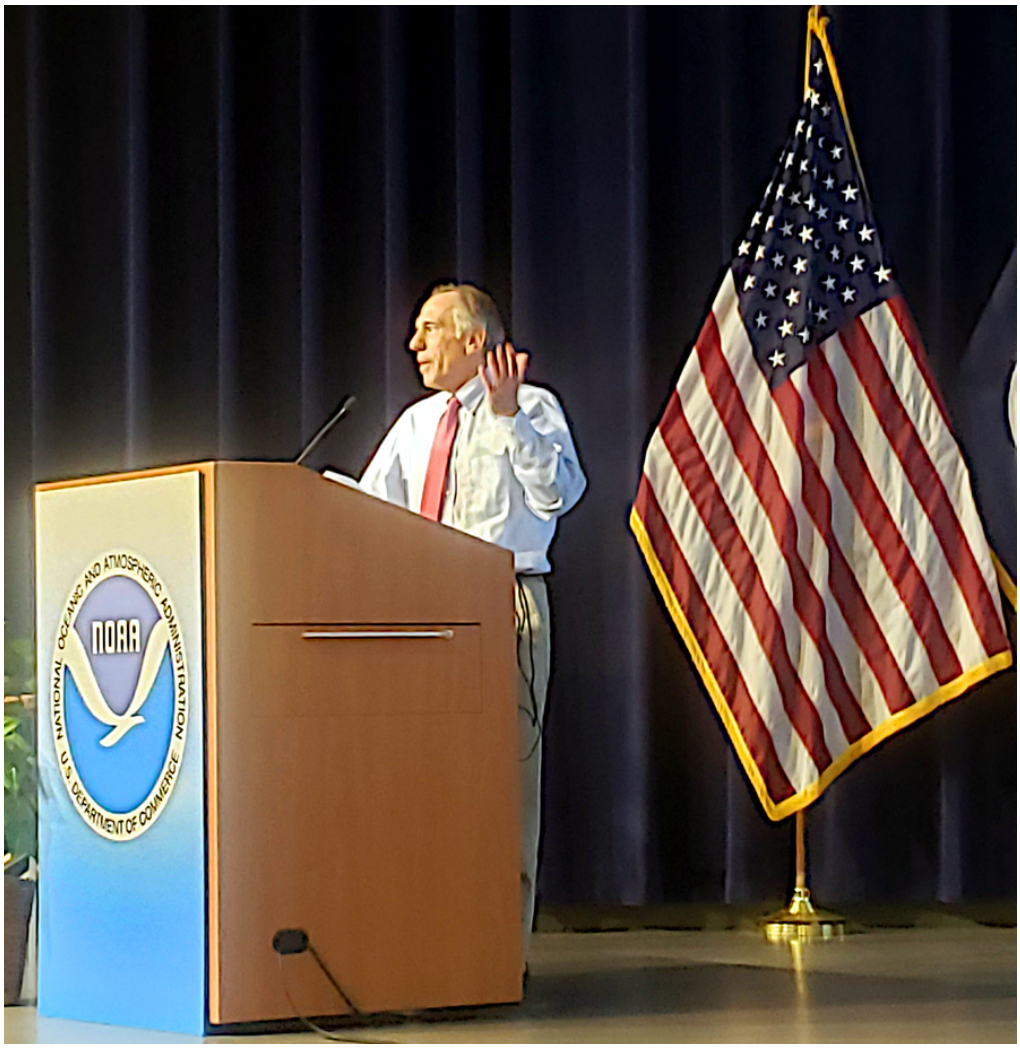
FALL 2020

UFS QUARTERLY

BULLETIN OF THE UFS COMMUNITY

Dr. William 'Bill' Lapenta
The Enduring Legacy of a Passionate Leader



'BILL' LAPENTA
SPECIAL EDITION

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2020 - The UFS in Review

doi.org/10.25923/ydpq-6y41

A JOURNEY OF LOVE AND PRINCIPLES

By Cathy Lapenta

My Reflection on Bill's Professional Passions

When I met Bill at Penn State in the fall of 1984, his childhood passion for meteorology and love of numerical weather prediction were already apparent. Our time together often competed with his need to submit late night runs to the NCAR Cray supercomputer in Boulder, CO. Over the next nearly 35 years, I saw Bill's dedication to student outreach and engagement and leadership development blossom.

Bill and Cathy celebrating after their oldest daughter, Kristy, graduated from High School in 2011

In 1991, Bill's passion for student outreach and engagement began in earnest when he became an adjunct professor at the University of Alabama in Huntsville (UAH) Atmospheric Sciences Department teaching atmospheric dynamics and synoptic meteorology. Bill loved to challenge students in the classroom and passed on lessons he learned from previous professors at both Penn State and Oneonta. Bill continued to teach, mentor, and advise students at UAH until we moved to the Northern Virginia area in late 2008.

Bill's passion for leadership development began in 2005 when he was accepted to the NASA Leadership Development Program which was an immersive and challenging one-year leadership training program located at NASA Headquarters in Washington D.C. Bill's experience in the program gave him a new perspective and confidence which ultimately led him to pursue demanding leadership positions at both NASA and NOAA.

Bill integrated all his passions together in a collaborative effort to create the NOAA Summer Internship Program. In this program, he spoke to each class of student interns about his life story and intertwined key leadership development principles that he felt made him successful.

