



# ANNUAL REVIEW



**FREDERICK S. PARDEE CENTER  
FOR INTERNATIONAL FUTURES**  
JOSEF KORBEL SCHOOL OF INTERNATIONAL STUDIES  
UNIVERSITY of DENVER

# LETTER FROM THE DIRECTOR

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Dear Friends:

Over the years our founder Dr. Barry Hughes has reminded me what progress requires. It's like the actual motion of walking: to take the next step you must throw yourself off-balance. This first year in my new position as Director has tested my balance but—thanks to a talented and dedicated team—we've maintained forward direction. Indeed, it has been a year of growth. We have stepped forward in our research output, model development, and internal capacity-building.

Our research efforts have “thrown” us forward across various issue areas. We have worked with think-tanks in the United States (Atlantic Council) and Africa (Institute for Security Studies) to publish work on geopolitical risk and development. We have advanced our understanding of the drivers of state fragility (through collaboration with Korb colleagues and the Minerva Initiative), the future of development in Ethiopia, Mozambique, Southern Africa, and Uganda (supported by Irish Aid and USAID), and trends in global security (the US Army). Our private sector collaborations include becoming a partner with the IBM Science for Social Good Initiative's Cognitive Policy Advisor project, presenting research supported by Zurich Insurance in Davos during the WEF, and continuing our long-standing partnership with AMG Bank. In peer-reviewed outlets we have published

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on the future of traffic fatalities in *Development Policy Review* and on cyber risks and benefits in *Technological Forecasting and Social Change*.

As we continue to move ahead, I am very pleased about new research connections on the horizon. We have moved forward with work supporting the United Nations' Development Programme's assessment of the Sustainable Development Goals (SDGs) as well as committing to support the United Nations' Environment Programme's Global Environmental Outlook 6. Recent trainings in Addis Ababa, Bangkok, and Nairobi, as well as early work on projects supporting the African Union, have filled out a busy year of next steps.

The core of our research effort is the development of the International Futures (IFs) platform. In the past year we created new visualization forms which enhance our ability to analyze the SDGs. We also significantly extended our ability to analyze and forecast bilateral data, adding nascent representations of trade by sector, foreign direct investment, migration, and foreign aid. We made enhancements to government revenue, education, water, land use, and state fragility sub-models. Much of this work involves direct consultation with decision-makers about current trends across issue areas, as well as setting expectations about potential impacts of policy shifts and environmental uncertainties.

Growth of an institution means tending to our most valuable resource: our growing professional staff and our robust team of graduate and undergraduate research assistants. We have embarked upon the process of formalizing our project management structure, which will build our capacity to respond to new requests quickly, track our progress, and meet the needs of our growing clientele.

I look forward to the next year of working with our staff and students, who animate our purpose in exciting ways and give me hope for what our center can eventually become. I hope you will enjoy learning more about our story, our work, and the people who make it all happen.

Working to build a better future,



**Jonathan D. Moyer**

# OUR YEAR IN REVIEW



115

students **employed** throughout the year **from 11 countries**



9

graduate students served **internships** with Pardee Center partners



19

**sponsored projects**



The Honorable Dr. Condoleezza Rice greets our research assistant Stelloh Kwasi (MA expected 2018) during a 2017 visit to her *alma mater*.



**\$1.9 million**  
in **sponsored research**



**19**  
current **professional**  
**staff members**



**21,000+**  
unique **online users**  
of IFs

# RESEARCH PROJECT HIGHLIGHTS

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## GEOPOLITICAL RISK

In partnership with the Atlantic Council and Zurich Insurance Group, our team produced a pair of reports that analyzed major areas of geopolitical risk around the world. In the main report, “Our World Transformed: Geopolitical Shocks and Risks,” published with our partners in April 2017, our researchers used IFs to create a new collection of scenarios that explore the potential longterm effects of amplified protectionism, an energy crisis, and water and food scarcity around the world. A supplementary reference report covered these potential risks in more detail and incorporated additional scenarios that simulated the impact of a potential collapse of the European Union, rising tensions between China and the United States, and increasingly volatile weather patterns due to climate change. Research Associate David K. Bohl and Director Jonathan D. Moyer led Pardee’s contributions and were supported by Senior Scientist Barry Hughes, Project Management Officer Jessica Rettig, and research assistants Taylor Hanna, Brendan Mapes, Kanishka Narayan, and Kumail Wasif.

## USAID

Our center expanded its relationship with the USAID, as we used IFs to inform the organization’s five-year Development Cooperation Strategies at both the regional and country level in Africa. In partnership with our colleagues at the Institute for Security Studies (ISS), we produced trend and scenario analysis reports for USAID missions in Southern Africa and Ethiopia, while continuing our relationship with the organization’s Uganda mission. We hope to launch similar projects in the coming year.

