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

Alekya Srinivasan, First Student Ambassador for the Unified Forecast System

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Acknowledgements: Aaron Jones, Laura DeHaan, Gina Eosco, Hendrik Tolman, Keven Blackman, and Kristopher Booker

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Speaker Background Information

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

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

- Advocating for community engagement & technological advancements for academia
- Determining/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

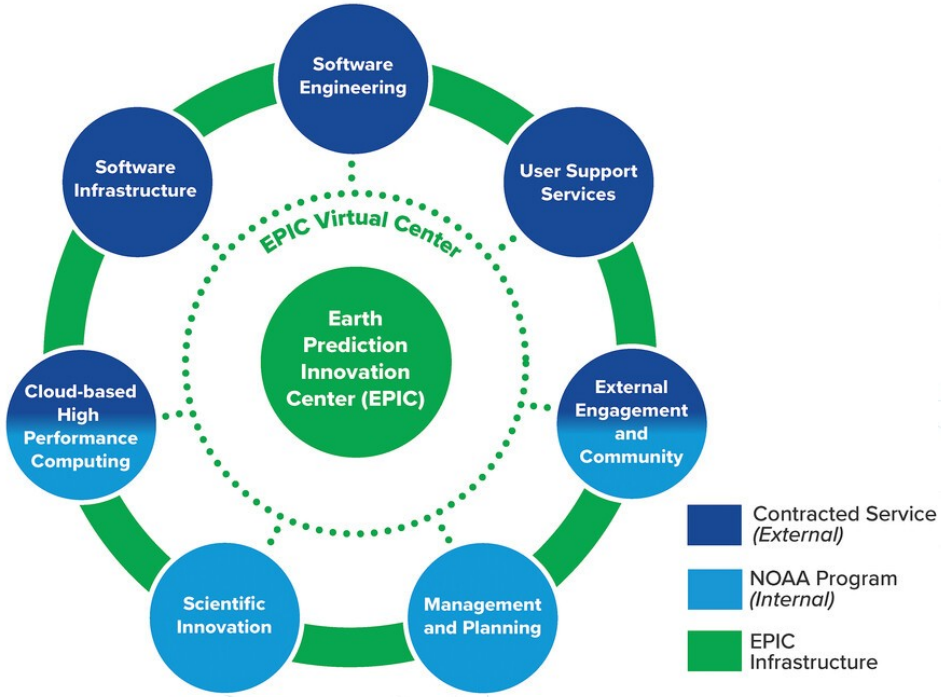

Fig. 3. Bulletin of the American Meteorological Society 103, 10; 10.1175/BAMS-D-21-0061.1

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

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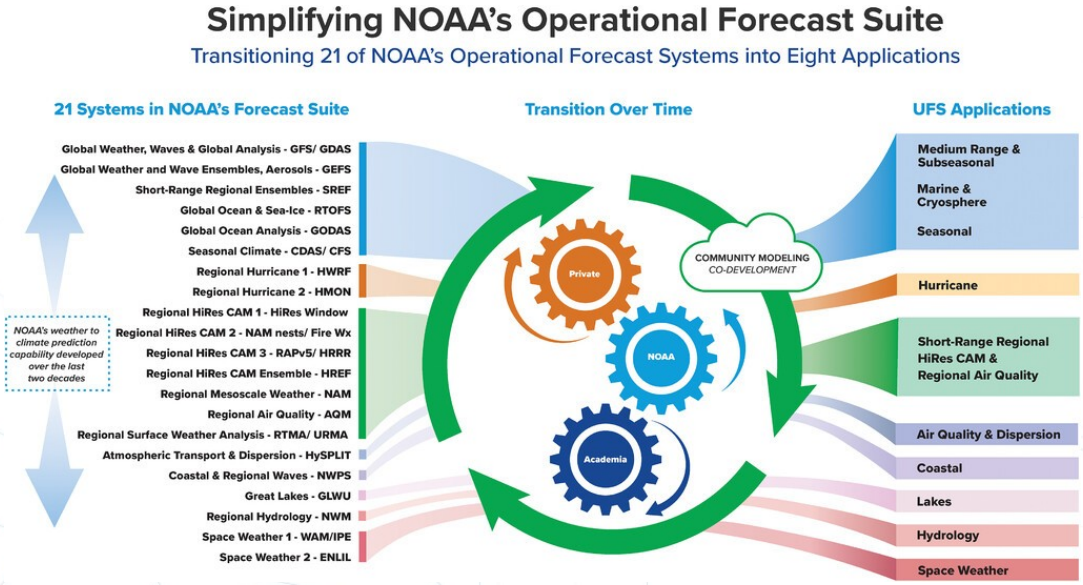
The Unified Forecast System



- Community-based Earth modeling system
- Encourages collaboration to accelerate R2O journey
- Public and private code repositories located in GitHub