The key principles he spoke to are:

- Build your network – it's a small community,
- Be inquisitive – ask questions,
- Be self-aware – everyone is watching,
- Be resilient – it only takes one yes,
- Be uncomfortable – expand your boundaries.

I am so grateful to have had the opportunity to share Bill's journey. I know we all miss him greatly. I hope this special newsletter edition inspires the community to continue pursuing their passions through Bill's example.

Editorial Board: *Jose-Henrique Alves, DaNa Carlis, Jimy Dudhia, Mike Ek, Genene Fisher, Leah Dubots, Lauren Gaches.*

Collaborators: *Cathy Lapenta, Neil Jacobs, Louis Uccellini, Craig McLean, James Doyle, Tom Hamill, Fred Carr, Jack Kain, Russell Schneider, Dorothy Koch, Michael Ek, Mussie Kebede, Ellie Venteicher, Alyssa Cannistraci, Tomer Burg.*

We are thankful to *John Cortinas, James Kinter, Susan Buchanan, Jeremy Andrucyk, Kate Brogan, Mike Walker, Tiffany Atkinson, Dani Dodge, and the UFS C&O Team for their strategic support and encouragement.*

Thank you, and forgive us if we forgot someone!

UNIFYING THE WEATHER ENTERPRISE

By Neil Jacobs

Bill Lapenta (third from left), Neil Jacobs (second from right) and NOAA Headquarters staff watch a thunderstorm from the Herbert C. Hoover building in Washington, DC, in 2019

Bill's Leadership, Friendship, and Valuable Advice

I first met Bill when he was at NCEP. I was working with Steve Lord at the time on aircraft data assimilation. We started playing around with the GFS code and sharing back a lot of what we were learning. Bill was always very interested in keeping that collaboration going, which was refreshing. Fifteen years ago, the private sector just repackaged NCEP output, and because of this, they were mainly viewed as customers. The idea that industry would ever contribute to model improvements was met with eye rolls.

In a talk at the 2010 AMS Washington Forum, I said the private sector was going to be able to run global models from raw observations. I asked if anyone was worried that perhaps industry would find it more profitable to cut the public sector out of the loop, which could mean the best forecast for protecting life and property would only be for those who could afford it. People literally laughed at me. Bill took me seriously. He cornered me at the conference, said he was worried about the same thing, and asked how we can prevent that from happening. We both agreed that we needed to come up with a way to get industry and academia to work with NOAA. That way they wouldn't end up treating each other like competitors.

The simple solution would be to refactor the GFS code into the community UFS, so that the entire weather enterprise could be part of the development program. Nobody will undercut something they are investing resources in to

improve. Bill, Fuqing Zhang, and I sketched out what this would look like probably seven or eight years ago.

To get broader community input, AMS formed the Forecast Improvement Group, which our colleague DaNa Carlis (currently at NOAA's Global Systems Lab) now chairs. The WMO also realized they needed to face this paradigm shift head on, and with help from the World Bank, they put together the Global Weather Enterprise Forum. Things were moving along, but slowly, and NOAA was at risk of getting left behind. We owe it to the citizens of our country to ensure they have access to the best forecast products available, and the Weather Enterprise doesn't end up separating the haves from the have-nots.

Being tapped for Assistant Secretary of Environmental Observation and Prediction was not in my plan, but when it happened, it was an easy decision to make this my top priority. Before I was even on board, Bill and I were thinking about what a community global model development program would look like. Bill was a fearless leader, and he never hesitated to tell people what he thought. I remember him on many occasions looking at me with that one-eye squint and shaking his head, telling me something wouldn't work. But when it came to EPIC, he was absolutely convinced it would work. He was so convinced, he proposed doing a detail with me to get it off the ground. Once things were in motion, his position at the NOAA Research Office of Water and Air Quality (now the Weather Program Office), was a perfect fit.

I had heard stories of Bill's leadership and compassion for those moving up through the ranks, but I had not seen it firsthand until I came to NOAA. One day, he came into the office and decided to spend the afternoon talking to my detailee from NOAA Fisheries, Kate Brogan, about NWP. Another time, at the EPIC Community Workshop in Boulder, he jumped up on stage and grabbed the mic, and he told everyone in the room how proud he was of DaNa for stepping up to take on this new role and also putting together a successful workshop. This was just who he was, and I'm so grateful for the time I've had with him to learn about not just modeling but leadership.

Bill's loss is tragic for the weather community. But knowing him, he'd be annoyed if he thought we were letting his absence slow down progress. One day, I was sitting at my desk looking frustrated, and Bill walked into my office. Without asking what was wrong, he goes, "C-mon man, you'll never fix fish. Let's go work on the UFS."

"Bill was a fearless leader, and he never hesitated to tell people what he thought. I'm so grateful for the time I've had with him to learn about not just modeling but leadership."

I will forever be grateful for his leadership, friendship and particularly for his final piece of advice. I was headed home that afternoon, and he was headed to the Outer Banks for vacation, and we were both talking about how work can overtake family time if you're not paying attention. As I was walking out the door, he looked at me and said, "Family is more important than anything; don't forget that." Thank you, Bill. I won't.