## Ethiopia

Working closely with the ISS, our team produced a report on the future of development in Ethiopia. Along with this report, our Director Jonathan D. Moyer and Research Associate Andrew Scott also traveled to Addis Ababa to conduct an interactive IFs training session in April 2017 for members of the National Planning Commission, the Ethiopian National Bank, local customs and immigration officials, as well as several private sector representatives.

## Southern Africa and South Africa

Our team, led by Research Associate David K. Bohl, produced a report on the major long-term trends, challenges, and opportunities for 14 countries in the Southern Africa region through 2040. We also completed a country-level report exclusively on South Africa, which highlighted the country’s own unique development challenges and its influence in the rest of the region across time.

## Uganda

After completing last year’s report on country-wide development trends in Uganda, the USAID mission in Kampala sponsored a new project aimed at better understanding long-term development at the district level. Led by our Financial and Program Officer Mickey Rafa, this project examined a number of methods for estimating GDP for all of the country’s 116 districts, eventually recommending an approach that approximates GDP using a combination of nighttime light intensity and agricultural production by district.

## IRISH AID IN MOZAMBIQUE

Following the presentation of our development trends report for USAID in Southern Africa, Irish Aid asked our team, along with our partners at the ISS, to expand our trend and scenario analysis in Mozambique. Together, we launched “Prospects and Challenges: Mozambique’s Growth and Human Development Outlook to 2040” in Maputo in June 2017. The report includes an adjusted IFs Base Case, or Current Path, scenario to better understand how advances in the country’s natural gas production might affect Mozambique’s development prospects. Research Associate David K. Bohl and Research Consultant Alex Porter led our team’s efforts.

## US ARMY FUTURE STUDIES GROUP

We continued this partnership by exploring the future operational environment for the US Army using data and modeling tools, including the IFs model. With this data, we also developed a number of new scenarios related to technology which were presented in a report in early 2017. Original data gathering efforts emphasized measuring military hardware to construct indices of hard capabilities, military capital stocks, and bilateral “reach.” Interns contributed to literature reviews, collection of statistical sources and media images, and written analysis of research findings.

## MINERVA RESEARCH INITIATIVE

Our center and partners are now wrapping up our third year of research as part of the US Department of Defense’s Minerva Research Initiative. This multi-faceted project analyzes previous attempts to predict the onset of state failure, evaluates the drivers of state fragility qualitatively

and quantitatively, builds tools and data associated with the drivers of domestic conflict, and uses IFs to forecast the probability of failure. In this past year, in parallel with the development of a series of quantitative models that might be used to forecast state failure, our researchers produced 50 qualitative case studies that summarized key circumstances leading to past state failure events around the world. The work was led by Assistant Professor Oliver Kaplan, Research Associate Drew Bowsby, and Research Consultant Alaina Ferguson, with support from Professor Tim Sisk. This grant also covered research on modeling dyadic conflict and supported ongoing development of our DataGator tool. Korb faculty also awarded this grant, including Erika Chenoweth, Cullen Hendrix and Oliver Kaplan, presented alongside Jonathan D. Moyer at the International Studies Association in Baltimore in February. In addition, this grant supported the continued development of the Major Episodes of Contention (MEC) database led by Professor Erica Chenoweth.

## PROGRESS TOWARD THE SUSTAINABLE DEVELOPMENT GOALS

Our ongoing relationship with the UN Development Programme reached new heights this year, as we presented IFs to the organization’s analysts, partners and other data-oriented stakeholders in both Nairobi and New York, and expanded our ability to measure and visualize each country’s progress over time in achieving the SDGs. Our Lead System Developer José Solórzano created two additional specialized displays in IFs that allow users to forecast the path of SDG achievement across targets to 2030. IFs is also featured in the UN Development Group’s online SDG Acceleration Toolkit. Our hope is that the UNDP and its partners will use the

# RESEARCH PROJECT HIGHLIGHTS

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new functionality in IFs to both reevaluate and measure progress against these long-term development targets over time. We have started work with stakeholders in Mexico and Moldova to use IFs to assess the conditions necessary for achieving the SDGs in each country.

## **IMPROVING POLITICAL SETTLEMENTS**

Director Jonathan D. Moyer spearheaded our work this year with the Political Settlements Research Programme, headquartered at the University of Edinburgh in Scotland. The program aims to make peace agreements worldwide more inclusive, as a means to reduce violent conflict. As we explore new ways to quantify the impact of political settlements over time, we, along with the ISS, are particularly interested in using our methods to think about how peace agreements can lead to improvements in long-term human development.

## **MODELING LONG-TERM WATER SUPPLY AND DEMAND**

Led by Research System Developer, Steve Hedden, we have continued to work with the Water Research Commission and the Institute for Security Studies in South Africa to better understand long-term water security at the national, regional, and global level. The water model, which is integrated into the IFs system, can help policymakers assess the implications of development strategies and how policy goals compete with or complement each other with respect to water scarcity.

