### CSC373

# Embedded EthiCS Module

#### Team



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## Goals

- The purpose of this module is **NOT** to:
  - Fell you what to think about ethical issues
  - Fell you what is right and what is wrong
- It is to help you:
  - > Be more confident and comfortable in identifying and discussing ethical issues
  - Practice thinking about a problem from different perspectives

## Reminders

- Feel free to use chat; we want to hear your thoughts!
- Be respectful, but don't hesitate to disagree with one another
- In the chat and breakout groups, address your comments to the person's views or arguments, rather than the person themselves

## Let's dive in!

### **Breakout Activity 1**

- Recall the vaccine distribution problem from the pre-module assignment:
  - > You were an intern at an NGO distributing vaccines from suppliers to countries
  - > m suppliers, each supplier r can supply up to  $s_r$  doses
  - > *n* countries, each country *i* is willing to purchase up to  $c_i$  doses
  - > You were given feasibility constraints dictating which suppliers can supply to which countries
  - You maximized the #doses delivered using network flow

#### • The goal of this breakout activity is to identify potential ethical issues with this

- The issues may lie in your solution (maximize #doses delivered) or in the problem formulation itself
- > Interpret "ethical" in the broadest sense as you understand it

## **Breakout Activity 1**

#### Logistics

- > We will create breakout rooms of ~6-8 students each
- > A moderator will come to your breakout room and provide a link to a Google Jamboard

#### Jamboard

- Frame 1 recalls the vaccine distribution problem
- Frame 2 asks you to identify potential issues with your solution
  - [7-8 minutes] Answer the question on this frame as a group using sticky notes
- Frame 3 asks you to identify potential issues with the problem formulation
  - o [12-13 minutes] Answer the question on this frame as a group using sticky notes
- > You have **20 minutes** to work on this exercise!

# Breakout!

# Synthesis of Activity 1

Let's go through some of the answers!

#### Food for thought

- > Various dimensions in which a flawed problem formulation can lead to ethical issues
- > Various ways in which a solution can be unethical

#### Takeaways

- > Before solving a problem, we should make sure we're solving the right problem
- For solving the problem, we should first ensure we are implementing an ethical solution, and then worry about how to implement it

#### Stakeholders

- We will use stakeholder theory to explore some of the ethical aspects of vaccine distribution between countries
- Primary stakeholders: people who are eligible to receive resources
  - It is important that any valid claims made by primary stakeholders be acknowledged when distributing resources
  - These claims will be framed in terms of "building blocks" (next slide)
- Secondary stakeholders: people related to the situation who have special knowledge or expertise regarding it
  - The special knowledge or expertise of stakeholders often reveals something important about how resources should be distributed

## **Building Blocks of a Theory of Fairness**



Efficiency: making sure resources are allocated where they are used most effectively



**Rights to a minimum**: making sure that everyone has a bare minimum needed to survive, thrive, etc.



**Desert:** making sure people get what they deserve (e.g. because they have worked for it)



**Equality:** making sure that everyone gets the same amount of resources, or that no one receives more or less for arbitrary reasons

# **Breakout Activity 2**

#### Logistics

- > We will create the same breakout rooms as in previous activities
- > A moderator will come to your breakout room and provide a link to a new Google Jamboard

#### Jamboard

- Frame 1 describes various stakeholders and tells you which stakeholder's perspective you are supposed to take
- Frames 2 and 3 ask you questions that you need to answer from your stakeholder's perspective
- > You have **20 minutes** to work on this exercise!

# Breakout!

# Synthesis of Activity 2

Let's go through some of the answers!

#### Food for thought

- > How do you identify all possible stakeholders for a given problem?
- How do you determine the needs and priorities of these stakeholders?