***Neil Jacobs** is the Acting NOAA Administrator*

BILL LAPENTA

A LIFE OF LEADERSHIP, COLLABORATION AND JOY

By Louis Uccellini

46th CMOS Congress, Montreal, Canada, 2012

Bill Lapenta worked during his 30-year federal career to improve operational weather prediction models, from his early days as a young researcher at NASA to his 11 years as a leader at NOAA/NWS, where he realized his dream and oversaw the entire model development and implementation process at the National Centers of Environmental Prediction (NCEP). And through this entire journey, he found his true calling in mentoring students. This next generation of science leaders will continue to advance science and modeling to improve weather forecasts for the benefit of the citizens across the United States.

Leading NOAA's Weather Models

Bill spent a large portion of his tenure at NOAA's National Weather Service (NWS) in leadership roles at the Environmental Modeling Center (EMC), from 2008-2010 as deputy director and from 2010-2013 as acting director; and then was selected as the 6th director of the National Centers for Environmental Prediction (NCEP) from 2013-2019. He oversaw the development, enhancement and maintenance of operational environmental modeling systems that provide the foundation for national and global weather and climate forecasts, including the upgrade of the Global Forecast System with the FV3 dynamic core, the continued improvements to the operational hurricane forecast models, and the introduction of space weather forecast models into the operational model suite.

A common theme woven throughout Bill's life story is his extraordinary people skills, which played a crucial role in breaking down long-held barriers within NOAA, He encouraged a collaborative and inclusive approach with the larger research community that could accelerate innovation and model improvement within all of NOAA, and especially for the NWS operational models.

"Bill exerted profound influence on the organizational structure of EMC with his visionary leadership, bringing rapid advancements in the model development and operational implementations. I was fortunate to be associated with, and mentored by Bill during his time at EMC," said Vijay Tallapragada, chief of the Modeling and Data Assimilation Branch, EMC, at the NWS.

These achievements were possible because of Bill's unique ability to guide the changing culture at the National Weather Service as we evolved to embrace a more collaborative forecast process internally and a more collaborative research and development process externally. Closer research collaborations both inside of NOAA and across the larger research community paved the way for rapid innovation. Bill prioritized bringing new talent into NOAA, and he fostered an organizational culture of infusing different perspectives and ideas into our modeling programs. Bill uniquely possessed the strong people skills, leadership coaching, and staff empowerment to nurture the relationships that made it all possible.

Embracing Collaboration

Bill's emphasis on scientific integrity and excellence was clearly evident. His no-nonsense style of transparency with the research community strengthened existing partnerships and opened the door for new collaborations across the spectrum as he inspired scientists to want to work together to achieve mutual success.

Bill established the momentum for the future push of the Unified Forecast System (UFS). His goals were to establish meaningful and sustained ways for NOAA to connect with the larger research and academic community outside of NOAA, to harness all the raw ideas and talent from the nation's top science minds so we could accelerate research-to-operations through efficiency and collaboration. He took to the concepts of the Development Testbed, the U.S. Joint Center for Satellite Data Assimilation, and Joint Effort for Data assimilation Integration. He embraced the capabilities of each, and understood their value when opened up to all communities.

Working closely with the program management team at National Weather Service headquarters, Bill helped assemble an outside panel of international experts to establish the parameters and process for recommending a new dynamic core for the Global Forecast System. The developed process would be based on scientific assessment and model performance of all submitted dynamic cores.

This was a monumental step that would serve as a template for future UFS collaborations. Today, everything that is brought into the UFS follows the review process based on that decision. And today, through the UFS GitHub, private sector and academic modelers can work within the UFS to access modeling code, conduct their own studies and provide recommendations for continued improvement of the operational GFS.

Lasting Influence and Legacy

Bill left lasting impacts on many young scientists who have benefited from his mentoring and the training programs he established with research partners throughout the world. His goal was to ensure there was an ongoing pipeline of people to continue building upon advancements of the research and operational modeling systems for the benefit of society.

Recognizing Bill's immense joy of nurturing the next generation of scientists, we have renamed the NCEP summer intern program (which Bill established at NCEP in 2017) the "William M. Lapenta NOAA Student Internship Program" with honor and gratitude.

***Louis Uccellini** is Director of NOAA's National Weather Service*

Outside of the NOAA Center for Weather and Climate Prediction, a red-leafed maple tree was planted in memory of Bill. As it grows, the tree will be a symbolic reminder of the sustained growth of Bill's influence in the continued enhancements of the operational modeling and forecast products and services and the continued student mentoring he initiated. The red maple and Bill's legacy will continue to grow with time, when every new student selected for the summer program named in his honor walks past the tree to enter the building for the first time.

By Jose-Henrique Alves and Jimy Dudhia with Fred Carr, James Doyle, Tom Hamill, Jack Kain and Russell Schneider

With a Little Help From His Friends: Nurturing the Future of Weather Forecasting

Sixteen years ago, Bill Lapenta played a decisive role in creating, and later nurturing to maturity, a vision that is revolutionizing weather forecasting in America. Envisioning a simplification of the suite of numerical models used operationally at the National Weather Service (NWS), he created an advisory committee that motivated the development of the Unified Forecast System (UFS). Bill's initiative fueled a community modeling effort and gave strength to creating the Earth Prediction Innovation Center (EPIC).