## **GEO 6**

The UN Environmental Programme (UNEP) invited our Research System Developer Steve Hedden to participate as a (coordinating) lead author of the “Outlooks” chapter of their sixth Global Environmental Outlook (GEO 6). Director Jonathan D. Moyer and Founder, Senior Scientist, and Mentor Barry Hughes will also participate as authors. Steve traveled to Bangkok in late May 2017 for the project’s second authors’ meeting, and he will continue to work with the report’s coauthors in coming months. Researchers from our center previously contributed to the UNEP’s GEO 4 report.

## **MODELING ARTIFICIAL INTELLIGENCE**

Led by Research Associate Andrew Scott, Senior Scientist Barry Hughes and Director Jonathan D. Moyer, the Pardee Center developed Base Case forecasts of global artificial intelligence (AI) development. The forecasts explore potential progression of AI across its major technological groups: narrow AI, general AI, and superintelligent AI. The Base Case suggests that generally intelligent machines could exist by mid-century. This initial forecasting effort lays the groundwork for future analysis on the impact of AI on long-term human development using IFs.



## FEATURED PUBLICATIONS

### **ICT/Cyber Benefits and Costs: Reconciling Competing Perspectives on the Current and Future Balance**

by Barry B. Hughes, David Bohl, Mohammad Irfan, Eli Margolese-Malin, José R. Solórzano

In *Technological Forecasting and Social Change* | Date: February 2017

In this paper, the authors evaluate competing narratives about the long-term costs and benefits of information and communications technology (ICT) in the global economy. Using scenarios created in IFs, they find that although short-term costs related to ICT—primarily around security issues—may outweigh the short-term economic benefits in higher income countries, over time, the compounded effect of such technologies on productivity could surpass these costs significantly. On a global basis, the authors conclude that, by 2030, cumulative net benefits of ICT could exceed \$100 trillion.

### **Cost Analysis of Global Road Traffic Death Prevention: Forecasts to 2050**

by Jonathan D. Moyer, Mark Eshbaugh, Jessica Rettig

In *Development Policy Review* | Date: published online June 2017

This paper's authors used International Futures to explore the plausibility of achieving the Sustainable Development Goals target of halving global traffic deaths by 2020 and the potential implications of reaching this target. They found that halving annual deaths caused by road traffic accidents is likely an overly ambitious scenario and instead examine more reasonable road traffic death-rate targets using an approach derived from road traffic death rates relative to income level. In all scenarios, we found that the benefits of preventing traffic deaths outweigh the relative costs across varying levels of development.



# EVENTS AND PRESENTATIONS



DECEMBER 2016  
**Barry Hughes presents of IFs and the SDGs at the Annual Meeting of the Integrated Modeling Consortium**  
 Energy Research Institute, China  
 University of Mining Technology,  
 and Beijing University of  
 Technology, Beijing, China

JANUARY 2017  
**Dr. Mathew Burrows, Director of the Atlantic Council’s Strategic Foresight Initiative, and Jonathan D. Moyer present on Geopolitical Risk during the WEF in Davos**  
 World Economic Forum Annual Meeting, Davos-Klosters, Switzerland

DECEMBER 2016  
**Jonathan D. Moyer meets with The Political Settlements Research Programme and the Institute for Security Studies**  
 University of Edinburgh, Edinburgh, Scotland

NOVEMBER 2016  
**Barry Hughes presents on modeling and IFs to the Potsdam Institute for Climate Impact Research**  
 Potsdam Institute for Climate Impact and Research, Potsdam, Germany

NOVEMBER 2016  
**DU’s Pioneer Symposium hosts Jonathan D. Moyer: “Forecasting Failure— Exploring the Historical Accuracy of Predictive Models of Political Instability”**  
 University of Denver, Denver, CO

NOVEMBER 2016                      DECEMBER 2016                      JANUARY 2017

JANUARY 2017  
**Dr. John Corbett, founder of aWhere, gives a lunchtime presentation on weather variability to Korbel students, faculty and staff, hosted by the Pardee Center**  
 Josef Korbel School of International Studies, University of Denver, Denver, CO

JANUARY 2017  
**David K. Bohl and Mickey Rafa present “Analytics in International Relations” to Professor Phil Beaver’s Special Topics in Analytics graduate class**  
 Daniels College of Business, University of Denver, Denver, CO

NOVEMBER 2016  
**Barry Hughes participates in a global meeting of the Club of Rome**  
 Club of Rome, Berlin, Germany

NOVEMBER 2016  
**Jonathan D. Moyer presents “The Big Picture in Data” at the Project X-ITE Social Enterprise Summit**  
 Josef Korbel School of International Studies, University of Denver, Denver, CO

# EVENTS AND PRESENTATIONS

FEBRUARY 2017

**Pardee Center hosts lunchtime seminar featuring Nicholas Sly, Senior Economist at the Federal Reserve Bank of Kansas City: "How does offshoring by multinational firms affect U.S. employment outcomes?"**

Josef Korbel School of International Studies, University of Denver, Denver, CO

MARCH 2017

**The Honorable Dr. Condoleezza Rice visits the Josef Korbel School, including a meeting with the Pardee Center to catch up on our recent work**

