FREDERICK S. PARDEE CENTER
FOR INTERNATIONAL FUTURES

ANNUAL REVIEW 2015-16

JOSEF KORBEL SCHOOL
OF INTERNATIONAL STUDIES

UNIVERSITY *of* DENVER

LETTER FROM THE DIRECTOR

To the Pardee Center Community:

In the last year, the Frederick S. Pardee Center for International Futures enjoyed considerable growth in sponsored research, an increase in our full-time professional research staff and a significant expansion in our team of undergraduate and graduate research assistants. As we continue to grow this next academic year, we are better positioned than ever to help organizations around the world think about their impact on the human condition in a broader, more integrated way.

As part of this pursuit, our team has worked hard to better represent the wide range of interconnected human, social and physical systems that we formally model in the International Futures (IFs) platform. Some highlights in our modeling included improving the granularity of our agriculture supply model, exploring the relationships between water use and scarcity, extending the representation of informal economies across the world, and significantly increasing the number of bilateral relationships, such as trade or diplomatic exchange, in our IFs historical database. We also beta launched a new, cloud-based data aggregation tool called the Data Gator to help fellow forecasters.

Thanks to our sponsors, our team was able to use these tools to better understand the integrated world we live in. For example, our research this year explored the relationship between demographics and risk, estimated the number of children in the world suffering from severe acute malnutrition and evaluated the cost of treatment, modeled future costs associated with cyber security and explored the potential of reducing hunger in Africa. We also published several reports on development trends worldwide.

Looking ahead, we hope to extend and enhance the relationships and tools that we have built over the past twelve months to help others further explore, understand, and shape the world around us.
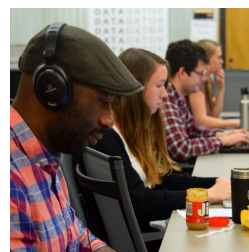
Kindly,

Dr. Jonathan Moyer
Director, Frederick S. Pardee Center for International Futures
Assistant Professor, Josef Korbel School of International Studies
University of Denver

Political Settlements workshop at DU

Student researchers learn the IFs model

Research assistants expand the Diplometrics database

OUR YEAR IN REVIEW:

83
STUDENTS EMPLOYED AS RESEARCH ASSISTANTS

21 PARTNERS & CLIENTS WORKING ACROSS
5 CONTINENTS

19
SPONSORED PROJECTS

COLLABORATIONS WITH **13** KORBEL FACULTY & EXTERNAL RESEARCH AFFILIATES

4
JOURNAL ARTICLES

3
POLICY BRIEFS

1.5
MILLION IN GRANTS, SPONSORED RESEARCH & TRAININGS

THE DIPLOMETRICS DATABASE WAS EXPANDED BY:

27,540
SOURCE & OPERATION CODES FOR **INTERNATIONAL NON-GOVERNMENTAL ORGANIZATIONS**

200,000+
DATA POINTS ON **MULTINATIONAL CORPORATIONS**

990,799
DYADIC INFLUENCE SCORES
[FROM 288+ MILLION DATA POINTS]

6,768
UNIQUE **HEAD-OF-STATE VISITS**

3,955
TRANSNATIONAL **CRIME ORGANIZATIONS**

373
UNIQUE ENTITIES IN THE LIST OF **MEMBERS OF THE INTERNATIONAL SYSTEM**

DIPLOMETRICS

Pardee staff and research assistants continued the Diplometrics project this year, coding and vetting hundreds of thousands of new data points on a number of areas related to international politics, including transnational criminal organizations, international non-governmental organizations, head-of-state visits, arms and personnel of global arms forces and multinational corporations. The team also continued work on the Diplodash data-visualization dashboard and a dyadic influence index. [diplodash.pardee.du.edu]

AFRICAN FUTURES PROJECT

2015-16 AFRICAN FUTURES POLICY BRIEFS:

Parched Prospects II:
A Revised Long-Term Water Supply and Demand Forecast for South Africa

Steve Hedden

This report uses IFs to evaluate the effects of future overexploitation of water resources in South Africa.

The paper forecasts that withdrawals across municipal, industrial and agricultural sectors will increase over the next two decades, and that proposed interventions for increasing supply and reducing demand will not be enough to reconcile the gap between forecasted withdrawals and supply within this time frame.

Refreshing Africa's Future:
Prospects for Achieving Universal WASH Access by 2030

Alanna Markle and Zachary Donnenfeld

This report uses IFs to forecast the possibility and subsequent effects of Africa reaching targets 6.1 and 6.2 of the Sustainable Development Goals: universal access to water, sanitation and hygiene (WASH).

The authors forecast that meeting universal WASH access in Africa could add over US$ 525 billion to Africa's GDP. However, the cumulative infrastructure investment required to meet the target is around US$122 billion and would require divestment from other sectors.

Living Cape:
Establishing Sustainable Human Settlements

Eli Margolese-Malin, Tristan Görgens and Tracy Jooste

The African Futures Project collaborated with the Western Cape Government to evaluate trends and policy options related to its One Cape 2040 vision.

This policy brief, the fifth in the series, analyzes potential changes in demand for housing opportunities in the province and explores how policy interventions or other economic or demographic dynamics could influence this demand in the long term.

