Artificial Intelligence AI
Workshop for Nonprofits

Facilitator Guide

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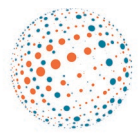INTELLIGENCE

March 2020

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Welcome

AI Workshop for Nonprofits is part of the AI Suitability Toolkit for Nonprofits that was developed by NetHope and partners with the goal to increase NGOs' internal expertise and capacity to evaluate, develop, procure, and use AI / Machine Learning (ML) in their work so they can make informed decisions, do their work better, anticipate issues that might arise from AI, and ensure that people in need are aware of the technologies that affect them and their communities.

The workshop materials were tested and used at several conferences (e.g., 2019 ICT4D Conference, 2019 AI for Good Global Summit, 2019 NetHope Global Summit) and refined based on those experiences.

About NetHope

NetHope empowers committed organizations to change the world through the power of technology. NetHope, a consortium of nearly 60 leading global nonprofits. Its membership collectively delivers over 60 percent of all annual, international, non-governmental aid. NetHope unites with technology companies and funding partners to design, fund, implement, adapt, and scale innovative approaches to solve development, humanitarian, and conservation challenges. Together, the NetHope community strives to transform the world, building a platform of hope for those who receive aid and those who deliver it.

Workshop Overview

About this Workshop

The goal of the *Artificial Intelligence (AI) Workshop for Nonprofits* is to increase NGO's internal expertise and capacity to evaluate, develop, procure, and use emerging technologies in their work.

This workshop will provide participants with an introductory overview of AI and Machine Learning (ML) capabilities, use cases, and how to evaluate AI for their programs and projects.

Note that the workshop is only one in a series of available AI resources. Refer to NetHope's Solutions Center website for additional resources and training.

For Workshop Facilitators

- Facilitator does not need to have significant AI background.
- Review the workshop materials and additional resources (see below) and then determine what you can deliver given your knowledge of the concepts, and where you might want to enlist SME support.
    - Additional resources to review in preparation for the workshop: AI Primer webinar, USAID's Reflecting the Past, Shaping the Future: Making AI Work for International Development report, and McKinsey's Applying artificial intelligence for social good.
- For the collaborative exercise segment, we recommend to invite technical SMEs (from local or global private sector, academia, or similar organizations like DataKind) and ensure that there is one SME at each table before you begin the workshop.

Target Audience and Delivery

- This workshop is designed to be applicable to any role in international development, with no-to-minimal knowledge of AI.
- This workshop does not require any prerequisite.
- This workshop is designed to be delivered in-person but the facilitator could adapt for remote delivery. We recommend up to 50 attendees for an in-person workshop, fewer for virtual

Learning Objectives

The purpose of *Artificial Intelligence (AI) Workshop for Nonprofits* is to provide participants with the information necessary to begin evaluating AI for their programs and organizations.

In the workshop, participants will learn about the fundamentals of AI and start exploring the potential of AI for their work. Workshop objectives include:

- Deliver a clear, actionable overview of key AI / ML concepts and capabilities.
- Help nonprofits understand the key benefits of and challenges with AI/ML through an overview of use cases and practical examples.
- Provide nonprofits with a reusable framework for evaluating AI/ML for their work and the opportunity to use it in a collaborative exercise.

Workshop Materials and Setup for in-person and remote

For workshops delivered in-person:
- Post-It notes and pens for participants to capture questions, concerns, resources and ideas
- Flip-chart or whiteboard labeled "Idea Board" to share Post-it notes
- Printed copy of framework questions to use in breakout group discussions
- Arrange room with tables that each seat 6-10 participants

For workshops delivered remotely:
- Online meeting platform that allows sharing slides, audio and, ideally, video of the facilitator (examples include GoToMeeting, Skype, Teams, Webex, UberConference, Zoom, and many others)
    - Define how participants will connect in small groups for collaborative exercise segment of the workshop. This could be by setting up parallel meeting links or similar, depending on the meeting platform.
- Create a shared document (and have the link ready to share) that participants can contribute to real-time as an "Idea Board" with headings to capture questions, concerns, resources, ideas
- Have framework questions in a file that can be distributed for breakout groups to each have a copy to work on.

Participant Materials

This workshop should be accompanied with the following Participant materials:
- Reflecting the Past, Shaping the Future: Making AI Work for International Development. We recommend pages 10-13 and page 23 as a pre-read.

Suggested Workshop Delivery Schedule

- Day 1: AI Primer: 9 am – 12:10 pm
- Day 1: Collaborative Exercise: 1 pm – 3:15 pm

AI Workshop Agenda

Estimated Length: ~6 hours

TIMING	MODULE	KEY TOPICS	EST. LENGTH
9:00 – 9:30 am	**Introduction**	• Welcome and introductions • Agenda and objectives	30 mins
9:30-9:55	**Introduction to AI for Nonprofits**	• Why AI and why now? • Why should nonprofits learn about AI? • Where do we see the potential of AI to deliver value? • What challenges are nonprofits facing today with AI? • How is NetHope supporting nonprofits? Brief Q&A	25 mins
9:55 – 10:55 am	**AI Primer**	• What is AI, ML, Big Data? • What are the types of ML? • What are the key AI capabilities? • What is the process for developing and using AI/ML? Brief Q&A	60 mins
10:55 – 11:10 am		*Break*	15 mins
11:10 – 12:10 pm	**Lessons learned from practical implementations of AI in the nonprofit sector**	We recommend picking from the following options: **Option A:** Select 2 examples of practical implementations of AI in the nonprofit sector from the local market. **Option B:** Watch videos of 2 practical examples that were presented in NetHope webinars. Please see links below. • [Lessons learned from practical implementations of AI in field programs and internal operations](), featuring Plan International and The Carter Center. • [Lessons learned from practical implementations of AI in conservation contexts](), featuring The Nature Conservancy and Carnegie Mellon University.	60 mins

		Brief Q&A	
12:10 – 1:00 pm		**Lunch**	50 mins
1:00 – 1:20 pm	**Introduction to AI Suitability Framework**	● Background ● Purpose ● How to use the framework	20 mins
1:20 – 2:30 pm	**Evaluate AI for your programs and organizations**	● Collaborative exercise segment, with groups of participants focused on using AI Framework to evaluate AI for specific problem statement. Supported by technical SMEs.	70 mins

2:30 – 3:00 pm	**Concept pitches**	• Concept pitches focused on two questions:
		   o What problem are you trying to solve?
		   o What is the solution?
			30 mins

3:00 – 3:15 pm	**Wrap Up**	● Q&A ● Resources and next steps	15 mins

AI Workshop for Nonprofits

ACTIVITY	SHOW
Welcome and Introductions Introduce yourself. Provide purpose and background on this workshop. _Say:_ _"The Artificial Intelligence (AI) Workshop for Nonprofits was developed by NetHope, NetHope members, and partners._ _The goal of the workshop is to increase NGO's internal expertise and capacity to evaluate, develop, procure, and use AI in their work._ [slide 3] _NetHope is a nonprofit technology consortium of 57 global NGOs._ _In February 2019, NetHope launched_ [Emerging Technology Initiative](#) _with the goal to connect NGOs with AI resources, knowledge and expertise._ _If you are interested in learning more about the Emerging Technologies Initiative, please visit:_ https://solutionscenter.nethope.org/et [slide 4] Have participants introduce themselves and provide details on their role and familiarity with AI. (This is especially helpful in mixed classes where people are not as familiar with one another.)	Slide 1-4 20 min

Agenda and Objectives
 	
Review and provide a high-level summary of the workshop objectives, agenda and housekeeping rules.
 	
Say: We have 3 objectives for this workshop. These objectives are grounded in the needs of the nonprofits to:
  1. _Learn about AI including key concepts, capabilities, and use cases._
  2. _Get AI practical tools and resources designed for nonprofits._
  3. _Learn how to evaluate AI for your programs and organizations._
	Slide 5-7
	
	10 min

[slide 6]

Say: The workshop agenda is designed to get everyone started with AI. In the workshop, we will cover:

- o *Introduction to AI in the nonprofit sector*
- o *AI primer*
- o *Lessons learned from a practical implementation*
- o *Introduction to AI Suitability Framework*
- o *Collaborative exercise: Evaluate AI for your programs and organizations. Pitch your concept to the group.*
- o *Resources and next steps.*

[slide 7]

- Explain that we will be using a **flip charts** as a parking lot (an Idea Board) for workshop today.
    - o The purpose of the Idea Board is to capture any questions, concerns, resources (e.g. tools, courses), and ideas.
    - o Emphasize that a benefit of the Idea Board is that it will inform future workshops and training materials.
    - o Let the participants know that you will take consolidate their feedback and send in email as a follow up to the workshop. [We encourage you to take pictures of the flipcharts for your own records and to share with the participants]

Ask: Are there any questions before we get started?

## Introduction to AI in international development sector 	
 	
 - Review key questions for AI in the international development sector (see notes in the slides):
     o Why AI and why now?
     o Why should nonprofits engage with AI?
     o Where do global NGOs see the potential of AI to deliver value? Share some of the examples of how AI is being used in the sector. You are welcome to add other examples.
     o What challenges are nonprofits facing today with AI?
 	
