, Lorraine Soisson • IRC: Michael Coleman, Robert Hecht, Dave Smith
First meeting of Project Advisory Group	August 8, 2008	• Reviewed broad overview of previous model and rationale for new work • Defined overview of new project • Reached agreement on roles and responsibilities of PAG • Articulated PAG's perspective on use and purpose of model
Meeting with Swiss Tropical Institute	August 11, 2008	• Received insight into previous STI model utilized to generate social impacts inputs • Gleaned feedback from STI about design of social impacts for current model
Documentation of previous version of model	August 28, 2008	• Completed a 76-page document containing critical deconstruction of previous model and documentation of inputs, outputs, links, drivers and sensitivities
First meeting of Independent Review Committee	September 18, 2008	• Provided the IRC with a background and context of the project • Provided a summary of the project and decisions taken to date • Provided an overview of the anticipated model components and functionality • Solicited input & feedback on topics requested by PMT
Collaboration with Malaria Atlas Project	October 10, 2008	• Reached tentative agreement between Malaria Atlas Project, STI, ASC and MVI on use of MAP's malaria transmission data for incorporation into model (final agreement contingent on 4 organizations signing MOU on confidentiality of data until MAP's public release)

Table 8. Social impact modeling objectives, deliverables and outcomes