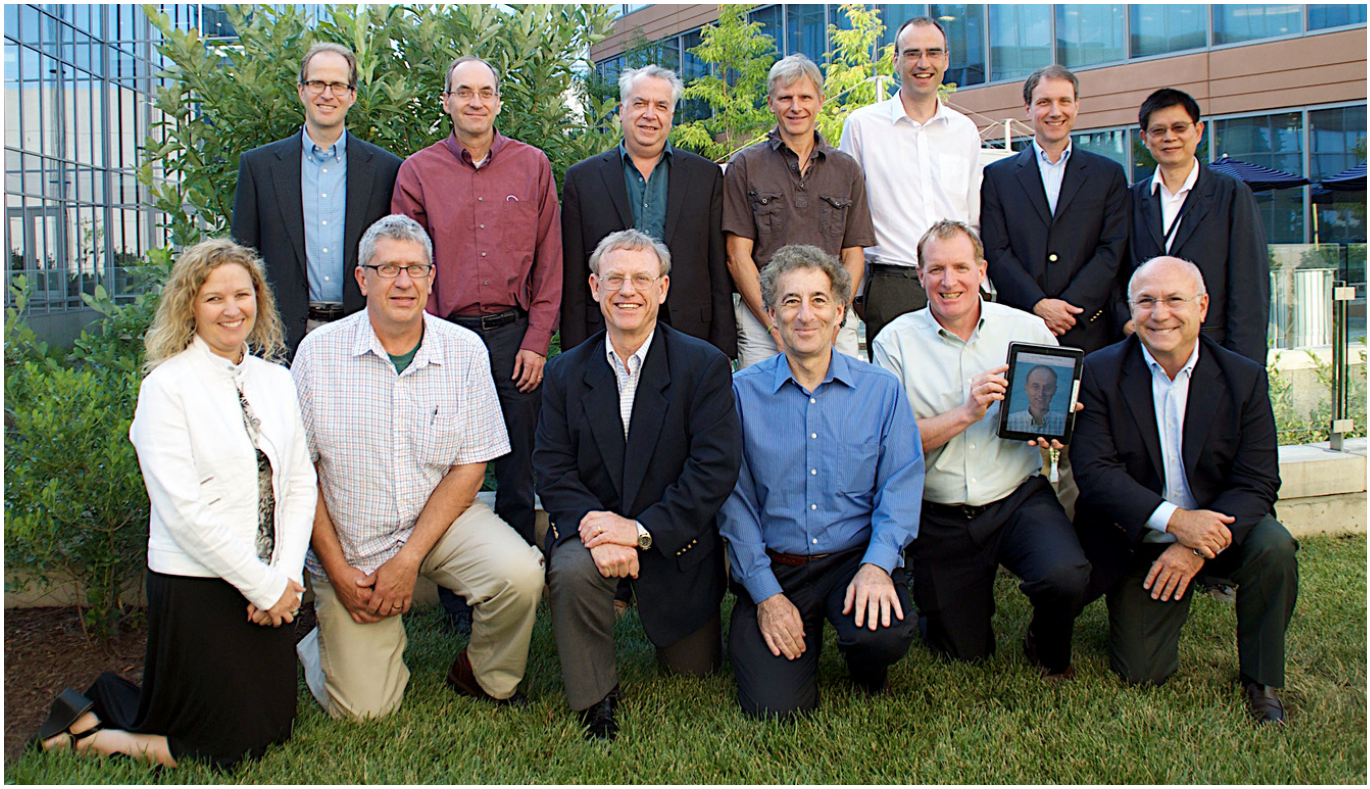
Bill at the NOAA Center for Weather and Climate Prediction in 2014

The ideas Bill helped set in motion have reshaped NOAA's culture, standing up a path for the United States to reclaim leadership in the development of operational numerical weather prediction systems. "Bill became deputy director of NCEP's Environmental Modeling Center (EMC) in 2008. That was the same year Louis Uccellini, and Rick Anthes asked Jim Kinter and me to co-chair a comprehensive review of NCEP," recounts Fred Carr, professor at the University of Oklahoma School of Meteorology.

Carr remembers that Bill was accommodating and supportive during his review of NCEP, motivated by a shared goal of improving the weather models developed by EMC and used in the operational NWS forecast suite. "Bill and Louis were instrumental in implementing many of our report's recommendations. The review led to the creation of the University Corporation for Atmospheric Research (UCAR) Community Advisory Committee for NCEP (UCACN), which continued to do annual follow-up reviews," says Carr, who met Bill at NASA's Marshall Space Flight Center in the 1990s.

Bill was a remarkably effective director of NCEP, and a visionary agent of change for the U. S. Weather Enterprise. His secret? He understood and instinctively knew how to deal with people.

Jack Kain, director of NOAA's National Severe Storms Laboratory (NSSL) remembers that "Bill was decisive and persuasive and knew how to maintain control of complex discussions and political situations. He used all these skills to engage and challenge the best and most influential minds in the meteorological community, use their input to inform a path forward, and take bold and sometimes unpopular actions to disrupt the status quo and put the trajectory of weather prediction in this country on a more favorable path. I didn't always agree with the way Bill got things done, but I admired his willingness to make the tough decisions and his determination to find a better way for the weather enterprise to serve society."