 Follow the talking points in the Master Deck as you present each concept. Conclude with Q&A about the material presented.
	Slide 8-13
	
	 [25 mins]

## AI Primer	Slide 14-32

Say: *"In the next 45min, we'll review:* • *What is AI, ML, Big Data?* • *What are the types of ML?* • *What are the key AI capabilities?* • *What are some AI examples relevant to our sector?* • *What is the process for developing and using AI/ML?* *Note that this AI Primer was developed by the Center for Digital Development at USAID.* *... We'll leave 15min for questions. Please use the Post It notes to write down your questions and observations and we'll get to as many as possible during the Q&A."* If you are presenting this AI Primer, make sure to watch the [AI Primer webinar recording](#) and practice. [10:25 – 44:30] *Ask*: *Are there any questions?*	[60 mins]
Break	[15 mins]
Practical implementations of AI in the nonprofit sector *Say*: *"The purpose of this segment is to dive deeper into the specific use cases for AI in the nonprofit sector and share lessons learned from early practical implementations of AI. We have selected 2 examples that are relevant for this group."* **Option A**: Identify 2 examples of practical implementations of AI in the nonprofit sector from the local market and recruit program leads for those examples to present at the workshop. We recommend selecting two practical examples (instead of one) as a way to show diverse use cases and projects. Whenever possible, include examples relevant to the region where the workshop is being hosted and workshop participants (e.g. their sector, roles). TESSA example is included in the master deck as an example for how to present the content. Ask each presenter to deliver their presentations in 20min and leave 10min for questions per example. **Option B:** Watch videos of 2 practical examples that were presented in NetHope webinars. Please see links below. • [Lessons learned from practical implementations of AI in field programs and internal operations](#), featuring Plan International and The Carter Center. • [Lessons learned from practical implementations of AI in conservation contexts](#), featuring The Nature Conservancy and Carnegie Mellon University.	Slides 33-44 (TESSA Example) [60 mins]

Ask: Are there any questions?	
Lunch	[45 mins]
Introduction to AI Framework *Say: "Now, I'd like to introduce to you a practical tool that you can use to determine suitability of AI for nonprofit programs and to plan for sustainability.* [slide 46] *The framework draws on the insights from the past and current implementations of AI in the nonprofit sector as well as the engagement with technology experts and researchers. It has been informed by a diverse set of stakeholders including NetHope NGO members, MIT, UC Irvine, and USAID. The framework was tested and used in numerous workshops and refined based on those experiences.* [slide 47] *This framework is designed to help those in our sector interested in exploring AI and incorporating it into their work know what questions to ask at each stage. It offers a menu of 32 questions to consider when exploring AI – from defining the opportunity ('Should you even use AI?') and evaluating data and bias, to resourcing, implementing, and maintaining AI-based solutions. Here are the key stages covered in the framework:* ● *Define the opportunity* ● *Evaluate data and bias* ● *Resource the solution* ● *Implement the solution* ● *Maintain and extend the solution* [slide 48] *We'll be using this framework in the collaborative exercise segment of this workshop. We'll use 8 key questions from the framework."* *Ask: Are there any questions?*	Slide 45-47 [20 mins]
Evaluate AI for your programs and organizations *Say: "Now is the time for you to take this framework and work together to evaluate AI for specific problem statements you'd like to focus on."* We recommend dividing the group into 'problem areas' such as (adapt these suggested groupings based on participants and context): - Emergency Response (e.g. natural disasters, conflicts, displacement) - Children and Youth (e.g. education, livelihoods, safeguarding, gender, accessibility)	Slides 49-52 [75 mins]

- Health (e.g. infectious diseases, nutrition) - Fundraising (e.g. charitable giving) & Internal Operations (e.g. supply chain / logistics, HR, finance) - Conservation / Environment (e.g. climate, species, preservation) And, ensure that there is at least one technical SME (from local or global private sector, academia, or similar organizations like DataKind) at each table. [Slide 51] *Say: You'll have 60min to collaborate on your problem area. Please be prepared to deliver a 90sec pitch to the whole group, answering these two questions:* *1-What problem are you trying to solve?* *2-What is the solution?* [Slide 52] *Say: "As you evaluate the opportunity of using AI to address the issues like malaria, or to meet the needs of refugees and children with disabilities, use the framework to interrogate the value and viability of AI for your work. For example, when **defining the opportunity**, consider how the problem is being addressed today and why AI might be better than the current solution.* *When **evaluating data and bias**, consider if have and/or can get lots of data for this problem (e.g., image, text, audio, video). Ask yourself: What are the potential biases that AI may introduce or amplify in your context?* *When mapping out the **resource the solution**, think about what infrastructure you would need for the solution and what might be your strategy for getting 'missing' resources (e.g. by partnering, or contracting vendors) or training existing resources.* *When planning **implementation and maintenance of the solution,** think about how you can secure the resources to continuously refresh the data and retrain the models."* Walk around and offer help with questions.	
## Concept pitches *Say: In this segment, we'll hear from each of the teams about their concepts.* *Each team has 90sec to pitch (facilitator may wish to adjust this time based on number of teams):* *1-What problem are you trying to solve?* *2-What is the solution?* *We will time each pitch, please be brief.*	Slide 53 [30 mins]

If time permits, discuss with the attendees their thoughts on the process (e.g. using the framework) and concepts that emerged.	
## Resources and next steps *Ask*: *Are there any questions as we transition into the final 15min of the workshop?* Review key next steps, including: 1. Continue learning about AI/ML. 2. Learn from other practical implementations in the nonprofit sector. Reuse what works. 3. Explore and experiment with AI/ML capabilities. Try something small first. Always, start with the problem, not with technology. 4. Get your data in order. 5. Understand ethical, responsible development & use of AI. 6. Partner - for expertise, resources, and a greater impact. 7. If you are a NetHope member, join NetHope's AI Working Group: **http://bit.ly/ET_WorkingGroup** *Say*: *"Finally, we'd like to share with you some of the resources that are available to you as you continue exploring AI for your work."* *Say: "We have also worked with technology providers and USAID to compile a repository of tools, services, trainings."* *Say:* *"This is just the beginning and we look forward to your participation in upcoming webinars and future workshops."*	Slides 52-57 [15 mins]

AI Suitability Framework

Where does this framework come from? It draws on insights from past and current implementations of AI in the nonprofit sector as well as engagement with technology experts and researchers. It has been informed by a diverse group of stakeholders including NetHope NGO members, UN agencies, technology providers, donors, and researchers. The framework was tested and used in numerous workshops (e.g., 2019 ICT4D Conference, 2019 AI for Good Global Summit, 2019 NetHope Global Summit) and refined based on those experiences.

What is the purpose of this framework? To help those in the nonprofit sector interested in exploring AI and incorporating it into their work *know what questions to ask at each stage.*

Collaborators:
Leads: Leila Toplic (NetHope) and Steve Hellen (Catholic Relief Services)
Contributors: Aubra Anthony and Amy Paul (USAID), Amit Arun Gandhi (MIT), Neil Sahota (UC Irvine), NetHope AI Working Group members (global NGOs like Plan International, The Carter Center, IRC), NetHope technology partners (e.g. Microsoft, Google, Salesforce, IBM, Amazon Web Services).

AI Suitability Framework

What does the framework offer? A menu of 32 questions to consider – from defining the opportunity ('Should you even use AI?'), to evaluating data and bias, resourcing, implementing, and maintaining AI-based solutions. Here are the key stages covered in the framework:

- Define the opportunity
- Evaluate data and bias
- Resource the solution
- Implement the solution
- Maintain and extend the solution

STEP ❶ Defining the **Opportunity**

1 What problem do you need to solve?

Notes:

Example problems:

- provide psychosocial support to refugee children;
- identify victims of human trafficking;
- predict food shortage or crop yields;
- match mentors with mentees;
- develop park ranger routes to prevent elephant poaching;
- diagnose skin cancer and recommend a treatment; etc.

2 **How is the problem being addressed today? Are there primary shortcomings or barriers-to-success of this (non-ML/AI) solution/approach?**

Notes:
- In most instances, there is already an existing process/methodology/set of KPIs.
- Existing solution might be high-touch, costly, ineffective, rarely utilized, cumbersome, non-scalable (e.g. in person, spreadsheets, etc.) but it is important to document (1) for benchmarking; (2) for learning that informs any new solutions.

3 Is there a potential for AI/ML to address the problem or part of the problem more effectively than the current solution? Why is AI/ML better than the current solution/other approaches?

Notes:
Is your current non-AI/ML solution a repetitive task that would benefit from automation?

What are other benefits you might be looking for in a new solution that are possible with AI? This includes:
(a) speed
(b) accuracy
(c) cost savings
(d) massive reach, etc.

It's important to explain why and how current solutions fail to address the identified problem in an expected and adequate way and how AI could help.

4 What is the proposed solution? How does it address short-comings of existing solutions or approaches?

Notes:
Describe:
- what the solution needs to be able to do
- who are the end-users of the solution
- what interventions might be included or informed by the solution
- what resources it requires (e.g., data)
- how it fits into the existing processes and programs.