Josef Korbel School of International Studies, University of Denver, Denver, CO

MARCH 2017

**Pardee Center hosts Mr. Gengezi Mgidlana, Secretary to the Parliament of the Republic of South Africa, for planning meetings and public lecture, "Development and Governance in Africa"**

Josef Korbel School of International Studies, University of Denver, Denver, CO



APRIL 2017

**David K. Bohl and Alex Porter join the Institute for Security Studies and Irish Aid for a discussion of development trends and alternative scenarios in Mozambique**

Mozambique Ministry of Economy and Finance, Maputo, Mozambique

FEBRUARY 2017

MARCH 2017

APRIL 2017

FEBRUARY 2017

**At the International Studies Association annual conference in Baltimore, Jonathan D. Moyer joined other Korbel School faculty to present their collaborative work funded by the Minerva Initiative. Professors Moyer, Oliver Kaplan, and Cullen Hendrix joined a panel on state fragility, "Are fragile countries each fragile in their own way?" chaired by Dr. Erica Chenoweth. Assistant Professor Moyer also presented on a paper he co-authored with Dr. Amanda Murdie from the University of Georgia and introduced a Diplometrics data project on international non-governmental organizations.**

ISA Annual Conference, Baltimore, Maryland

MARCH 2017

**Research System Developer Steve Hedden and Lead System Developer José Solórzano lead IFs training at the UN Data Innovation Lab in Kenya**

United Nations, Nairobi, Kenya



APRIL 2017

**Steve Hedden presents on IFs at Project X-ITE's "Flight to Denver" Solutions Summit Bootcamp**

Galvanize, Inc. Denver, CO

APRIL 2017

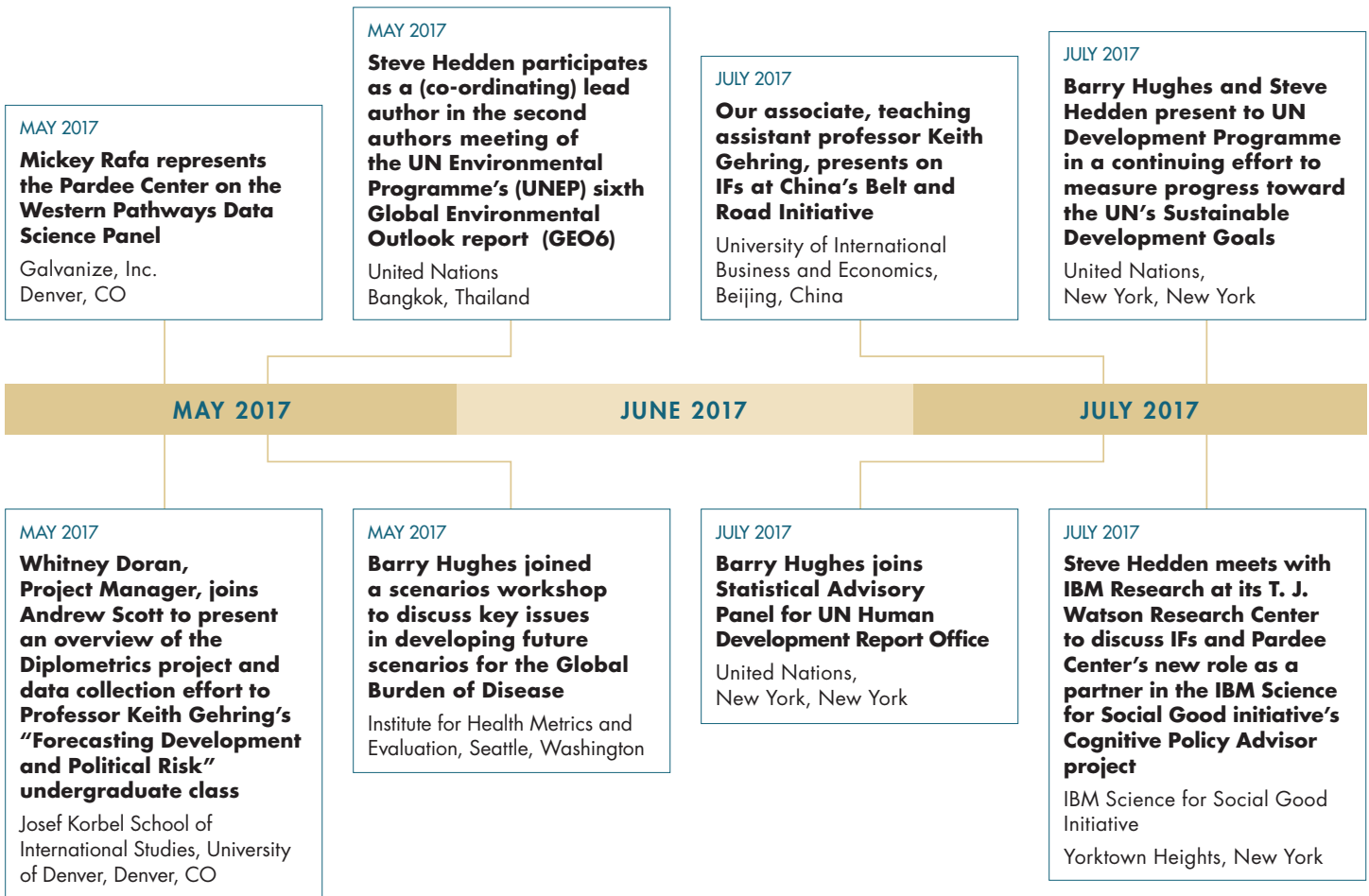
**Zachary Donnenfeld, Jonathan D. Moyer, and Andrew Scott lead interactive IFs training session for Ethiopia's National Planning Commission and the Ethiopian National Bank**