The UCACN Modeling Advisory Committee (UMAC) at NCEP in 2015. Front row: Christa Peters-Lidard, Richard Rood (co-chair), Fred Carr (co-chair), Cliff Mass, Peter Neilley, Alan Blumberg. Back row: Tom Hamill, Jim Doyle, Gilbert Brunet, Eric Chassignet, Andy Brown, Jim Kinter, and Bill Kuo. Additional members not present: Chris Bretherton, Ben Kirtman, and Anke Kamrath

The Community-Driven NCEP Model Review

After becoming NCEP Director in 2013, Bill welcomed the continued input from the UCACN members. In 2014, he expressed an interest in expanding the UCACN review with a more specific focus on the NCEP Production Suite future. Carr remembers that "Bill created the UCACN Modeling Advisory Committee (UMAC), co-chaired by myself and Ricky Rood. Our 2015 report helped motivate the Unified Forecast System (UFS) concept." The vision crystallized in UMAC's report supported a series of significant changes to NOAA's model development culture and EMC's business model.

The UMAC was composed of subject-matter experts in various environmental prediction areas to guide NCEP. Bill charged the UMAC with developing the first unified NOAA modeling strategy to advance the U.S. to world leadership in numerical modeling capabilities, laying the groundwork for the future UFS through many different activities.

One of the recommendations that came out of UMAC was that NCEP should devise and execute a strategy for the transition to a unified modeling system, including a strong emphasis on improving model physics and data assimilation, and improved verification and diagnostic methods, at all scales, within a decade. Specific recommendations were made for the global, regional, water, ensemble, air quality, dispersion, and space weather modeling systems.

"Bill was always very engaged, providing constructive comments and guidance for NOAA staff and UMAC members, which is just another example of Bill's resolve and commitment to improving the NOAA models, as well as his innate leadership skills," reflected James Doyle, senior scientist at the Naval Research Laboratory, Marine Meteorology Division.

An overarching theme was to simplify the NCEP Production Suite, using an evidence-based approach grounded in methodical testing to advance the systems. "Bill used these key recommendations along with his outstanding leadership and vision to initiate the modernization of the NOAA modeling suite and set the pathway for the UFS," concluded Doyle.

Towards an Innovative, EPIC Future

Since Bill's passing last year, the UFS community has realized some of his passionately pursued efforts. The UFS Community released the first user-ready version of the UFS Medium-Range Weather Application, aligned with NOAA's operational GFS. NOAA launched an upgrade to the operational Global Ensemble Forecast System (GEFSv12) featuring, for the first time, a version of the UFS with coupled atmospheric and wave components. In partnership with the UFS Community, NOAA established the integrated UFS R2O Project, a coordinated effort aggregating 14 community organizations representing research and operational forecasting activities.

When Bill decided to put UMAC's words to action, he understood that meant inviting the community to become part of the weather model development process. He partnered with NOAA's line offices to support the Next-Generation Global Prediction System (NGGPS) program and spearheaded the upgrade of EMC's Global Forecast System (GFS) by using the new Finite-Volume Cubed Sphere dynamic core (FV3). His passion for community involvement impressed NOAA's Acting Administrator, Neil Jacobs, who brought him into the Office of the Under Secretary of Commerce to help develop EPIC in 2018. Soon after, he became director of the Office of Water and Air Quality (OWAQ, renamed recently Weather Program Office), where he continued to develop EPIC.

"Bill's presentations on EPIC were enthusiastic and inspired great optimism for the future of weather modeling in the U.S," said Carr, who last interacted with Bill at the first EPIC Workshop in August 2019. "Bill was his usual ebullient self, encouraging all attendees to participate in the UFS and EPIC programs. I was looking forward to his leadership at OWAQ. While no one is irreplaceable, NOAA has big shoes to fill in the leadership of EPIC and related weather prediction programs," concluded Carr.

Bill championed the EPIC vision at several meetings and workshops, where he had a chance to discuss his idea with colleagues more closely. One of his colleagues at NOAA and close friend since their graduate-student years at Penn State, Tom Hamill, remembers a discussion they had during the AMS Weather and Forecasting conference in Denver, June 2018. "I heard a rumor or two about how EPIC was evolving and was hot and bothered. Bill listened to me talk heatedly about the position I was so very passionate about, one I suspect that I no longer hold. He listened politely, pushed back when he thought I was talking nonsense, and my heated rhetoric didn't stop him from inviting me for a drink the next time he was in town. Bill struck a balance that few could do, caring both about guiding the organization to do better while keeping that very personal connection."

In March 2020, NOAA realized another landmark of Bill's legacy: the EPIC request for proposals. Bill played a significant role in developing EPIC and was very enthusiastic about its role in accelerating the flow of new ideas from research to operations. EPIC and the UFS are cornerstones of Bill's vision of the NWP community driving NWS operational forecast systems' advances in the United States.

"Bill spoke endlessly to us about the need for seamless integration of the numerical modeling community across boundaries. We hope Bill's commitment continues to motivate us to invest all our energy in creating a seamless community focused on important societal challenges," summarized Russell Schneider. He succeeded Lapenta as acting director at the Weather Program Office (WPO), NOAA Research.

Participants in the EPIC (Earth Prediction Innovation Center) Community Workshop, at the Boulder University Memorial Center, August 2019

MENTORING CHANGE AGENTS

By Craig McLean

A United Effort of Diversely Skilled and Talented People

Bill Lapenta with Weather Program Office (WPO) staff in front of the NOAA Silver Spring building in 2019

I heard the name 'Bill Lapenta' from Louis Uccellini on a more frequent occasion before, when Louis and I quickly became focused on bringing the relationship of OAR and NWS much closer to effect better transition of technology and overall alignment. Given Louis' NY roots, which of course Bill had also, the name was a comfortable contraction to me. Sounding almost musical, Bill's first name blended so well with the beginning of his last. It also sounded heroic.