Explore if you need to develop a new solution or procure existing solution(s). Consider pros and cons.

5 What kinds of data will your solution need (e.g., audio, image, video, text)? Where and how will you get these data?

Notes:
Consider the following:
- is the data structured or unstructured (Word documents vs. Excel sheets)?
- is it digitized?
- is it comprehensive/representative of the target population and context?
- is it "accessible" to you (e.g., your own data, partner data, publicly available data)?

6   Can the proposed solution be implemented and sustained? What barriers/ challenges do you anticipate? How will you address them?

Notes:

Consider the following:

- Can you reach the target population with your solution (e.g., displaced people with no access to the internet)?
- Do you have the time and resources to refresh (i.e., gather and prepare) the data?
- Do you have technical expertise to develop and maintain the solution (e.g., retrain the models)?
- If the solution is procured, do you have the resources (e.g., funding) to continue supporting the solution?
- List all challenges and how you might address them.

7 How will you measure success?

Notes:
- Include all KPIs and long-term measures of success.
- Note where you can do direct measurement vs. where you'll rely on other reports.
- Success can include a reduction in time spent on particular tasks or more efficient access to a target population

8 Can the proposed solution be extended or shared broadly?
If not shared, how might others be able to audit or validate your model's outputs?

Notes:
- Include if you plan to create a reference design that can be shared with other organizations or field offices (e.g., chatbot reference design);
- Consider if the solution can be used for other problem statements or contexts (e.g., preventing poaching of different animals, combating different forms of human trafficking, etc.).

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9 What are relevant considerations regarding the local legal, regulatory environment?

Notes:
Consider things such as:
- local privacy laws
- data ownership laws

Questions include:
- can data collected in-country be stored on servers outside the country?
- who owns the data? The local government? Your organization?

STEP **1a** Evaluating
Data & Bias

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1 From *Defining Opportunity*: Do you have and/or can you get lots of data for this problem (i.e., image, text, audio, video)?

Notes:
Consider the following:
- is the data structured or unstructured;
- is it digitized;
- is it comprehensive and representative of the target population and context;
- is it "accessible" to you (e.g., your own data, partner data, publicly available data;
- is it enough to train an AI/ML model.

2 Is the data that you have or can acquire for this solution 'labeled' or 'unlabeled'? How will you identify and define the appropriate training data set?

Notes:
Can you access or create a subset of data that is already labeled with "answers" to the problem you are looking to solve, such that it can be used to train a AI/ML model?

Example: an image classification algorithm to identify human settlements from satellite imagery would need sample data that identifies areas of settlement and areas without settlement to train a generic algorithm to do the same for new areas.

3 What are potential biases that AI may introduce or amplify in your context?

Notes:
- Could an AI solution in this context unfairly target or exclude people?
- What are the underlying reasons for potential unfairness?
  - Are they social, i.e., social biases, introduced into the training data?
  - Are they inherent to the data (imbalanced data, mismatch between training data and use context)?
- Are there technical reasons for potential biases (e.g., using a ML algorithm or a procured solution that may not be the most appropriate for the specific problem)?

3a In assessing the potential for bias: do the data in question concern people (vs. plants, buildings, geographies, etc.) or human behavior?

Notes:
Consider how data feeding into a solution might capture different biased aspects of society.

It's arguably less likely that a model built to predict crop yields using harvest data and weather data will have as strong a potential for bias as data about the farmers of those crops and their behaviors.

3b What are the protected attributes for this problem or context?

Notes:
Are there specific protected attributes (e.g., gender, age, race, etc.) that you want to make sure will not affect the outcomes?

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4 **What steps can you take to mitigate these biases?**

Notes:
Consider accountability among those procuring, creating and / or relying on this AI implementation and the right to remedy by individuals affected by this use of AI.

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5 What are potential negative outcomes and harmful use cases for the solution you are creating?

Notes:
For example, facial recognition can be used to deliver valuable services but also to target vulnerable populations. Another example is a chatbot being used to connect marginalized youth with local economic opportunities, but also creating a problem for female users because biased data was collected and reused.

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STEP ❷ Resourcing the **Solution**

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1 **What resources do you have in-house that can support the development and implementation of the new solutions?**

Notes:
- What resources do you need to support the development, implementation, use (of procured solutions), and maintenance of the solution?
- List both technical and non-technical.

2 What additional resources do you need for the project?

Notes:
- List both technical and non-technical resources
- Could be access to a data scientist to update the model over time or a platform to visualize the information

3 How will you survey the landscape of available expertise?

Notes:
- Recognize that resource needs will vary by type of AI (for example, chatbots vs. image recognition)
- What research needs to be done to match the objective you hope to accomplish with available expertise to achieve it?

4   What is your strategy for getting 'missing' resources or re-training and training existing resources?

Notes:
Options to consider:
- Hire in-house
- Hire a vendor
- Partner with an academic institution or tech partner to develop the solution and transfer knowledge to in-house staff
- Other

5   What infrastructure do you need for the project?

Notes:
- Consider the data workflow, whether you'll need to edit the data, if there are other data processes occurring alongside the AI/ML model.
- What tools or platforms are needed? For example: Azure, Amazon Web Services, PowerBI, GIS mapping

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6 What changes to existing processes do you require in order for this solution to be possible?

Notes:
Examples:
- administering new surveys (aligned with data needs)
- doing online and structured surveys vs. in-person/unstructured, partnership with a data source, etc.

STEP 3 Implementing the **Solution**

1 Do you have a process in place to maintain access to lots of quality data for this problem (i.e., image, text, audio, video)?

Notes:
Examples:
- administering surveys (aligned with data needs)
- doing online and structured surveys vs. in-person/unstructured, partnership with a data source, etc.

2 Do you have resources to continuously clean up the data and ensure that it is representative of the problem set and target audience?

2a How can you best implement fairness in your algorithms?

Notes:
Fairness through unawareness (ignoring protected data) can still result in unfair outcomes. For example, if your loan provision training data has a gender bias, ignoring gender data may not provide a fair result if other features are correlated with the protected attribute.

Approaches such as demographic parity, equalizing odds, equalized opportunity, etc., may be a more fair approach.

3 Do you have management buy-in and support for the duration of the project?

Notes:

Consider the following:

- What level of management do you need to get to buy-in first?
- Can you get a POC implemented and value demonstrated before getting management buy-in for a broader implementation?
- Does the solution require additional resourcing and why? It's important to consider total cost of ownership (TOC) of any procured solution.

4   What is your plan to test the solution, both at the outset/initial deployment as well as ongoing monitoring once it's been deployed?

Notes:
Consider how you will evaluate whether the results achieved the desired outcome. Set up KPIs, measure, and report.

STEP ④ Maintaining the Solution

1 What resources do you have in-house or relationships with technology partners to:

- Fix issues that arise with the solution.
- Update the solution to fit changing conditions/data.
- Extend the solution to new contexts.

Notes:
This question applies to both procured and newly developed solutions. Consider both technical and non-technical resource needs for ongoing support. For procured solutions, plan for sustainability from the start by having a plan in place for ongoing maintenance / support, and a fee structure that sets you up for success.

2 What is your strategy for retaining access to these resources?

Notes:
Consider the following options:
- Hire in-house
- Hire a vendor
- Partner with an academic institution or tech partner to develop the solution and transfer knowledge to in-house staff
- Other

3 How do you intend to capture and share lessons learned from the solution, both internally and externally?

Notes:
Consider having a process for capturing and incorporating user experience/user feedback into the solution. For procured solutions, that might include providing user feedback to the solution provider, working with them to iterate the solution to better meet your needs, and augmenting the solution with additional programming.

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4 How will you retire or decommission the solution?

5 What will you do with any data when the solution is decommissioned? What will you do with the solution's code?

Notes:
Consider:
- how long must the data be retained
- can it be anonymized
- where will it be archived
- who will have access to the archive
- who will purge the data when the retention period ends
- will source code be published in an open, shared online repository or shared with research or startup communities?

AI Suitability Framework

Thank you

1 Defining the
Opportunity

2 Evaluating
Data & Bias

Evaluating
Data & Bias

1. From *Defining Opportunity*: Do you have and/or can you get lots of data for this problem (i.e., image, text, audio, video)?
2. Is the data that you have or can acquire for this solution 'labeled' or 'unlabeled'? How will you identify and define the appropriate training data set?
3. What are potential biases that AI may introduce or amplify in your context?
3a. In assessing the potential for bias: do the data in question concern people (vs. plants, buildings, geographies, etc.) or human behavior?
3b. What are the protected attributes for this problem or context?
4. What steps can you take to mitigate these biases?
5. What are potential negative outcomes and harmful use cases for the solution you are creating?

3 Resourcing the **Solution**

3 Resourcing the **Solution**

1. What resources do you have in-house that can support the development and implementation of the new solutions?
2. What additional resources do you need for the project?
3. How will you survey the landscape of available expertise?
4. What is your strategy for getting 'missing' resources or re-training and training existing resources?
5. What infrastructure do you need for the project?
6. What changes to the processes do you require in order for this solution to be possible?