Government of Ethiopia, Addis Ababa, Ethiopia

APRIL 2017

**David K. Bohl and Alex Porter help launch two development trends reports prepared for USAID (South Africa and the region of Southern Africa) using IFs data and Pardee Center analysis**

Institute of Security Studies, Pretoria, South Africa



# DATA AND TOOLS

## THE DIPLOMETRICS PROJECT

The Diplometrics Project builds data, develops tools, and analyzes issues related to the international political system, focusing on diplomatic representation, international non-government organizations, head-of-state travel, international organizations and multinational corporations. The project is driven by new research questions related to soft power, bilateral treaties, diplomatic capacity, cultural affinity, and power projection. In cooperation with DU's Center for Statistics and Visualization, we have created the DiploDash tool to help visualize and understand some of the ongoing work of the Diplometrics Project ([diplodash.pardee.du.edu/](http://diplodash.pardee.du.edu/)).

IN 2016-17 THE DIPLOMETRICS DATABASE WAS EXPANDED BY:



26,729

### UNIQUE ENTRIES FOR 125 INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS (INGOS)

The INGOs data initiative is part of Diplometrics' transnational actors project and measures the work of programmatic and advocacy based INGOs internationally between 1990 and 2017.



15,991

### VISITS BY HEADS-OF-STATE ABROAD

The Heads of Government and State project is an effort to catalog international travel from 1990 to 2016 by heads of state for 210 countries around the world.



9,449

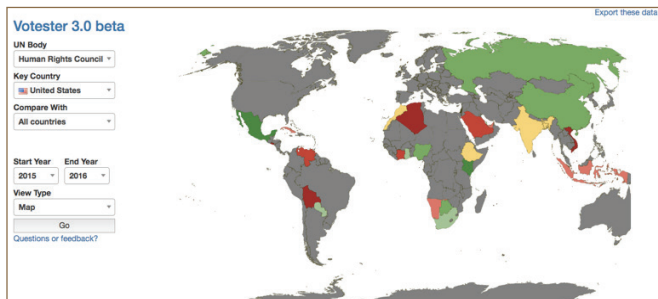
### UNIQUE ENTRIES ON DIPLOMATIC REPRESENTATION

This project measures diplomatic relations between states across time.



## VOTESTER

Votester is a website developed by the Pardee Center and Joseph Ryan from DU's Center for Statistics and Visualization that assesses voting patterns in the UN General Assembly, the UN Human Rights Council, and the UN Security Council from 1946 to the present. The tool allows users to analyze the composition and cohesion of voting blocs and political alliances. The interactive platform also reveals changes in diplomatic relationships among UN member states.



## DATAGATOR

DataGator is a data-exploration and transformation tool funded by various clients, including the Minerva Initiative. We continue to work on the tool, intended to help overcome common challenges in aggregating, structuring, and sharing data and provide a way for researchers, practitioners, and students to combine, transform, and improve social science data in an online community.

**Extract Data**  
One of the major components of the DataGator is the ability to extract data of various structures and file types and convert them into a uniform format. The Data Explorer allows users to import, store, media data and other file types, identify their structure and units of analysis, and upload the newly formatted data to a private or public repository on DataGator.

**Find**  
At the core of the DataGator is the Data Explorer. The Data Explorer allows users to search, view, share, download and comment on data collections provided by other users in the DataGator community. The Data Explorer also provides robust and consistent metadata fields that will help users understand the content of the data and identify the persons or groups that created the data.

**Make Data Greater**  
The Workflow Builder is a tool that allows users to perform cloud-based transformations on data tables that have been uploaded to DataGator. Users are able to implement various data cleaning and aggregation techniques through easy-to-use wizards. These wizards can be linked with each other to allow for multiple transformations to occur consecutively.

