Representation Matters: Insights, Strategies, and Perspectives from the Inaugural UFS/EPIC Student Ambassador

Alekya Srinivasan, First Student Ambassador of the Unified Forecast System

NOAA
WEATHER
PROGRAM OFFICE

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EPIC
Earth Prediction
Innovation Center

Speaker Background Information

- **2023 William M. Lapenta Intern**
  - First Student Ambassador for the Unified Forecast System (UFS)
- **Undergraduate student at Penn State**
  - Pursuing a B.S. in Meteorology & Atmospheric Science
- Very excited to share my summer research and findings!
- Honored to continue Bill Lapenta's legacy

What is the Role of the UFS/EPIC Student Ambassador?

- Advocating for **community engagement** & technological advancements for academia
- Measuring/evaluating usability of UFS tutorials in academic environments
- Utilizing **outreach and technology** to support/promote community collaboration across the Weather Enterprise
- Providing an **undergraduate student perspective** on UFS accessibility and stakeholder engagement

Earth Prediction Innovation Center (EPIC) - Building Blocks

Building Open and Dynamic Collaboration within the Earth Sciences Community
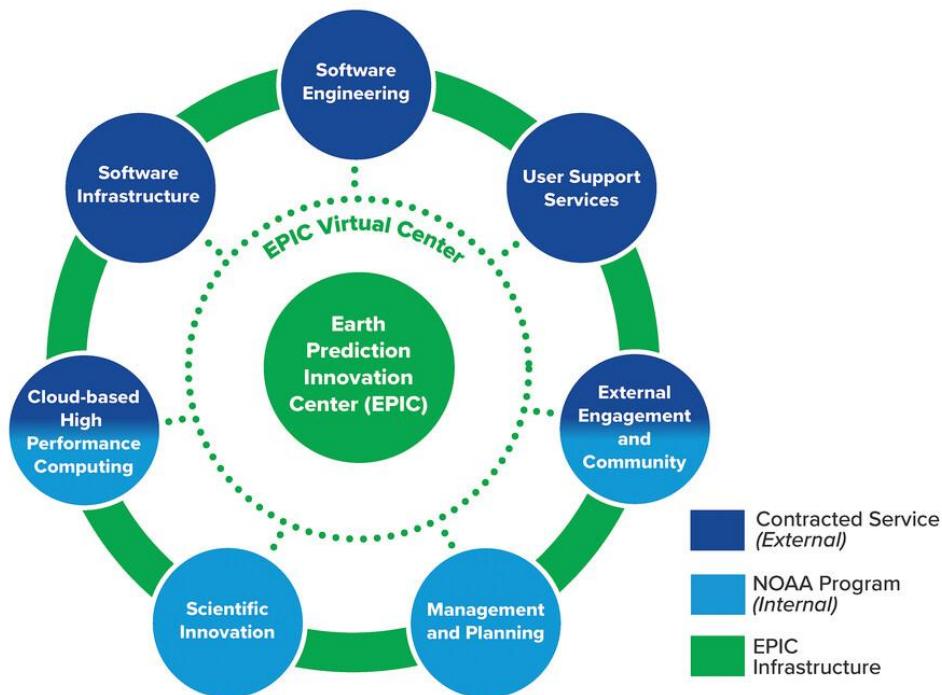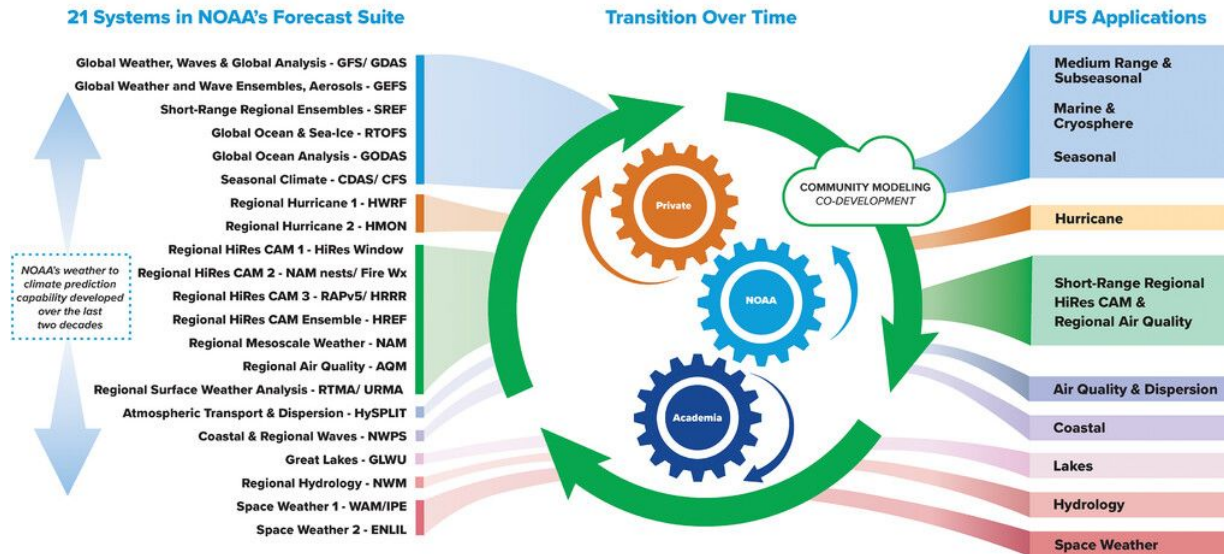
Focus Points