4 Implementing the
Solution

4 Implementing the
Solution

1. Do you have a process in place to maintain access to lots of quality data for this problem (i.e., image, text, audio, video)?
2. Do you have resources to continuously clean up the data and ensure that it is representative of the problem set and target audience?
2a. How can you best implement fairness in your algorithms?
3. Do you have management buy-in and support for the duration of the project?
4. What is your plan to test the solution, both at the outset/initial deployment as well as 'online' monitoring once it's been deployed?

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5 Maintaining the **Solution**

1. What resources do you have in-house or relationships with technology partners to:
   - Fix issues that arise with the solution.
   - Update the solution to fit changing conditions/data.
   - Extend the solution to new contexts.
2. What is your strategy for retaining access to these resources?
3. How do you intend to capture and share lessons learned from the solution, both internally and externally?
4. How will you retire or decommission the solution?
5. What will you do with any data when the solution is decommissioned? What will you do with the solution's code?

About this workshop

The Artificial Intelligence (AI) Workshop for Nonprofits was developed by NetHope, NetHope members, and partners.

The goal of the workshop is to increase NGO's internal expertise and capacity to evaluate, develop, procure, and use AI in their work.

About NetHope

NetHope is a nonprofit technology consortium of 57 global NGOs.

In February 2019, NetHope launched [Emerging Technology Initiative](#) with the goal to connect NGOs with AI resources, knowledge and expertise.

Introductions

- Name
- Organization
- One thing you hope to get out of today's session.
- Are you using AI in your work? Are you considering using it?

[Please share in 90sec]

Workshop Objectives

Learn about AI including key concepts, capabilities, and use cases.

Get AI practical tools and resources designed for nonprofits.

Learn how to evaluate AI for your programs and organizations.

Workshop Agenda

Introduction to AI in the nonprofit sector

AI Primer

Lessons learned from a practical implementation

Introduction to AI Suitability Framework

Collaborative exercise:
Evaluate AI for your programs and organizations. Pitch your concept to the group.

Resources and next steps

Ground Rules and Idea Board

- Bring your expertise and practical examples into the discussion.

- Be open about the challenges you're facing. Share ideas.

- Avoid jargon and product pitching.

- Capture your questions, concerns, resources (e.g. tools, courses), and ideas on Post-it notes and share on the Idea Board (flipchart).

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Why AI? Why now?

- Technology advances are now real due to:
  - Lots of data
  - Greater and cheaper computing power
  - Better algorithms

- There is a whole set of **business** and **societal** problems that AI along with other tools can help us solve.

- All of us have both the **opportunity and responsibility** to add our own voice and expertise.

Why should nonprofits engage with AI?

- Guide the use of AI to solve societal problems
- Provide contextual knowledge about problems an AI solution is meant to address
- Ensure that the needs and perspectives of the local communities are incorporated into AI/ML solutions being developed
- Have a say in responsible, ethical development and use of AI

Where do nonprofits see the potential of AI to deliver value?

- Make decisions and act faster in emergencies
- Reach more people with services and information they need
- Predict problems before they spread and escalate
- Prevent loss of life and resources

Practical implementations in the social impact space

- Predicting food insecurity in Malawi
- Preventing poaching of wildlife with better park ranger routes
- Detecting online hate-speech content for removal
- Early warning systems for earthquakes in Mexico
- Identifying Zika virus reservoirs in the Americas
- Detecting malaria
- Detecting plant diseases

The Global Goals icons:

1 NO POVERTY
2 NO HUNGER
3 GOOD HEALTH
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 RENEWABLE ENERGY
8 GOOD JOBS AND ECONOMIC GROWTH
9 INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE AND JUSTICE
17 PARTNERSHIPS FOR THE GOALS

THE GLOBAL GOALS
For Sustainable Development

What challenges are nonprofits facing today with AI?

- Technical Expertise
- Resources
- Data
- Sustainability
- Responsible, ethical innovation

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AI Primer

What is AI, ML, Big Data?

What are the types of ML?

What are the key AI capabilities?

What is the process for developing and using AI/ML?

This AI Primer was developed by the Center for Digital Development at USAID. For more information, please review Reflecting the Past, Shaping the Future: Making AI Work for International Development

1. **DATA**
Text, Numeric,
Audio, Image, Video

DATA

MACHINE LEARNING

ARTIFICIAL INTELLIGENCE

2. **MACHINE LEARNING**
Supervised, Unsupervised,
Reinforcement, Deep Learning

3. **ARTIFICIAL INTELLIGENCE**
Computer Vision,
Natural Language
Processing, Chatbots,
Robotics
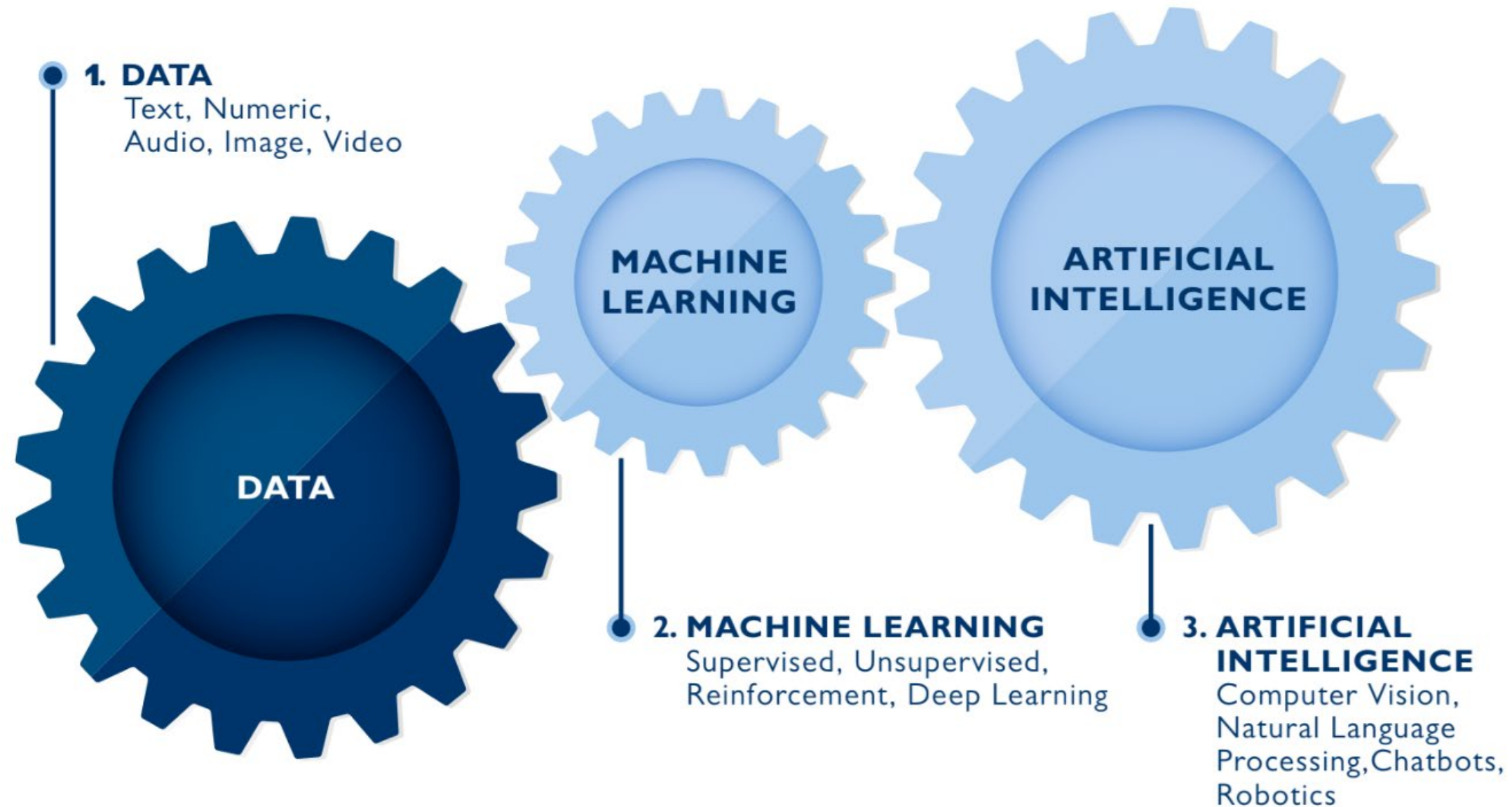
For more information, please review *Reflecting the Past, Shaping the Future: Making AI Work for International Development*

Terminology

Machine Learning (ML): A set of methods for getting computers to recognize patterns in data and use these patterns to make future predictions. *Think of ML as "data-driven predictions."*

Artificial Intelligence (AI): Uses computers for automated decision-making that is meant to mimic human-like intelligence. Automated decisions might be *directly implemented* (e.g., in robotics) or *suggested to a human decision-maker* (e.g., product recommendations in online shopping); the most important thing for our purpose is that some decision process is being automated. *Think of AI as "smart automation."*

Big Data: A set of technologies developed to handle data sources that are "big" in terms of volume, velocity, or variety. While the term "Big Data" emphasizes *data management* more than learning and predictions, many former Big Data companies have rebranded themselves as AI companies, and there is *broad overlap* in tools and techniques.