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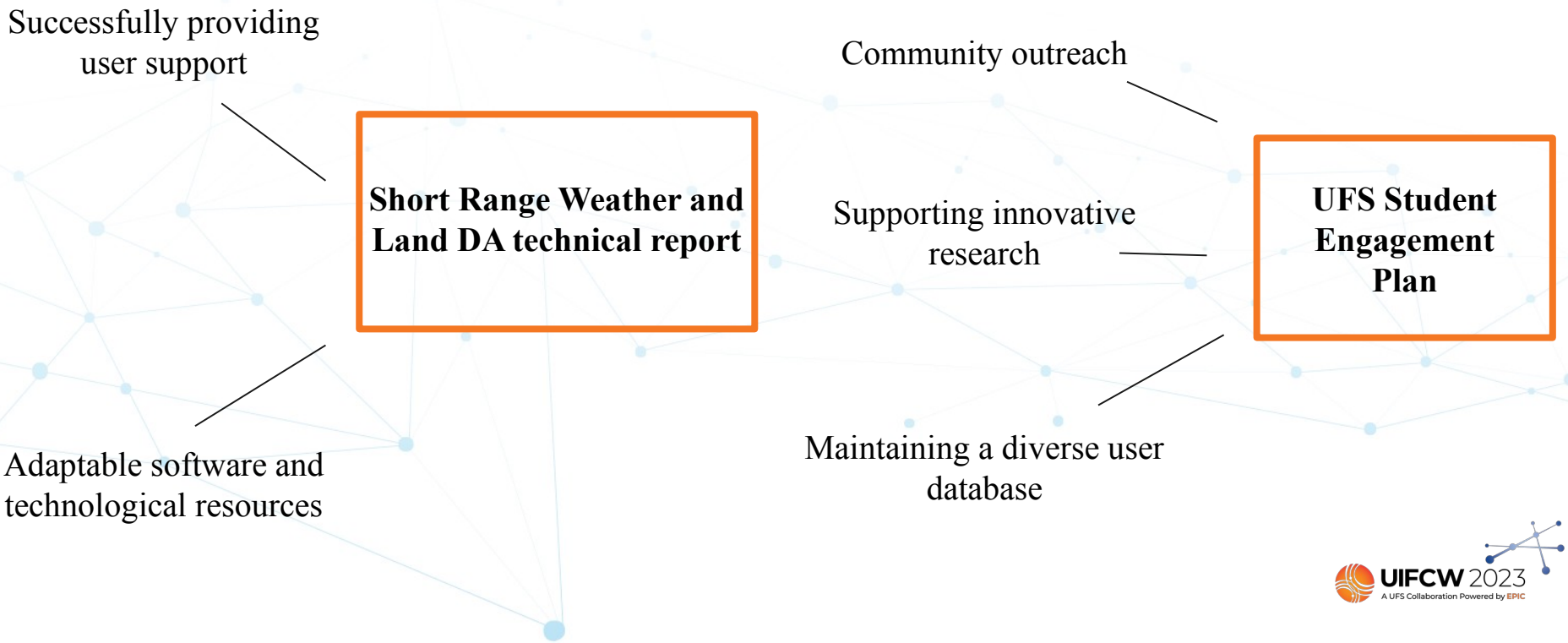
Designing Innovative Solutions



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

- 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

- 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

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

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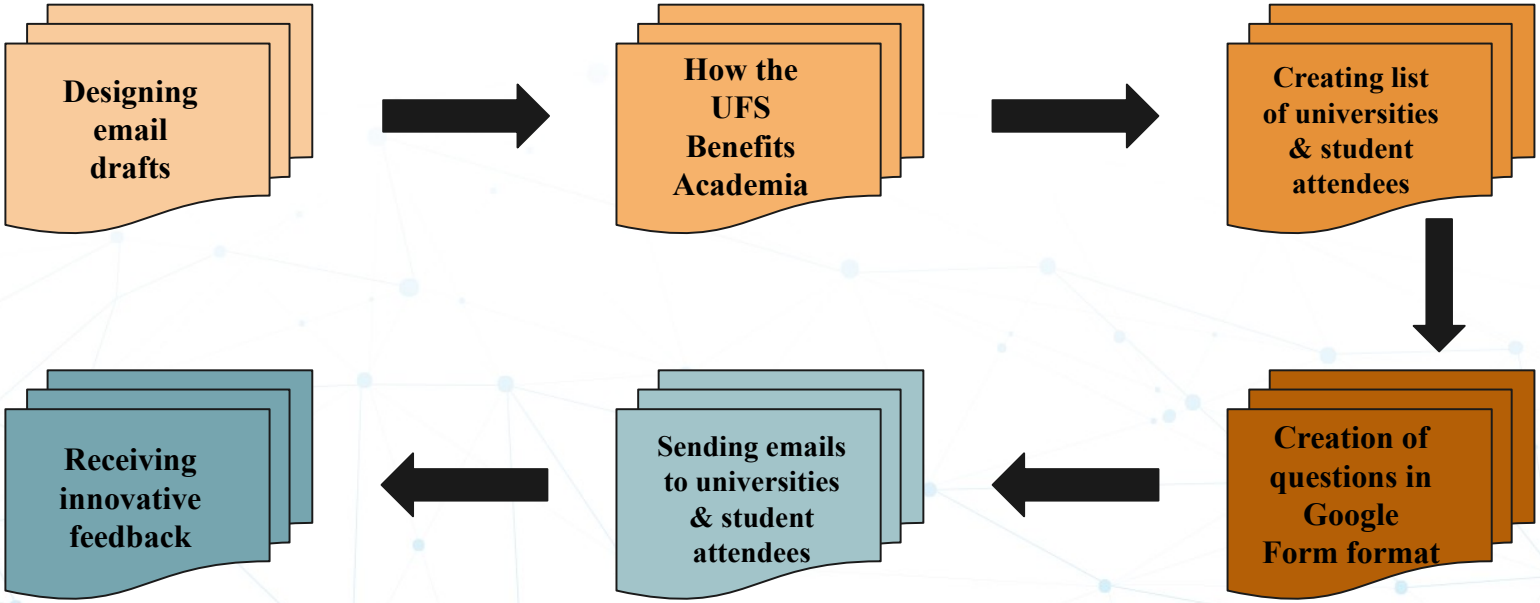
Community Outreach