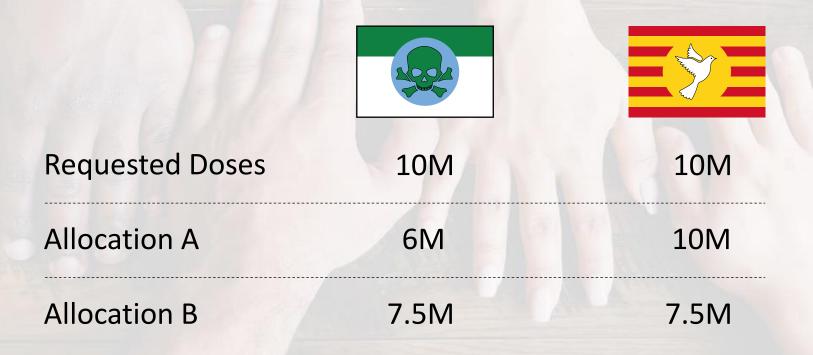
#### Takeaways

- > Different individuals or groups can, in some contexts, have differing claims to a resource
- An ethical solution must find a balance between the needs and priorities of all stakeholders
  - It should be justifiable to each stakeholder!

# Time for some polls!

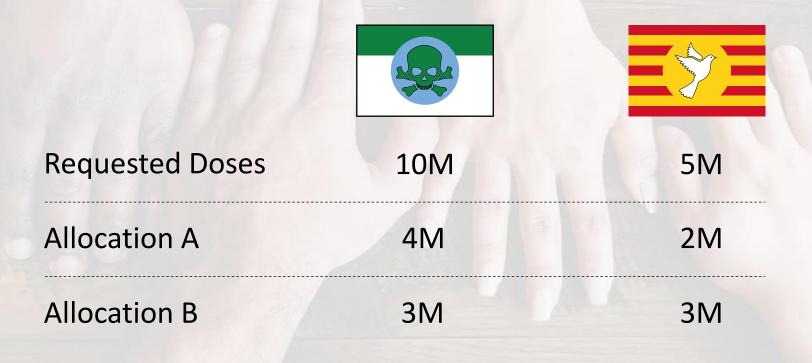
## Poll 1

- Imagine two hypothetical countries requesting 10M vaccines each
- Which of the following two vaccine allocations is fairer in your opinion?



## Poll 2

- Now imagine two hypothetical countries requesting different numbers of doses
- Which of the following two vaccine allocations is fairer in your opinion?



### Poll 3

Which of the following policies for vaccine distribution do you think is the fairest?
c<sub>i</sub> = #doses requested by country i

>  $a_i$  = #doses allocated to country *i* 

**Policy 1:** Maximize the total number of doses allocated,  $\sum_{i} a_{i}$ **Policy 2:** Maximize the minimum number of doses allocated,  $\min_{i} a_{i}$ **Policy 3:** Maximize the total fractions of demands satisfied,  $\sum_{i} \frac{a_{i}}{c_{i}}$ 

**Policy 4:** Maximize the minimum fraction of demands satisfied,  $\min_{i} \frac{a_i}{c_i}$ 

**Policy 5:** For a reasonable threshold T, maximize the total number of doses allocated subject to each country receiving at least T doses (maximize  $\sum_i a_i$  s.t.  $a_i \ge T, \forall i$ )

# **Concluding Remarks**

# Designing an Ethical Algorithm

| IDENTIFY STAKEHOLDERS                 |
|---------------------------------------|
| Pay attention to primary vs secondary |
| stakeholders                          |

#### LEARN THEIR NEEDS

Elicit them directly (e.g., focus groups) or learn from data

#### SET THE SYSTEM GOALS

Find a good balance between the needs of different stakeholders

#### DESIGN THE ALGORITHM

Design an algorithm for optimizing your set system goals

#### **EXPLAIN TO STAKEHOLDERS**

Justify your algorithms and its outcomes to the stakeholders



2

4

#### **FEEDBACK & ITERATE**

Get feedback from the stakeholders to improve your algorithm

3

5

### Ethics

- This module focused primarily on fairness in the form of distributive justice
- There are many, many other aspects to ethics
  - Privacy
  - Safety & reliability
  - Transparency
  - Consent
  - Rights
  - Data ownership
  - > Agency
  - Environmental impact
  - ≻ ...

#### Thank you

# **Questions?**

## Feedback?