I finally met Bill more deliberately, beyond the casual nod at a Senior Executive Services (SES) summit. When we met to discuss how NCEP and the OAR labs and programs could work better together, I was impressed with his forthrightness, directness, and remarkably easy and comforting smile. We got along easily as I saw that Bill's motivation was to be the best at the all-around level; not his reputation, not his own organization, but the larger enterprise. It was the quality of our weather forecasts and our integrated ability to succeed for a higher cause. Through my engagements with Bill, I concluded that we are not line organizations of NOAA; we are a united effort of diversely skilled and talented people working to deliver the best life and property saving forecasts to the American people.

On the many occasions we spoke over the phone I didn't need the video we now use because I could easily see in my mind one of the two expressions that Bill would present. The first was that easy and comforting smile; the other was "the look" which was the primal signal that whatever he had to say was important, one eyebrow lower than the other, and I'd better pay attention. And I did. I learned from Bill about our collective operation mechanics and how to improve our alignment and communication. I jumped in. I enjoyed our interactions because of Bill's intelligence, awareness of people, and his heart.

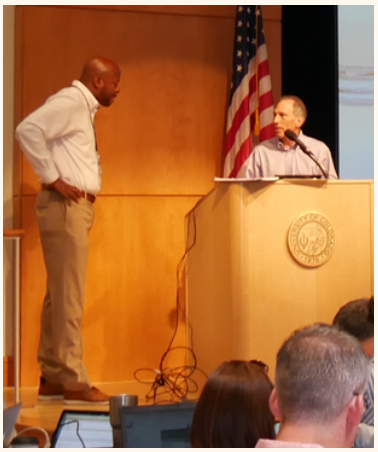
When Bill took the special assignment to work directly with Neil Jacobs and advance EPIC's concept into an actually describable enterprise, I was confident in the success of the initiative. When Bill accepted the opportunity, I offered him the director's position at OAR's Weather Program Office (formerly the Office of Weather and Air Quality), following another outstanding leader, John Cortinas. Bill wisely suggested that he take it first in an acting position, and we could decide how well our mutual fit would be. His mature and steady outlook, just as he had shown to his many mentees, made me became one of them. As it turned out, we did just fine. Bill's return to research was the rewarding experience that he clearly loved and desired after his championing and achieving many successes in our mission's operational side. I was delighted to have Bill say "yes" to the permanent position, Director of WPO, and bring EPIC into being.

The last time I saw Bill was at the end of a long day. He came past my office, and we caught up briefly. He smiled and told me how much he was enjoying his work and the people, and said that he off for the Outer Banks with Cathy for a vacation. I miss him.

***Craig McLean** is NOAA's* Assistant Administrator for Oceanic and Atmospheric Research

MENTORING CHANGE AGENTS

DaNa Carlis and Dorothy Koch



DaNa Carlis met Bill Lapenta in 2008 at NOAA's Environmental Modeling Center (EMC). Bill mentored DaNa at EMC, and later they became collaborators at NOAA Research (OAR) establishing the Earth Prediction Innovation Center (EPIC). DaNa is now deputy director at NOAA's Global Systems Laboratory (GSL).

"I first met Bill back in 2008 when he became deputy director of the Environmental Modeling Center (EMC), at NOAA's National Center for Environmental Prediction (NCEP). I always thought of him as a serious person who was passionate about environmental modeling and producing the Nation's best weather forecasting system. Bill was one of those leaders who weren't comfortable with being stagnant. He was always striving to be a better leader, pushing the boundaries of leadership and not settling for the status quo.

There are two areas where Bill broke away from the norm. The first was the UMAC review of the NWS operational modeling suite. The 2nd was going on assignment to work with the Acting NOAA Administrator on EPIC. Both of these acts showed his willingness to do what it takes to move our community forward in ways that took great sacrifice and incredible leadership.

Bill was a visionary leader who firmly believed in the leadership concept of being comfortably uncomfortable. His final mentoring session with me came at the end of the EPIC Community Workshop, where he publicly exclaimed how proud he was of me for leading the planning for the workshop. For someone of Bill's stature to publicly say that meant so much to me, and it'll be a day that I'll remember for the rest of my career.

For Bill's ability to push leadership boundaries, I like to call him the 'EPIC' Bill Lapenta."

Dorothy Koch met Bill Lapenta in 2015. Over the years, they discussed how to better coordinate modeling groups in the Weather Enterprise. Dorothy moved from the Department of Energy to NOAA, joining Bill's team in 2019. He became an inspiration for developing a vision she follows as division Modeling Program director at NOAA's NWS Office of Science and Technology.

"Bill was a once-in-a-career colleague who combined a passion to improve weather prediction, a deep concern for his team, and a creative no-nonsense energy. Looking back, I sometimes imagine him as a chess master, assembling us as his 'pieces' according to our strengths, and maneuvering us around the board in a manner that challenged our growth, while also achieving the greater mission plan — and maybe, every now and then, adjusting the rules to improve the game.

Bill was a true friend to me, although we overlapped at NOAA for less than a year. He seemed pleased to have pulled me into NOAA from 'the outside,' I guess I was part of his scheme to shake things up. Bill had little concern for rank or affiliation, especially if these would get in the way of creating the best possible team. He sought to unify not only model codes, but also modeling efforts across line offices at NOAA, and also with the broader community.