Types of Machine Learning

Supervised learning: Given a set of labeled training data, learn to predict labels for unlabeled data.

Estimate the probability of loan repayment based on financial data from past borrowers.

Unsupervised learning: Find patterns or structure in a dataset.

Determine whether potential borrowers comprise several distinct groups, for which different loan products could be designed.

Key AI capabilities

Natural language processing (NLP) analyzes or synthesizes "natural" human languages such as English, Spanish, or Arabic.

Computer vision processes images or video in order to identify objects or interpret scenes or events.

MIT, Harvard: Identifying Infection in surgical scars

Key AI capabilities (continued)

Speech or audio recognition analyzes audio files to recognize specific sounds or speech patterns. Speech recognition often relies on NLP to transcribe speech into written text.

Advanced Analytics carries out sophisticated analysis of multiple data sources, structures.

Content Generation creates new text, images, video from understanding of key patterns in training text, images, video.

Rainforest Connection: Detecting Illegal Deforestation via monitoring chainsaw sounds

Practical Examples: Chatbots

Users request information from a system, often using written or spoken queries.

- **Key capabilities:** Natural language processing, speech recognition, conversational interfaces

- **Application areas**: Health, Agriculture, Financial inclusion
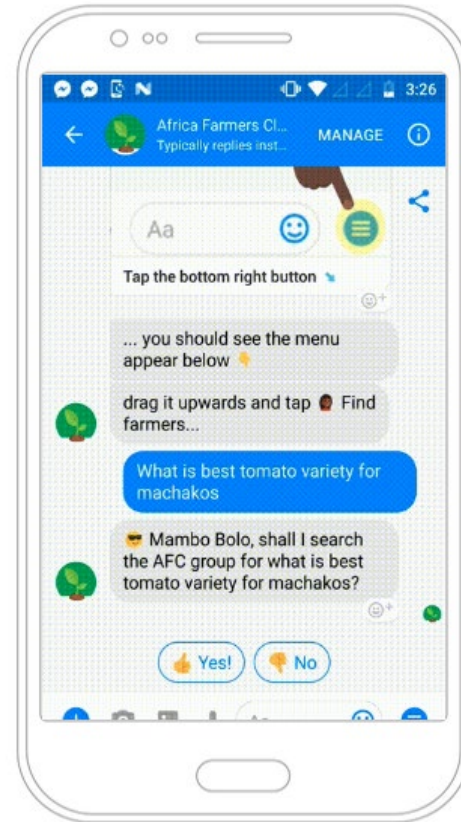
Farm.ink, Fall Armyworm Tech Prize winner

Plan International's TESSA chatbot

Personal targeting/screening

Uses information about people to decide to *whom* resources should be allocated. Typically used by a small group of decision-makers.

- **Key technologies:** Natural language processing, advanced analytics

- **Application areas:** Employment, credit scoring, law enforcement, health
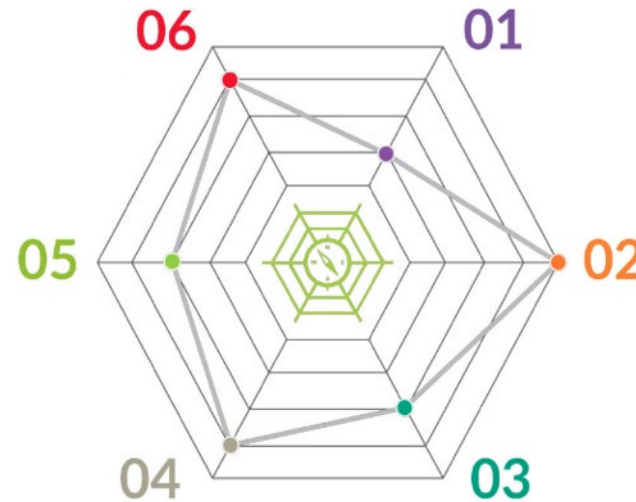
Harambee - Matching at-risk youth with entry-level jobs.
http://harambee.co.za/
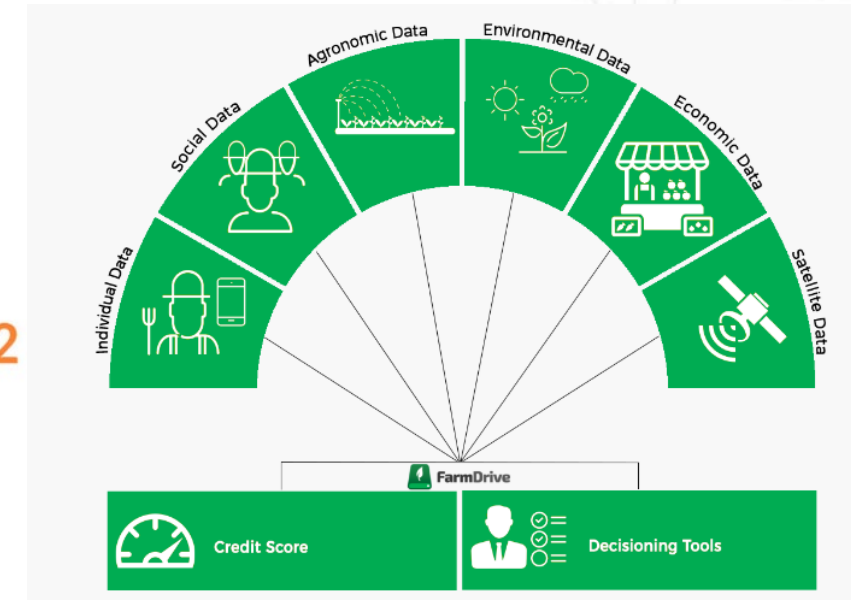
FarmDrive - Alternative credit scoring for smallholder farmers
https://farmdrive.co.ke/

Humanitarian response

Uses satellite imagery and other geographic information (e.g. geotagged user data) to decide *where* resources should be prioritized for allocation. Typically used by a small group of decision-makers.

- **Key technologies:** Computer vision, geospatial analysis, social media analytics

- **Application areas:** Humanitarian assistance, disaster response, law enforcement, policy planning

Artificial Intelligence for Digital Response (AIDR)

Vision + Audio diagnostics

Analyzes images from cell phone cameras to diagnose disease in humans or plants.

- **Key technologies:** Computer vision, speech or audio recognition, NLP

- **Application areas:** Agriculture, Health

Also some recent research on diagnosing mechanical malfunction (e.g., in cars or factories) or logging of rainforests using cell phone audio.
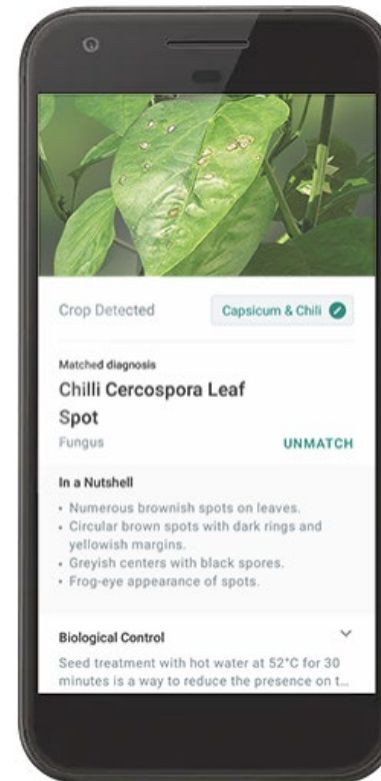
Diagnosing plant diseases with Plantix.

