



AMS

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Supplemental Material

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Trustworthy Artificial Intelligence for Environmental
Sciences: An Innovative Approach for Summer School
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1 **Supplemental Material for:**

2 **Trustworthy Artificial Intelligence for Environmental Sciences:**

3 **An Innovative Approach for Summer School**

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15 **Supplemental materials: Description of all persona**

16 Below are the personas we used to guide the interdisciplinary activities for the 2022 AI2ES
17 Trust-a-thon. This is the content we developed specifically for our goals, lectures, and notebooks
18 used in the summer school. Please feel free to use the general ideas here to help you develop
19 content of your own, but note because of how directly we tailored them to our goals and datasets
20 that they may not be directly transferable to other problem sets or lectures. If you do use these
21 materials, we ask that you either cite this paper and/or acknowledge the AI2ES institute.

22 **Overview:** As we discussed in the lecture series, trust and trustworthiness are really in the eye
23 of the beholder. So developing AI we hope to be perceived as trustworthy and useful requires
24 engaging and working with your intended end-users.

25 In an ideal world, we would work closely with end users all throughout the design and develop
26 process. However, for this summer school we don't have the time or ability to do this well. In fact,
27 this is what our institute is working on doing. You'll learn more about these practices and goals
28 throughout the lecture series this week. To stimulate user-driven development, we have prepared
29 a series of fictitious potential users for each data set. Please review the user personas below and
30 select one to be your end-user for the rest of the trust-a-thon activities.

31 *a. Space Weather Persona*

32 Special thanks to Rob Redmond, Manoj Nair, and LiYin Young, for guiding these.

33 **1) Precision Navigator for an International Research Institute**

- 34 • *Background:* Precision navigation systems used to plan and execute underwater and below-
35 ground research expeditions can be disrupted by geomagnetic storms and disturbances. These
36 disruptions could result in miscalculations and incorrect information about important distances
37 and locations. National weather services such as the Space Weather Prediction Center (SWPC)
38 forecast and nowcast the occurrence of these events. If they had an estimate of the strength
39 of the event in real time, they could accommodate this disturbance level into their magnetic
40 calculations for precise navigation
- 41 • *User needs:* The precision navigator needs to know when a geomagnetic storm event may
42 initiate at least 24 hours beforehand because it takes about one day to switch their operational
43 systems. If they are warned too late, they will not have enough time to make the switch, which

44 would force an expensive and potentially dangerous pausing of the research trip. However,
45 they also need this information with accurate geomagnetic disturbance level predictions 1 hour
46 in advance so they can either switch to other navigation means, pause operations or ideally
47 incorporate this prediction to improve their navigation calculations and continue exploring
48 uninterrupted.

49 **2) Flight Planner for a Large Airline Company**

- 50 • *Background:* Geomagnetic storms and disturbances can interfere with radio communication
51 systems on certain routes. These events can result in radio communication not functioning
52 for several days in certain areas. During these events, flights must be redirected to areas and
53 latitudes where they can use other forms of communication.
- 54 • *User needs:* The flight planner needs to know about when events are going to start at least 7
55 days beforehand so they can reroute flights and notify their customers. The more time they
56 have, the better. Their customers do not like changed itineraries and it can cost the company
57 a lot of money. They also need to know how long the events will last, so they know just
58 how many flights they need to change and what flights will not need to be changed. This
59 information will help them better manage customer relations.

60 *b. Tropical Cyclone Persona*

61 Special thanks to Andrea Schumacher for guiding these.

62 **1) A Forecaster in a Tropical Region**

- 63 • *Background:* Wind speeds are an important dimension for forecasting tropical cyclones. While
64 there is some opportunity for direct measurements (such as with aircrafts), observational data
65 is not often available. Forecasters need other ways to get this crucial information.
- 66 • *Key user needs:* The forecaster needs to know roughly how strong wind speeds are so they
67 can assess the local impacts and provide accurate information to local emergency managers.
68 They also need this information to have high resolution so they can advise the emergency
69 managers on where the priority areas are for their disaster responses. If the information is not
70 accurate or precise enough, the forecasters may lead the emergency management officials to
71 the wrong areas and/or waste valuable time in the wake of the tropical cyclone.

72 **2) Department of Transportation Official**

- 73 • *Background:* Wind speeds are an important factor for transportation officials when making
74 decisions about closing and (reopening) bridges. Strong winds can cause driving conditions
75 to deteriorate, making driving on them incredibly dangerous. Crashes are not only dangerous
76 to those driving, but they could also block important routes for emergency response vehicles.
77 The decision to close the bridges is also very important because they are needed for people to
78 evacuate, especially from barrier islands, so closing the bridge means potentially taking away
79 some people's ability to evacuate from a storm.
- 80 • *Key user needs:* The transportation official needs extremely precise data on wind speeds so
81 they can effectively walk the line between keeping pathways open for evacuation and making
82 sure driving conditions are safe.

83 *c. Severe Weather Persona*

84 Special thanks to Randy Chase for guiding these.

85 **1) Emergency Manager in a Rural Area.**

- 86 • *Background:* Each year lightning strikes start thousands of wildland fires. These fires can be
87 very dangerous and difficult to monitor in large, rural counties. Emergency managers must be
88 prepared to respond quickly to these events and must mobilize teams and resources efficiently.
89 Knowing where lightning strikes across a large county with a lot of wildlands can help guide
90 the early discovery of fires.
- 91 • *Key user needs:* The Emergency manager needs to know which areas have had high amounts
92 of lightning strikes with a very high resolution so they can focus on which areas to search.
93 Due to time and resource limitations, they can only search a few areas, so they need to be able
94 to prioritize the most likely areas.

95 **2) Director of Operations at a Sports Stadium**

- 96 • *Background:* Lightning is a threat for stadium operations and is tied to decisions to cancel
97 and/or delay games or matches. These decisions are tied to concerns for the safety of both the
98 players and the fans, but also to concerns about potential revenue loss.

99 • *Key user needs:* Making the decision to cancel or delay a game is not taken lightly and this
100 user needs to know that there is reported lightning headed towards the stadium with a high
101 degree of certainty. They also need to be able to report just how much lightning has been
102 observed, where, and when so they can decide if they should just delay the event or cancel it.