## ECONDASH

EconDash is a collection of interactive data visualizations that allows users to explore patterns of behavior for country-level economic and network-based indicators across multiple decades. The first visualization we created measures changes in bilateral trade networks over time. The second, which is still in progress, is a tool for evaluating a country's vulnerability or resilience to economic shocks. Together, these public dashboards will help analysts better understand a country's structural exposure to economic crisis due to domestic conditions as well as their positioning within trade networks. EconDash draws on historical data from sources including the IMF Systemic Banking Crises Database, data from UN Comtrade, and French research center CEPII, as well as data and forecasts from the IFs platform.



Visualization in EconDash: Global trade network in 2015, with line width representing the level of trade between two countries, bubble size representing the centrality of a country within the trade network, and color representing region.

# PARTNERSHIP HIGHLIGHTS

## THE INSTITUTE FOR SECURITY STUDIES

Since 2010 the Pardee Center has partnered with ISS on the African Futures Project (AFP). The African Futures Project pairs the Pardee Center's expertise with the ISS's in-depth human security research and analysis to provide policy-relevant material that frames uncertainty around human development across the continent. AFP has produced 25 forward-thinking policy briefs exploring possible futures on topics ranging from the shifting burden of disease across the continent to potential avenues for development in Ethiopia and Mozambique to the impact of solar energy in the South Africa's Western Cape province. The partnership also serves as a conduit for Pardee graduate assistants to gain professional research experience through internships at ISS headquarters in Pretoria, South Africa. Students spend three months providing IFs technical support, training others in the use of IFs, and supporting ISS publications. The Pardee Center interns in Pretoria this year were: Kanishka Narayan Alanna Markle, Joel Maweni, and Stellah Kwasi.



Our partners in Pretoria: Jakkie Cilliers, Zachary Donnenfeld, intern Joel Maweni



Ambassador Christopher Hill, Lord Mervyn King, Assistant Professor Jonathan Moyer

## AMG NATIONAL TRUST BANK

The 2016-17 academic year launched a collaboration between AMG National Trust Bank, the Korbel School, and the Pardee Center. Led by AMG Chairman and Co-Founder Earl Wright, the partnership includes a scholarship for a Korbel School student and a series of educational events for AMG employees by Pardee Center Director Jonathan D. Moyer. In September, Jonathan D. Moyer and Ambassador Christopher Hill, Dean of the Korbel School of International Studies, joined Lord Mervyn King, former Governor of the Bank of England, and Julio C. Fernandez, Global Quantitative Analyst, for an Executive Session at AMG World Bank in Greenwood Village, CO. Forces at Work: The Executive Session was an interactive discussion about geopolitical risk, global monetary policy and the future of global growth. More events with Professor Moyer and AMG are planned for the coming years. The AMG National Trust Bank Scholarship is awarded every two years to an incoming Master's candidate with a particular interest in working with IFs and the Pardee Center. The 2016-17 school year brought Taylor Hanna to campus as the first AMG scholar. Taylor hails from Austin, Texas, earned her B.A. in Sociology from the University of Texas, and is studying Global Finance, Trade and Economic Integration at the Korbel School. At the Pardee Center, she has coded, gathered and cleaned data for the dyadic essential series update and co-authored the reference report Understanding and Forecasting Geopolitical Risks and Benefits. She is currently exploring new data sources for the Diplometrics project and expects to graduate in June.



# INTERNSHIPS WITH PARDEE CENTER PARTNERS

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Every year, several of our research assistants meet the internship requirement for their Korb School degrees by working with our partners. These internships demonstrate the value of real-world experience, build our students' understanding of how to use and apply IFs, and extend the reach of our research. Here are the highlights of the internships served by our research assistants during the 2016-17 school year.

## **STRATEGIC POLICY UNIT OF THE UNITED NATIONS DEVELOPMENT PROGRAMME**

The Strategic Policy Unit is a group within the UNDP's Bureau for Policy and Programme Support. Its responsibilities include the research and analysis of global policy, identification of key development trends, and engagement with external partners. Interns for this group are tasked with providing research in support of the Strategic Policy Unit's goals. This work includes analyzing data on a wide range of sustainable development issues, collecting data and conducting quantitative analysis with the use of modeling tools, and providing support for policy papers, reports, and speeches. Through this position interns have the opportunity to assist the UNDP in its contribution to global policy debates and key development processes.

## **THE LEARNING CONTRACT FUNDED BY USAID-UGANDA**

This internship is located in Kampala, Uganda, where interns from the Pardee Center collect and enter data into IFs to inform USAID-Uganda about their program design, management, and assessments on a subnational level. Interns perform tasks including data management, manipulation, visualization, and some descriptive data analysis.

## **INSTITUTE FOR SECURITY STUDIES**

The African Futures Project is a collaboration between the Institute for Security Studies and the Pardee Center. The ISS is a Pan-African think tank established to focus on human security issues. This internship was created to support the African Futures Project through the use of the International Futures model. Interns are tasked with training researchers on the use of the IFs model. They also co-author papers in the African Futures Project series and contribute to other ongoing projects.