Cataract screening in Kenya with the Peek app
https://www.medicalnewstoday.com/articles/264905.php

Other real-world applications

Health

- Image-based diagnostics (Parasight)
- Tailored behavior change messaging (Surgo Foundation)
- Identifying mosquitoes from photos or audio
- Disease surveillance (USAID Zika Grand Challenges)

Finance

- Alternative credit scoring and personalized financial services (Branch, Tala, USAID/DIV-LenddoEFL)

Agriculture

- Prediction of crop yields from satellite imagery and climate data (USAID/BFS + CIAT)
- Agricultural input loans (USAID/DIV -Apollo, FarmDrive)

Humanitarian response

- Earthquake early warning system (USAID/DIV - Grillo)
- Situational awareness from social media (AIDR)

Conservation

- Protection Assistant for Wildlife Security (PAWS) helps park rangers design effective patrol routes to prevent poaching of wildlife. (CMU)

Developing and Using AI+ML: It's a process

REVIEW DATA

- Survey possible data sources
- Choose input data
- Label training data
- Clean data
- Exploratory data analysis
- Check for bias
- Update with any new data

REVISIT

BUILD MODEL

- Define modeling problem
- Select outcome variable
- Choose evaluation metric
- Choose algorithm
- Feature selection
- Feature engineering
- Update with any new data

REVISIT

INTEGRATE INTO PRACTICE

- Understand status quo
- Assess confidence in model
- Estimate cost of errors (including social impacts)
- Establish proximity to final decision
- Collect feedback
- Re-evaluation, revision, and updating

Example:
Using computer vision to identify malaria in blood smear image
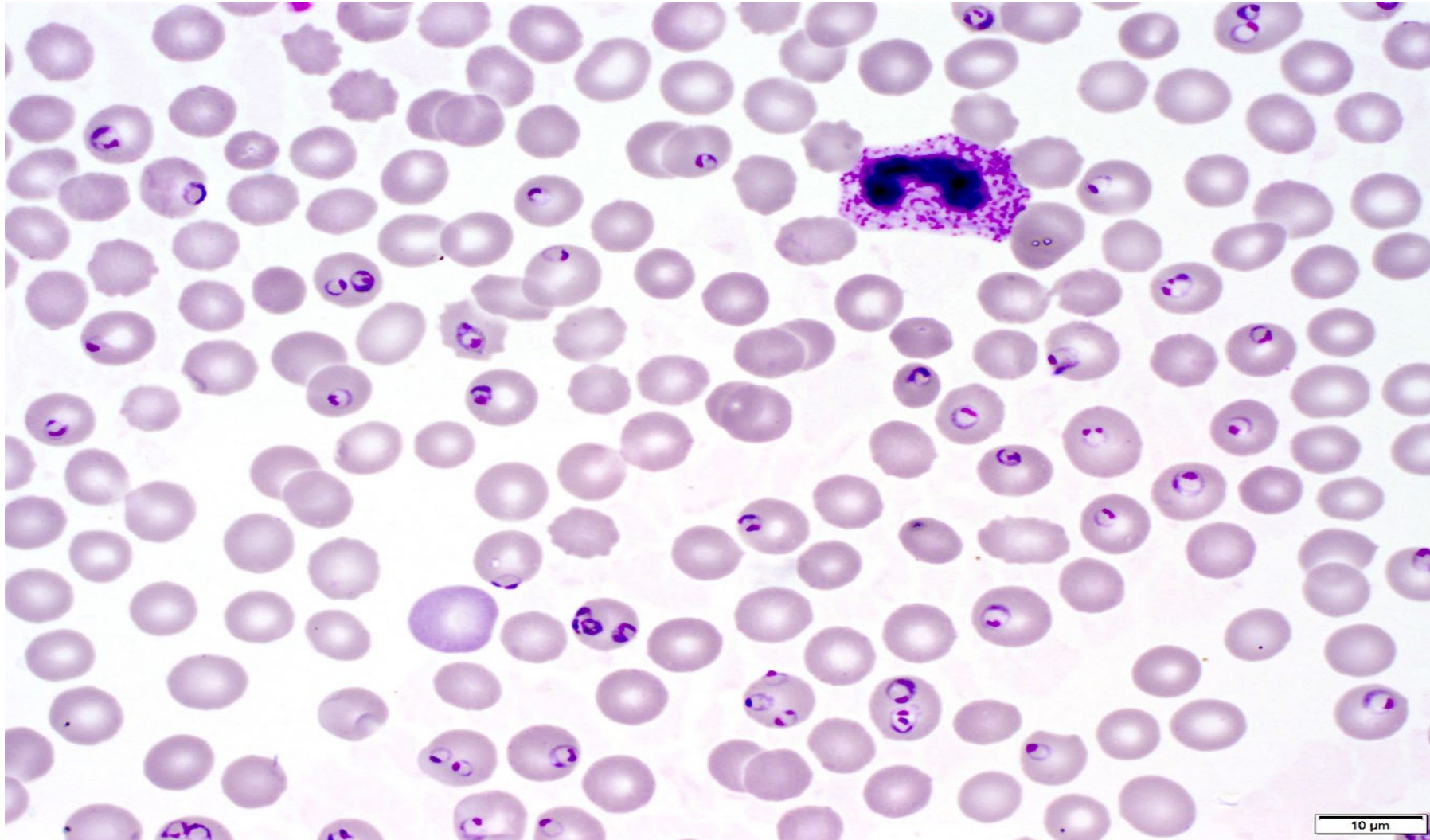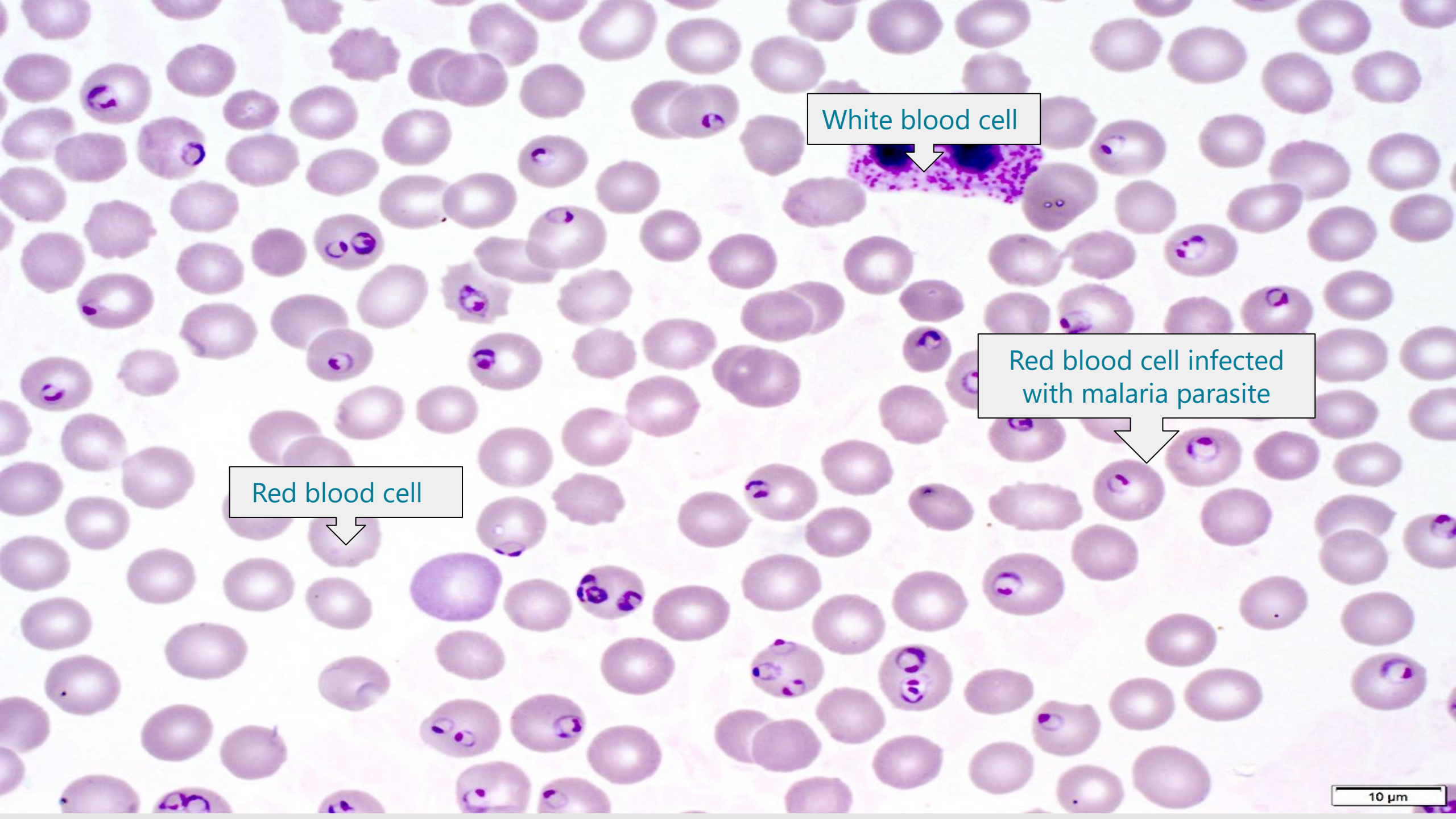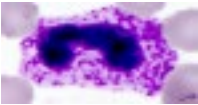
A closer look at data review

Cleaning Data

Removing images that are:

- out of focus
- poor lighting
- distracting background conditions
- are of cats

Labeling Image Data

Image	Label
	no parasite
	parasite
	no parasite
	no parasite

A closer look at model-building: Features

Features are the data elements that describe things in your dataset. In computer vision applications, these can be organized into a hierarchy:

High level

Low level
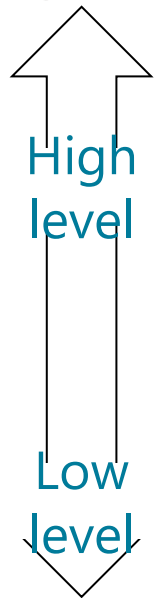
Objects

Shapes

Textures

Edges and corners

Colors

Pixel values
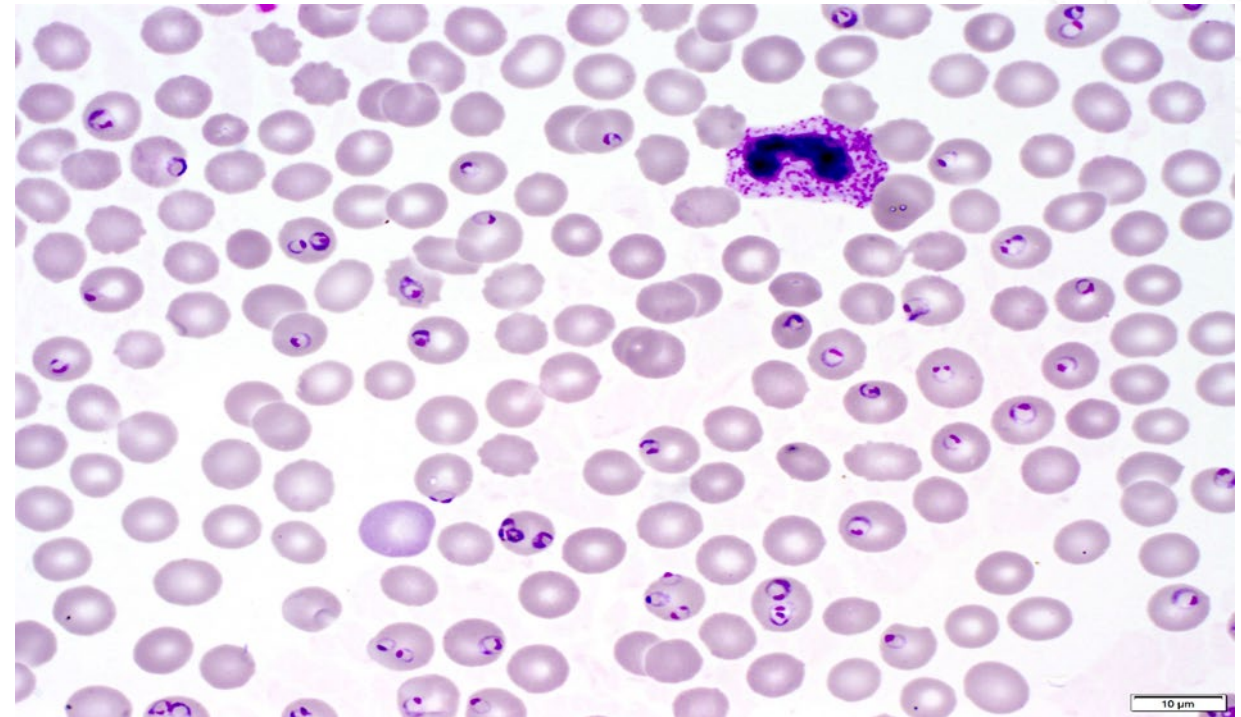
For other types of data, features might be easy-to-interpret descriptors (gender, income, birth date, etc.)

A closer look at model building: Evaluation

False positives:

- Detecting a malaria parasite in cells that do not actually contain one.

False negatives:

- Failing to detect a malaria parasite in cells that do actually contain one.

- Which definition of "accuracy" is appropriate depends on context.

- What are the consequences of being wrong?

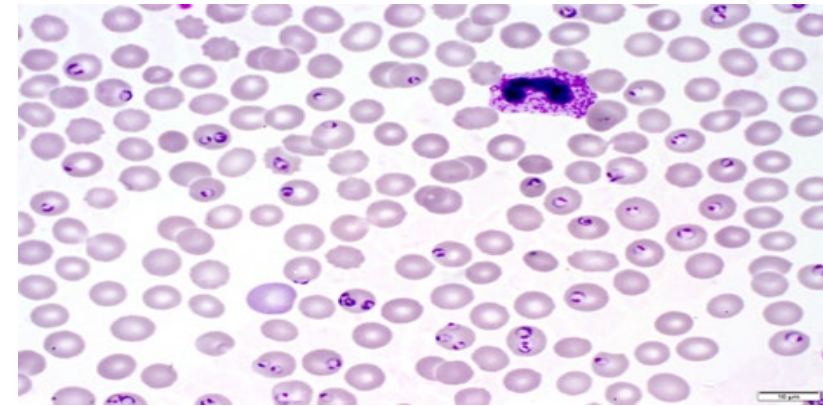- Are you looking for something rare or something common?

Image	Predicted Label	Evaluation
	Parasite	True Positive
	No parasite	True Negative
	Parasite	False Positive
	No parasite	False Negative

A closer look at integrating into practice...

Estimating cost of errors

- What is the cost of missing potential malaria infections? (false negatives)

- What is the cost of unnecessary confirmatory testing/treating people who don't have malaria? (false positives)

- How accurate does model need to be to actually improve treatment?

Establishing proximity to final decisions

- Should this be used as a screening test or final diagnosis?

- Should it be used to assist a community health worker in referral for a confirmatory test, or the basis on which they administer treatment?

Child receiving artemisinin combination therapy (ACT). Image credit: Bonnie Gillespie

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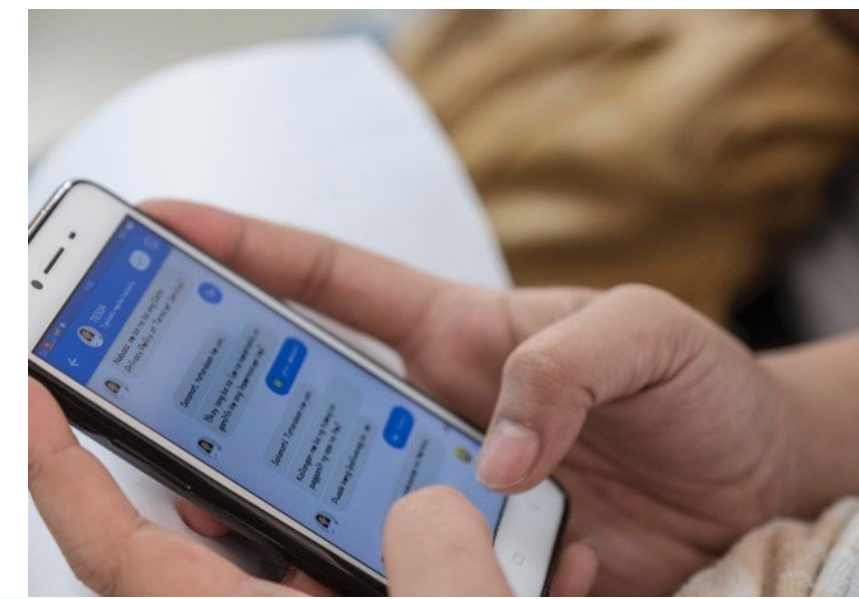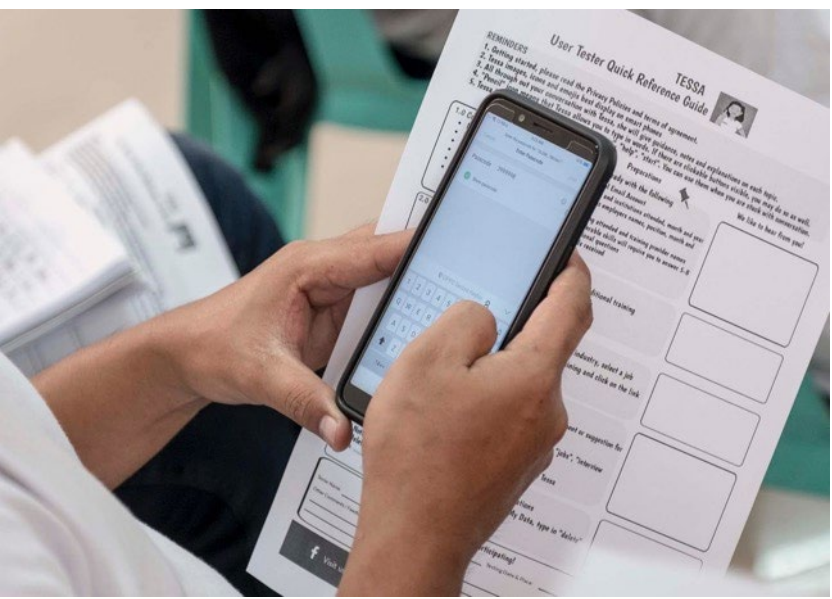Introduction to AI Suitability Framework

Collaborative exercise:
Evaluate AI for your programs and organizations. Pitch your concept to the group.

Resources and next steps

TESSA
Plan International's **T**raining, **E**mployment and **S**upport **S**ervices **A**ssistant

PLAN INTERNATIONAL

YOUTH EMPLOYMENT SOLUTIONS

What problem are you trying to solve?

Marginalized youth in Asia, particularly young women, are unable to effectively express and communicate their skills and link to suitable economic opportunities.

How is the problem being addressed today?

Quality without Quantity

Community Development Facilitators work across private sector and value chain partners and support youth to understand and 'formalize' their skills then link them to opportunities.

Limitations

The CDF approach requires significant human and financial resource and often experiences and demand for support cannot be met.

Why is AI better than the current solution?