(1) Successfully providing user support

(2) Community outreach

(3) Supporting innovative research

(4) Adaptable software and technological resources

(5) Maintaining a diverse user database

The Unified Forecast System (UFS)

Simplifying NOAA's Operational Forecast Suite

Transitioning 21 of NOAA's Operational Forecast Systems into Eight Applications

- Coupled, community-based Earth modeling system
- Encourages collaboration to accelerate research to operations (R2O) journey
- Public and private code repositories located in GitHub

Designing Innovative Solutions

Successfully providing user support

Short Range Weather and Land DA Technical Report

Adaptable software and technological resources

Community outreach

Supporting innovative research
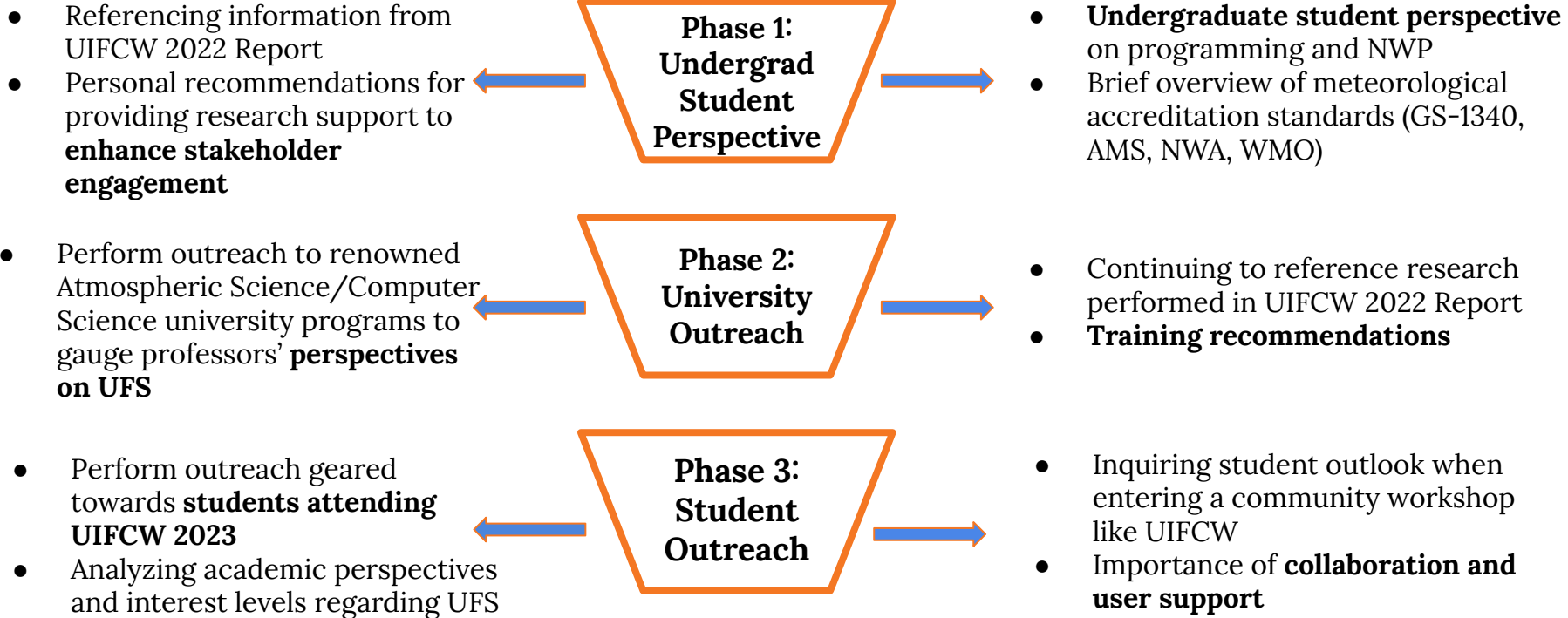
UFS Student Engagement Plan
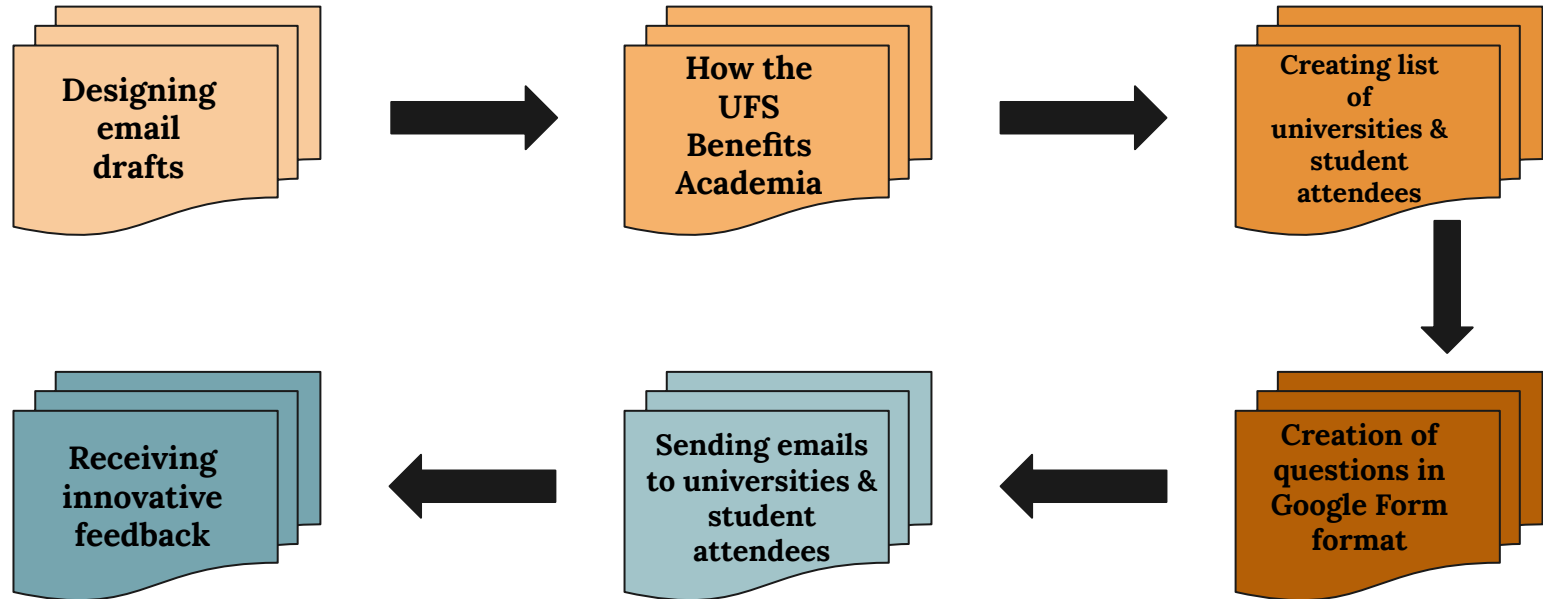
Maintaining a diverse user database