## **US ARMY FUTURE STUDIES GROUP**

The US Army Future Studies Group conducts research and analysis using data and modeling tools, including the International Futures model. Interns from the Pardee Center are assigned individual research projects to support the group's agenda. The research topics cover a wide breadth including long range forecasting, modeling and simulation. Interns also contribute to literature reviews, collection of statistical sources and media images, and written analysis of research findings. Pardee research assistants are especially valuable in this position because of their knowledge of the IFs model and their experience with analysis.

## **AFRICAN LEADERSHIP ACADEMY**

The African Leadership Academy's mission is to identify and develop young African leaders. In pursuit of this goal the ALA and the Pardee Center partnered this year to design a unique internship opportunity connecting the ALA to the IFs network through the design and implementation of educational programming, professional development, and outreach. Through this internship, an IFs intern will have the opportunity to make a direct impact on a vibrant learning community dedicated to fostering the growth of African leaders. The intern will lead the design and implementation of the ALA-IFs project, coordinate installation of IFs hardware, and advise students.

# THE PARDEE CENTER EXPERIENCE



*My Research Assistant position at the Pardee Center was the deciding factor as I chose my graduate program, and my experience here has surpassed my expectations. Working on projects for clients like USAID and the African Union has deepened my understanding of many academic concepts and prepared me for the next steps of my career. I have grown as a technical writer and project manager and I have enjoyed excellent professional opportunities through my work with the Pardee Center, including an internship in South Africa and my first job after graduation, at the Western Cape Government in Cape Town, South Africa.*

**- ALANNA MARKLE**

M.A. Global Finance, Trade, and Economic Integration, University of Denver (2017) – Josef Korbel School of International Studies Consultant, Western Cape Government



In June, 26 Pardee Center research assistants earned degrees from the University of Denver.



*I began working as a Research Assistant at the Pardee Center while I was enrolled in the International Futures class. The systems-thinking approach to international relations was novel to me and grounded all the theory I was learning in my other classes. The Pardee Center has given me great work experience; I have worked on projects for a bevy of government clients, building my resume while in school. These projects challenged me in ways different from my classes and have made me a much better researcher.*

**- MEREDITH MOON**

M.A. Global Finance, Trade, and Economic Integration, University of Denver (2017) – Josef Korbel School of International Studies 2017-18 Research Fellow, Pardee Center for International Futures



Senior Scientist and Mentor Barry Hughes explores the lighter side of forecasting.



*My research for the Pardee Center has given me valuable experience as an undergraduate and has opened my eyes to the importance of data and data analysis in international relations. Having a quantifiable understanding of the world profoundly impacts how we can affect it, and it is rewarding doing work that contributes to such an understanding.*

**- MARIANNE HUGHES**

B.A. candidate, International Studies and French, University of Denver (2019)



*The Pardee Center offered me an opportunity to write policy briefs on issues that are close to my heart (agriculture, education, governance effectiveness, and demographics). I have contributed to projects for international organizations such as USAID, Inter-American Development Bank, and the NEPAD Agency, which has allowed me to experience the process of formulating, conceptualizing and brainstorming ideas while working toward real-world deadlines. I have also had the opportunity to work on the data-management side of IFs, which has given me experience in systems vetting, validation and data acquisition. My work at the Pardee Center has broadened my knowledge across several issue areas and I am grateful for the opportunities I have had here.*

**- JOEL MAWENI**

M.A. Global Finance, Trade, and Economic Integration, University of Denver (2017) – Josef Korbel School of International Studies



Spike Ball was the hit of our summer Pardee Party in the Park.



*Working with the Pardee Center has reshaped how I think about issues facing global human development over the long-term. The macro decisions we make today can and often do have real long-term impact. For the casual observer, producing a forecast of a given variable may seem as simple as extending a line beyond the historical data. But it's much more than that. It requires a deep understanding of the drivers of that variable, as well as how those drivers are changing across time. Modeling and forecasting requires broad knowledge across many issue areas.*

**- ANDREW SCOTT**

M.A. Global Finance, Trade, and Economic Integration, University of Denver (2016) – Josef Korbel School of International Studies  
Research Associate II, Pardee Center for International Futures



Our researchers celebrated PI DAY (03.14) with chocolate cream, banana cream, and lemon meringue.

# SPONSORS & PARTNERS

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- 
- Atlantic Council / Zurich Insurance Group
  - Inter-American Development Bank
  - Irish Aid
  - Minerva Research Initiative
  - Social Science Foundation
  - United Nations Development Programme
  - UK Department for International Development
  - USAID-Ethiopia / Social Impact
  - USAID-Indonesia / Development Alternatives, Inc.
  - USAID-Southern Africa
  - USAID-Uganda / The QED Group
  - US Army Future Studies Group
  - Water Research Commission of South Africa
  - Western Cape Government

# STAFF & COLLABORATORS

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## CURRENT PARDEE CENTER STAFF