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UFS University Outreach Project and Results

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

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UIFCW Student Outreach Project and Results

(In Progress)

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
- No users of UFS, one mention 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

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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

Anticipated Outcome of UFS Student Engagement Plan

Main Goal: getting more students interested and involved with UFS

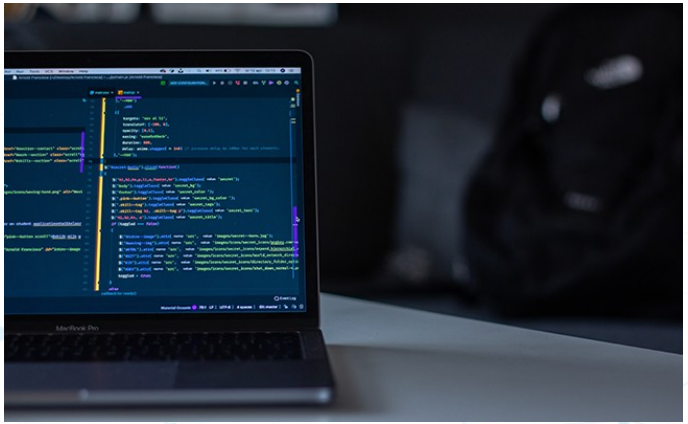
- Greater stakeholder engagement including students and professors
- Increase in R2O and O2R achievements in academia
- Broadening of diverse UFS and NWP user database

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



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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

Recommendations for Future Deliverables

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

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

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SRW Reconfiguration to Jupyter Notebooks

**** Access through Amazon Web Services (AWS) EC2 Instance Connect ****

Running Jupyter Notebooks through EC2 Server

Rewriting SRW code in Jupyter Notebooks

Publishing code on public GitHub repository

Increased student engagement

Why Jupyter Notebooks?

- Appealing to younger programmers
- Organized notebook format
- Documentation command definitions implemented into code
- Can be downloaded and accessed on a browser

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Anticipated Outcome of SRW and Land DA Technical Report

Main Goal: ensuring usability of tutorials in an academic setting

- More academic research represented and accelerated in Research to Operations (R2O) journey
- Greater efficiency and impact of UFS tutorials
- More user support leads to greater stakeholder engagement
- Increased incorporation of UFS and Numerical Weather Prediction (NWP) into general academic curriculums
- Connects to enhancing a diverse community of users through Weather Enterprise

What I have Learned/Challenges I Faced

- Trial and error while using AWS during SRW infrastructure tutorials
  - Initial use of incorrect instance connection methods
  - Incorrect EC2 instance settings - many issues with running code
  - Running Jupyter Notebooks on EC2 server - needed to expand size of instance, change security group settings, and accessing Jupyter online
- University Outreach might not have provided me with 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
- Discussing plans of approach with numerous mentors - learning about EPIC, how UFS is the future, and how to represent UFS as First Student Ambassador
- Bringing academia to spotlight of community and technological advancements
- Continuing a legacy of community modeling and innovative collaboration
- Creating amazing connections with mentors and leaders throughout NOAA

Future Initiatives for Continuing Research Post-Internship

- Completion of SRW reconfiguration into Jupyter Notebooks
  - Community can successfully access this code on public GitHub UFS repository
- Construction of an UFS/NWP academic lesson plan
  - Continuing to uphold a welcoming environment for academia and young programmers
- Improving methods of outreach and continuing to reach out to both Minority Serving Institutions (MSI) and Historically Black Colleges and Universities (HBCU)
- Attending more CodeFest's and Hackathon's for further analysis and understanding of tutorials
- Include analysis of UIFCW Student Outreach results in final report

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