If Bill was a chess-master, he was one who cared deeply for each of his pieces. And I was astounded to discover – after his death – how vast his team was. I heard countless stories of how Bill would always answer a text or phone call, he was always there, engaged, responsive – yet efficient.

We were blessed to have Bill help establish our course, and show us how best to play the game and to achieve the mission – with open, collaborative, creative, and no-nonsense energy, coupled with deep concern for one another."

THE WILLIAM M. LAPENTA STUDENT INTERNSHIP

By Genene Fisher

Celebrating and Honoring a Legacy Centered on Professional Development

Preparing breakfast for interns in 2018

Dr. William (Bill) Lapenta left a lasting impression on many people. In addition to being a brilliant scientist and leader in the weather modeling community, he was known for being a remarkable mentor and passionate about helping others with their professional development. As Director of NCEP from 2013-2019, he wanted to broaden NCEP's ability to train the next generation of scientists. In particular, he thought students could contribute by having hands-on experience at NCEP helping to advance Research to Operations (R2O) and mentors could help contribute to their career development.

Bill had the vision that NCEP needed its own program that focused not just on a student project, but also provided weekly seminars and professional development and housed the students in close proximity. Students would have the opportunity to hear from professionals on career advice, visit high-level NOAA officials, participate in social events, and present project results at the end of the summer. It was important to him that the students become a cohort and develop a network that would continue beyond the program.

Under Bill's leadership, the first year of the NCEP Internship Program was launched in the summer of 2017 with 14 students. Bill was an integral part of the program. He would meet with the students early on and was eager to share his life story, encouraging them to follow their own path with excitement and passion and take calculated risks. Bill was honest about the challenges of balancing work and life, as well as the importance of taking care of yourself. He would meet with the students several times over the summer to check-in, see how things were going, and get feedback. Despite his busy schedule, Bill insisted on having an open door for students to stop by and they took advantage of his offer. He also joined them in social activities whether it was bowling after work or making them breakfast in the office. After the first year, it was clear that this program was going to be successful.

Bill knew the program was special and looked for ways to expand it. In the following years, it was expanded to the National Weather Service's Meteorological Development Laboratory (MDL) and AWIPS Program Office. In 2019, Bill was also working with NOAA Oceanic and Atmospheric Research (OAR) to develop a similar internship program, building off best practices from the NCEP experience.

After Bill passed away in September 2019, NWS honored Bill's legacy by renaming the NCEP program the William M. Lapenta Student Internship Program. Soon after, NOAA's Office of Oceanic and Atmospheric Research (OAR) joined in and there were a total of 23 students this past summer.

Leading from behind: Bill (3rd from right), NWS Director Louis Uccellini (front-center), Genene Fisher (1st from left), staff, students during the ice breaker of the 1st NCEP Summer Internship in 2017

As we look ahead, the program continues to expand as NESDIS Center for Satellite Applications and Research (STAR) has agreed to participate. In all, 68 students have now gone through the internship program. Feedback received from former students (on **page 13**) revealed this internship has been career-changing, providing hands-on experience in a government setting, expanding network, creating a peer cohort, refining their career goals, and building their self-confidence.

Bill bowling with students: after the first year, it was clear that the program was going to be successful.

When looking at the students from the first three years, over ninety percent are working in NOAA mission fields or still pursuing their degrees. Several students have been hired to work at NOAA as meteorologists, Pathways students, and contractors. In 2020, NOAA designated that the participants of the Lapenta Internship Program are eligible for direct hire by NOAA under the Conservation Corps Act—which should now advance the hiring of the intern alumni at NOAA.

Bill was truly dedicated to encouraging and guiding early-career scientists. He gave numerous talks about leadership and navigating career paths, always ending his talks with "you're all now part of my network." Bill would make his mentees and students understand that to reach your goals, you must be comfortable with being uncomfortable.

Renaming the intern program after Bill was an excellent way to honor him. His lessons live on through the program organizers, mentors, intern alumni, and anyone else who knew him. As we look to 2021, the program will be in its fifth year, continuing to grow stronger, as we keep Bill's leadership lessons as our core principles.

***Genene Fisher** is Deputy Director of NOAA's Office of Ocean Exploration and Research*

To honor the legacy of Bill's outstanding contribution to the atmospheric sciences and his passion for supporting the next generation of leaders in the field, the Lapenta family has set up a travel grant fund through AMS to help students who wish to attend AMS events. Donations may be sent to: AMS, Attn: Lapenta Fund, 45 Beacon Street, Boston, MA 02108.

Further information and application details about the William M. Lapenta Summer Internship Program can be found online at: lapentainternship.smapply.io/

Check out the student intern stories in the next page!

Alyssa Cannistraci, Tomer Burg, Mussie Kebede and Ellie Venteicher

Mussie Kebede works on short-to-medium range forecasting and surface analysis at NOAA's Weather Prediction Center. He earned a Bachelor's in Meteorology at Virginia Tech and a Master's in Atmospheric Sciences at Howard University.