Community Engagement

Creation of a UFS Student Engagement Plan in Phases

- Referencing information from UIFCW 2022 Report
- Personal recommendations for providing research support to **enhance stakeholder engagement**

Phase 1: Undergrad Student Perspective

- **Undergraduate student perspective** on programming and NWP
- Brief overview of meteorological accreditation standards (GS-1340, AMS, NWA, WMO)

- Perform outreach to renowned Atmospheric Science/Computer Science university programs to gauge professors' **perspectives on UFS**

Phase 2: University Outreach

- Continuing to reference research performed in UIFCW 2022 Report
- **Training recommendations**

- Perform outreach geared towards **students attending UIFCW 2023**
- Analyzing academic perspectives and interest levels regarding UFS

Phase 3: Student Outreach

- Inquiring student outlook when entering a community workshop like UIFCW
- Importance of **collaboration and user support**

Community Outreach Process

Designing email drafts → How the UFS Benefits Academia → Creating list of universities & student attendees

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Receiving innovative feedback ← Sending emails to universities & student attendees ← Creation of questions in Google Form format

UFS University Outreach and Feedback

General Questions Asked

(1) How has your institution **already implemented** programming/NWP into curriculums?

(2) What, if any, are some of your **software requirements**? Are there any obstacles that you have encountered/are encountering?

(3) **How can we help**? What, if any, support do you have for the software you are currently using?

(4) Would you be interested in participating in a **"UFS Roadshow"** (in-person demonstrations) and/or receiving online live tutorials?

University Feedback

○ Interest in **live UFS demonstrations** - opens a doorway to greater stakeholder engagement

○ Mentions of **both undergraduate and graduate programs** having programming courses available

○ Only some universities have NWP courses, some are **optional electives**

○ **Python** - commonly used programming language

○ **Closing the gap between academic research and innovative technology/software**
  ■ One of the main issues EPIC and the UFS community face in the eyes of academia

# UIFCW Student Outreach and Feedback

General Questions Asked

(1) What, if any, is your **experience with the UFS?**

(2) Are you familiar with the UFS? If so, would you want the UFS to be **incorporated into your academic studies**?

(3) Are there any programs or resources that **you wish your university offered**?

(4) What do you hope to accomplish from **representing academia** at the UIFCW 2023?

UIFCW 2023 Student Attendee Feedback

- Little experience with NWP
- Not many users of UFS, couple mentions of WRF
- Interest in **UFS becoming integrated** into general university-level curriculums
- **UFS training courses**, NWP and coding classes, introductory courses are requested
- Students are attending UIFCW 2023 to present research, network, and familiarize themselves with modeling frameworks
- **Representation of academia**:
  - Uplifting student voices
  - Gaining forecasting and modeling knowledge to share with peers
  - Learning about current research
  - Discuss progression of academic research

Student Ambassador Insights

➤ Students want to be heard

➤ Providing students with hands-on UFS learning experience

➤ **Reaching younger generations**

  ○ Social media platforms

➤ Engaging and motivating speakers visiting universities

➤ **Allowing students to hear other student experiences**

  ○ UFS success stories

  ○ Funding and grant information

  ○ Increases confidence when students are provided reassurance from others

➤ Create separate training series for undergraduate and graduate students

  ○ **Accurated training courses**
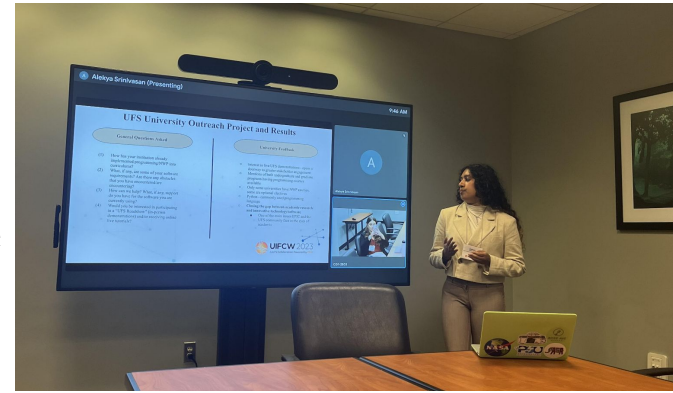
Technological Component