**Mike Bartee, MA:** Research Consultant  
**David K. Bohl, MA:** Research Associate II  
**Drew Bowsby, MA:** Research Associate I  
**Janet Dickson, MSW:** Research Consultant  
**Whitney Doran, MA:** Project Manager  
**Lisa Lane Filholm, MEd:** Operations & Communications  
**Steve Hedden, MA:** Research System Developer  
**Barry Hughes, PhD:** Senior Scientist and Mentor  
**Mohammod Irfan, PhD:** Research Consultant  
**Alanna Markle, MA:** Research Affiliate  
**Meredith Moon, MA:** Research Fellow  
**Jonathan D. Moyer, PhD:** Director  
**Kanishka Narayan, MA:** Research Associate I  
**Alex Porter, MA:** Research Consultant  
**Mickey Rafa, MA:** Financial and Program Officer  
**Jessica Rettig, MA:** Project Management Officer  
**Andrew Scott, MA:** Research Associate II  
**José Solórzano, MS:** Lead System Developer  
**Lily Welborn, MA:** Research Affiliate

## FACULTY COLLABORATORS + AFFILIATES

**Erica Chenoweth**  
**Richard Cincotta**  
**Stacy Closson**  
**Claude d'Estree**  
**Cullen Hendrix**  
**Evan Hillebrand**  
**Theodore Jay Gordon**  
**Lewis Griffith**  
**Keith Gehring**  
**Oliver Kaplan**  
**Randall Kuhn**  
**Amanda Murdie**  
**Dale Rothman**  
**Timothy Sisk**  
**Thomas Volgy**

# FOUNDING DIRECTOR BARRY HUGHES: A LASTING LEGACY

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Barry Hughes has been associated with global modeling since its beginning in the 1970s, when he was a young professor at Case Western Reserve University. Mijahlo (Mike) Mesarovic and Eduard Pestel invited him to join the team that built the system underlying the second report on global futures to the Club of Rome. After moving to the University of Denver, he became in the 1980s the “commuting” member of the GLOBUS modeling team at the Science Center Berlin, where his emerging International Futures (IFs) system played a key role.

At the University of Denver, Barry continued to develop IFs, even while serving in the 1990s as the Vice Provost for Graduate Studies. In the early 2000s, invitations from the European Commission and the U.S. National Intelligence Council provided support to start building a team (Mohammad Irfan and José Solórzano, still with the project, were the initial members) and to contribute to analyses such as three Global Trends reports (authored by Dr. Mathew Burrows) that the NIC delivered to successive US presidents. Such work led to a meeting at RAND Santa Monica with Fred Pardee and, in the late 2000s, to the formation of the Frederick S. Pardee Center for International Futures.

As the Center’s founding director, Barry led production of five volumes in a Patterns of Potential Human Progress (PPHP) series; growth of the team; and development of project associations with partners including the Institute for Security Studies in South Africa, the government planning agency in Peru, the World Bank, and the United Nations Human Development Report Office.

Environmental sustainability issues, especially global warming, have become the predominant focus of world modeling in recent years. Teams in Europe, the U.S., Japan, and elsewhere have developed Integrated assessment models (IAMs) focused on these issues. The structures of IFs, strengthened during the PPHP volume series period, enable it to be a bridge between the earlier world models and the IAMs. In particular, the system’s integrated representation of human and social systems with the biophysical



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systems critical to sustainability gives IFs unique issue area coverage. Its public availability in a package with a strong user interface creates high usability. In summary, with the emergence of the multi-issue Sustainable Development Goals (SDGs), IFs and the Pardee Center are positioned to make still greater contributions to understanding global futures and helping in some small way to shape them.

In 2016, with Barry's enthusiastic support, Jonathan Moyer became the new director of the Pardee Center and Barry moved to a new position as senior scientist and mentor. Barry now has time not only to continue helping build IFs and to further train the Pardee Center's enthusiastic and talented younger team, but also to reflect on the position of the Center and IFs in the global community. To that end he is writing a book for 2018 publication that will document the status of IFs, place it in the context of the global modeling field, and help identify further steps for both IFs and the field.

#### THE HUGHES-DICKSON SCHOLARSHIP: INVESTING IN THE FUTURE

*In 2015, Barry and his wife, Janet Dickson, established the Hughes-Dickson endowed scholarship fund with a \$500,000 bequest, matched by an immediately-available equal amount provided by DU. To date, three Korbel School students have been the recipients of the Hughes-Dickson scholarship. Their learning experience at DU is shaped by their work as research assistants for the Pardee Center.*

*Hughes-Dickson Scholars: Alanna Markle (MA 2017), Ann Elizabeth Rogers (MA 2017), and Elizabeth Bremer (entering fall 2017).*



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*"The most valuable thing I learned at the Pardee Center was how to think. Here, there is a core way of thinking about the world as a system of interconnected actors and their interactions. Learning to think in this way helps us understand the second- and third-order effects that often explain why policies seemingly go awry. My work and study here have solidly prepared me for the next stage of my career."*

**- CALEB PETRY** BA International Studies, University of Denver (2017)  
PhD student, Pennsylvania State University (expected 2022)