Approachable and Accessible

- Anywhere, anytime
- Extends reach and capacity
- Access to geographically marginalized youth
- Provides an alternative interface for diverse youth

Consistent Quality

- Compliments the current approach
- Takes quality inputs to scale
- Provides an equal intervention to all youth

What is the solution?

TESSA translates informal skills and interests into formal employability skills and links youth to potential aligned economic opportunities.

What kinds of data does your solution need?

User and Labor Market Data

- Age
- Location
- Employment history
- Personal interests

- Work experience
- Job profiles
- Job skills

Where and how are you getting these data?

- User data is collected through NLO conversations with TESSA
- Labor market data is collected through a Plan International customized portal
- Jobs and skills data will be automated in near future
- Partnerships being formed with government and local hiring sites

What resources do you need to support the development, implementation, and maintenance of the solution?

Technical

Product Owner

Designer

Developer

Gender Experts

Subject Matter Experts

Initial Dev Team (Accenture)

Solution Architects

Environment

Non-technical

Project Oversight

Administration

Community Development

Facilitators

MarComms

Influencing

Community Support Workers

What are the potential biases that AI may introduce or amplify in your context?

Gender Transformative Tech

- Extensive bias exists in preexisting AI tools developed by predominately male tech teams
- Recommendation AI often reinforces preexisting stereotypes. For example women are often recommended to stereotypically 'female' roles (hairdressing, beauty, etc.)
- Language in conversations needs to be gender transformative

In Design

- Subtle bias such as external influences crept into the design of the solution
- Implicit bias exists in the 'Human' part of the Human Centered Design Process
- Restructured design teams to ensure gender balance (equal or majority women)
- New features will identify bias in third party technologies (such as job matching)

# What are the potential biases that AI may introduce or amplify in your context?

What is your approach to maintaining the solution?

Internal Support

- Initial development done in collaboration with Accenture Liquid Studios PHL team
- Initial development done with 2 week sprints over 6 months
- Plan International took over operational, administrative & support functions
- Internally supported by Plan International's Innovations Hub for next 18 months

Supporting Partners

- Accenture Corporate Citizenship – Initial development
- Microsoft Azure Sponsorship – Architecture
- Microsoft Employee Engagement – Engineers & Architects
- Microsoft Giving Program – Ongoing financial donations
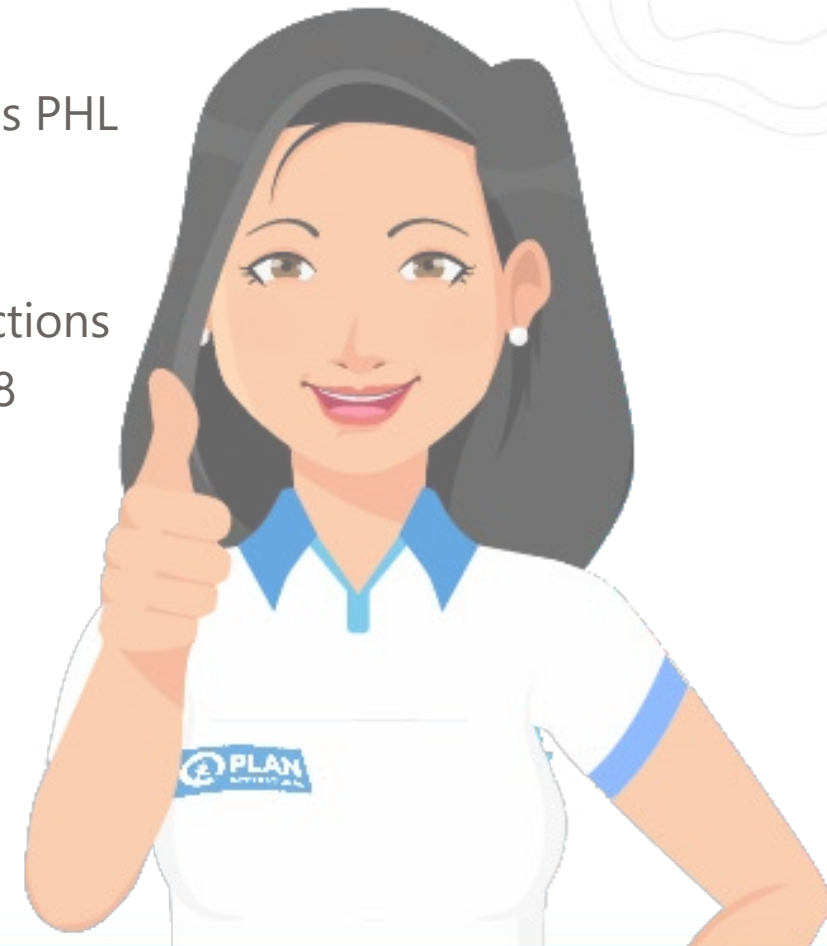
Call to action

Opportunities to Partner

- Architecture strengthening
- Feature expansion
- Context expansion

How you can contribute

- Technical expertise
- Staff augmentation
- Mentorship

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Resources and next steps

AI Suitability Framework: What is it?

- Driven by the need of the nonprofit sector for practical tools
- Developed by NetHope AI Working Group in partnership with USAID, MIT, UC Irvine, and many other contributors
- Developed through an iterative and consultative process.
- Designed to be used by different stakeholders: Practitioners,
- Technologists, Donors

AI Suitability Framework

A set of 32 questions, to help you determine suitability of AI for international development programs and to plan for sustainability.

- Define the opportunity
- Evaluate data and bias
- Resource the solution
- Implement the solution
- Maintain and extend the solution

SAMPLE QUESTIONS

1. WHAT PROBLEM ARE YOU TRYING TO SOLVE?

2. HOW IS THE PROBLEM BEING ADDRESSED TODAY?

3. WHY IS AI BETTER THAN THE CURRENT SOLUTION?

4. WHAT IS THE SOLUTION?

5. WHAT KINDS OF DATA DOES YOUR SOLUTION NEED?

6. WHAT RESOURCES DO YOU NEED TO SUPPORT THE DEVELOPMENT, IMPLEMENTATION, AND MAINTENANCE OF THE SOLUTION?

7. WHAT ARE THE POTENTIAL BIASES THAT AI MAY INTRODUCE OR AMPLIFY IN YOUR CONTEXT?

8. WHAT IS YOUR APPROACH TO MAINTAINING THE SOLUTION?

https://solutionscenter.nethope.org/artificial-intelligence-suitability-toolkit-for-nonprofits

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Evaluate AI for your work, **collaboratively** and with the support from **partners**.

- Emergency Response
  (e.g., natural disasters, conflicts, displacement)

- Children and Youth
  (e.g., education, livelihoods, safeguarding, gender, accessibility)

- Health
  (e.g., infectious diseases, nutrition)

- Fundraising (e.g. charitable giving) & Internal Operations
  (e.g., supply chain / logistics, HR, finance)

- Conservation / Environment
  (e.g., climate, species, preservation)

BE PREPARED TO DELIVER 90 SECOND PITCH PER GROUP:

1. WHAT PROBLEM ARE YOU TRYING TO SOLVE?

2. WHAT IS THE SOLUTION?

SAMPLE QUESTIONS

1. WHAT PROBLEM ARE YOU TRYING TO SOLVE?

2. HOW IS THE PROBLEM BEING ADDRESSED TODAY?

3. WHY IS AI BETTER THAN THE CURRENT SOLUTION?

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7. WHAT ARE THE POTENTIAL BIASES THAT AI MAY INTRODUCE OR AMPLIFY IN YOUR CONTEXT?

8. WHAT IS YOUR APPROACH TO MAINTAINING THE SOLUTION?

90 SECOND PITCH PER GROUP:

1. WHAT PROBLEM ARE YOU TRYING TO SOLVE?

2. WHAT IS THE SOLUTION?

Q&A

Next Steps

1. Continue learning about AI/ML.

2. Learn from other practical implementations in the nonprofit sector. Reuse what works.

3. Explore and experiment with AI/ML capabilities. Try something small first. Always, start with the problem, not with technology.

4. Get your data in order.

5. Understand ethical, responsible development & use of AI.

6. Partner - for expertise, resources, and a greater impact.

7. If you are a NetHope member, join NetHope's AI Working Group: **http://bit.ly/ET_WorkingGroup**

Where to learn about AI/ML:

NetHope Solutions Center

https://solutionscenter.nethope.org/et

Example webinars:
- AI Primer
- Demos of AI/ML tools that don't require specialized knowledge
- Get your data ready for AI
  Lessons learned from practical implementations of AI in field programs and internal operations, featuring Plan International and The Carter Center
  Lessons learned from practical implementations of AI in conservation contexts, featuring The Nature Conservancy and Carnegie Mellon University

Example reports:
- Reflecting the Past, Shaping the Future: Making AI Work for International Development by USAID.

Resource: Repository of AI / ML Resources

A set of set of tools, services, trainings compiled by NetHope, USAID, Microsoft, Amazon, Google, IBM, and Salesforce.

http://bit.ly/AI4Gtools

Thank you!

Name, Organization, Email