Creation of Short Range Weather and Land DA Technical Report

Tutorials evaluated:

➔ Running Short Range Weather (SRW) packer and infrastructure code installation in the Cloud environment (pre-recorded)

    ➔ Virtual SRW/packer/AWS sandbox general tutorial

    ➔ CodeFest Land DA virtual training

Student Perspective-Based Technical Evaluation

Discussing personal background experiences with programming

Analyzing teaching methods used

Recommendations for a seamless integration into academia

Suggestions for improving intended deliverables

Identifying gaps that need to be addressed

Prioritizing student user support and satisfaction

Inclusive environment for all platforms in tutorials (Mac, PC, etc.)
- Tutorials for puTTy configuration
- EC2 Instance Connect
- Other SSH clients

Distribution of pre-tutorial materials
- Creation of AWS account
- General terms to know before tutorial
- Explanation of documentation commands

Recommendations for Future Deliverables

Pre-recorded and in-person tutorials: more impactful than virtual
- Tutorials that are fast-paced and have quick delivery are not ideal for academic integration

Inclusion of all relevant and required information
- Mentioning "i" for inserting text in a file

What I have Learned/Challenges I Faced

- **Trial and error while using AWS during SRW infrastructure tutorials**
  - Initial use of incorrect instance connection methods
- **University Outreach might not have provided enough data to support original project vision**
  - Created a second method of outreach - UIFCW Student Outreach
  - These results will be included in UFS Student Ambassador Final Report
- Learning how to represent EPIC, the UFS, and NOAA's Weather Program Office
- Bringing academia into spotlight
- **Continuing legacy** of community modeling and innovative collaboration
- Creating **lifelong connections** with mentors and leaders

# Future Initiatives for Continuing Research Post-Internship

- **Reconfiguration of Short Range Weather application into Jupyter Notebooks**
    - Appeals to younger programmers
    - Organized notebook format - downloaded and/or browser access
    - Documentation command definitions implemented into code
    - Community code access through public GitHub UFS repository
    - Increased student engagement
- **Construction of a UFS/NWP lesson plan**
    - University collaboration to integrate UFS/NWP into academic curriculums through courses
- **Improving outreach**
    - Continuing/expanding contact with Minority Serving Institutions (MSI) and Historically Black Colleges and Universities (HBCU)
- Attending more CodeFests and Hackathons
- Full project analysis included in UFS Student Ambassador Final Report

Unifying Innovations in Forecasting Capabilities Workshop (UIFCW)

- **Given the opportunity to present findings at UIFCW 2023 in Boulder, Colorado**
  - July 24th - July 28th, 2023
  - Presented summer research & participated in student panel
  - Master of Ceremonies (MC) for one day of workshop
  - Led a student session
    - Learning about undergraduate/graduate experiences from other UIFCW student attendees in-person
  - Moderator for Roundtable discussion

Lapenta Internship!

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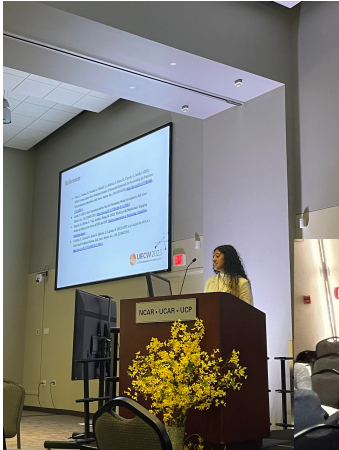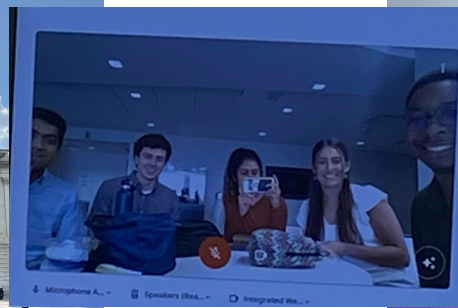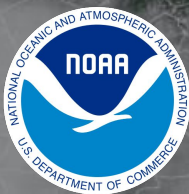
THANK YOU

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