"I had the unique opportunity to participate in the first annual Bill Lapenta Internship program in the summer of 2017. It was here that I learned very useful work and research skills. While that experience was beneficial, it was the networking and interpersonal connections I made that propelled me toward my goal of becoming a Meteorologist at the Weather Prediction Center. It was at NCEP that I met my future academic and professional mentors. It was here that I made lasting friendships outside of work. It was here that I had the pleasure of sitting in on Dr. Lapenta's early morning NWS leadership briefings. I'm grateful for all the doors that this internship opened and will continue to open in the future."

Alyssa Cannistraci is a final-semester geography master's student at the University of Tennessee. She earned her bachelor's degree in meteorology from Millersville University. She studies spatiotemporal diffusion of tweets during a winter storm and tornado outbreak.

"I first met Bill while on a school fieldtrip to NCEP in 2017. He encouraged us undergraduate seniors to take risks, never settle, and show confidence in everything we do. I was then introduced again to Bill in 2019 during the NCEP Student Internship. He again shared words of wisdom and talked about the importance of work-life balance. In all our conversations, Bill reminded us to stop and appreciate life. Yes, careers are important; but there is more to life than one's job. I will carry Bill's advice with me in my next chapter. I hope to live up to his legacy through my contributions to the weather, water, and climate enterprise."

"My time as an NCEP intern was a truly transformative experience as it allowed me to grow as a scientist, professional, and individual. The project I was tasked with not only allowed me to develop invaluable research skills, but also witness the tangible impacts I was able to make through my efforts. This instilled me with the confidence that I could contribute to our community. In addition to research, this program also did a wonderful job providing us with opportunities to interact with diverse and interesting individuals from across the field. This not only exposed us to career paths that I had previously not known existed, but also allowed me to develop a wider professional network that has continued to present new opportunities as I further my career. I can confidently state I would not be where I am today without this internship."

Ellie Venteicher is a master's student in Atmospheric Sciences at Texas Tech. Her work uses high-resolution radar and in-situ data to study rear-flank downdraft internal surges and tornado genesis. She has a Bachelor's in Meteorology from Valparaiso University.

I was accepted into the NCEP Student Internship Program at a transitional stage in my career: changing to a different university for my PhD research. The experience I gained and connections made in those short two months were invaluable. Working at the Environmental Modeling Center provided insight into the latest developments in operational modeling and knowledge that would subsequently benefit my PhD work with modeling. The networking opportunities at NCEP were plentiful; speaking with some well-known experts in the field and hearing their journeys to get to where they are now was inspiring and humbling, and motivated me to accomplish more in the first year of my PhD in spite of a challenging change of setting in a new program. As Bill Lapenta wisely said, "get comfortable with being uncomfortable."

Tomer Burg is a PhD student in the School of Meteorology at the University of Oklahoma. His thesis work is about Arctic Cyclones and Tropopause Polar Vortices. Tomer was previously a Masters student at the University at Albany, SUNY.

THE YEAR IN REVIEW

By Hendrik Tolman and Ricky Rood

2020 — A Remarkable Year for the UFS

Bottom-line, upfront: 2020 was the year when the Unified Forecast System (UFS) went from an idea of a concept to a tangible reality. At the core of this reality are the first UFS code release and Graduate Student Tests (GST) that early in the year made the UFS a community asset and documented its viability.

One of us [Hendrik] gave a TEDx talk on November 14th remembering that in the not very distant past, it would take several months, a team of a few people, and even a powerful supercomputer to be able to run some of NOAA's operational weather models. The talk went on to recognize that scenario has changed drastically. With the first UFS release (the Medium-Range Weather Application v1.0.0) in March, anyone can now alone and in one day set up NOAA's Global Forecast System (GFS) on a wide range of computers accessible by all. This first UFS release is the game-changer that we needed to make the American operational weather model available and usable for both research and operations. We can now start working on a process where a much broader community can contribute directly and collaborate to improve operational environmental modeling using the UFS as common ground.

Since March, we have seen other numerical weather prediction code unification efforts, with most operational forecasting applications at NCEP now using a single Finite-Volume cubed (FV3) atmospheric dynamical core. We have seen additional application releases that are all critical to keeping the present momentum of the UFS going, for instance, the Model Evaluation Tools (MET), the Community Common Physics Package (CCPP), and the JEDI data assimilation framework. We published a new GST for testing the Stand Alone Regional version of FV3.

Starting earlier this year, NCEP and the UFS community have made great strides in planning for simplifying all regional convection-allowing models into a single Rapid Refresh Forecast System (RRFS) framework. Simultaneously, the UFS-R2O Project rolled out this year formalizes NOAA's commitment to the UFS by focusing resources directly on research-to-operations (R2O) outcomes, making the first step towards more holistic management of a UFS-based operational production suite. Finally, we are also close to publishing a first UFS strategic plan and an updated governance document.

The train has left the station, but we are still far from our envisioned destination. Over the next year, we will need to focus on critical things like workflow development (including the linkage between data assimilation and modeling), application releases, and GSTs to cover the entire holistic coupled ensemble vision for the UFS, simplification of the production suite, and governance of the end-to-end Innovation To Operations (I2O) process.

None of the progress we have seen over the last few years would have been possible without the UFS community-wide commitment. It is fantastic to see your dedication to the community modeling vision, with many of you fitting this work into your "day job." It has been an absolute pleasure to work with all of you as members of the UFS community.

We wish you all Happy Holidays and a Happy New Year, with many more UFS milestones to reach.

Hendrik Tolman and Richard Rood are Co-Chairs of the UFS Steering Committee