The art and science of forecasting:
new porcelain mural in the Pardee Center conference room

Beyond Attributable Burden: Estimating the Avoidable Burden of Disease Associated with Household Air Pollution
PLOS ONE

Randall Kuhn, Dale Rothman, Sara Turner, José Solórzano and Barry Hughes

Pardee Center staff and faculty collaborated with former Korbel faculty member Dr. Randall Kuhn to investigate the avoidable burden of disease associated with household air pollution (HAP), an unfolding global epidemic due to the use of household cookstoves. The authors illustrated that dynamically calculating avoidable risk yields different estimates than more static attributable risk accounting methods, thus allowing policymakers to identify certain regions where windows of opportunity for intervention are closing more rapidly.

International Futures (IFs) and Integrated, Long-Term Forecasting of Global Transformations
FUTURES

Barry Hughes

Written by International Futures creator Dr. Barry Hughes, this paper uses IFs to provide Base Case forecasts of global transformations that appear to be unfolding in human, social and environmental development. The article also includes scenario analysis on global poverty, carbon emissions, governance, HDI and agriculture, and argues for the balance of both art and science in the practice of forecasting.

Poverty Eradication in Fragile Places: Prospects for Harvesting the Highest Hanging Fruit by 2030
STABILITY: INTERNATIONAL JOURNAL OF SECURITY & DEVELOPMENT

Gary Milante, Barry Hughes and Alison Burt

This article uses the IFs forecasting model to explore poverty eradication in fragile states. The article takes a scenario-modeling approach to identifying likely trends in poverty as well as possible results of aggressive interventions. The article concludes that "even under the most optimistic circumstances, fragile states will almost certainly be home to hundreds of millions of poor in 2030, suggesting that the world must do things dramatically differently" to eradicate poverty in fragile and conflict-affected countries in the next 15 years of development.

Cost Analysis of Global Road Traffic Death Prevention: Forecasts to 2050
DEVELOPMENT POLICY REVIEW (MANUSCRIPT ACCEPTED AUGUST 2016)

Mark Eshbaugh, Jonathan Moyer, Jessica Rettig

This paper's authors used the International Futures integrated forecasting system to explore the plausibility of achieving the Sustainable Development 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 at varying levels of development.

Barry Hughes and Julius Gatune Kariuki in Kigali

Amartya Sen and our research scientist Mohammod Irfan in Tokyo

Human Trafficking discussion at the Pardee Center with the UN's Kristiina Kangaspunta and Korbel's Claude d'Estree

PROJECT HIGHLIGHTS

HUNGER & FOOD SECURITY IN AFRICA

As part of ongoing collaboration with the African Union's New Partnership for Africa's Development (NEPAD), faculty, staff and students from the Pardee Center, including Steve Hedden, Barry B. Hughes, Dale S. Rothman, Alanna J. Markle, and Joel Maweni, contributed to an analysis on current efforts to reduce hunger and ensure food security across the continent. The report explores various scenarios and outlines both the conditions and actions necessary to put the region on track to eliminate hunger and food insecurity as soon as possible. Steve joined NEPAD CEO Dr. Ibrahim Assane Mayaki, as well as our partners at the Institute for Security Studies, to present the paper's findings at a launch event in South Africa in early September 2016.

DEVELOPMENT PRIORITIES IN UGANDA

Funded by USAID-Uganda, this project explores the policy choices facing Uganda and the international aid community with the goal of identifying aggressive but achievable goals. Although the country has made significant economic, human, and social progress since the end of autocratic rule, Uganda is under pressure from a multitude of local constituencies, international organizations, and foreign aid groups to simultaneously improve human, social, and environmental development outcomes. The Pardee Center report helps identify the interventions most likely to boost human development, ease suffering, and put Uganda on the path towards middle-income levels of development.

FUTURE OF THE PACIFIC ALLIANCE

In partnership with PricewaterhouseCoopers (PwC), the Pardee Center used IFs to explore key development trends in the Pacific Alliance, a Latin American intergovernmental organization whose member states include Chile, Colombia, Mexico, and Peru. This research examined trends in long-term productivity in the Pacific Alliance and highlighted opportunities for member states to accelerate development and avoid the "middle-income trap" over the next two decades. The Pardee Center's research supported PwC's report entitled "Future of the Pacific Alliance: Integration for Productive Growth."

DEMOGRAPHIC RISK

The Pardee Center, in a partnership with Atlantic Council and Zurich Insurance, completed a multi-report analysis on the future of demographic risk, as part of a broader study addressing the question, "Is global risk outpacing global growth?" The work, authored by David K. Bohl, Barry B. Hughes and Shelby Johnson, uses IFs to explore demographic change, which can be so slow-moving as to be nearly imperceptible over short-term horizons. However, as the analysis demonstrates, the macro-economic, financial, and social implications of these changes can be enormous. The report shows that while many developing countries still have some time before being confronted with the financial risks that these transitions bring, the rate at which they are aging means they will have much less time to adequately prepare before their population-driven surplus runs out.

IFs & POLICY ANALYSIS IN INDONESIA

Jonathan Moyer, David Bohl and Korbel Teaching Assistant Professor Keith Gehring traveled to Jakarta, Indonesia in late May 2016 to train USAID policy practitioners and their partners on the International Futures model. The training, which took place over a week, highlighted how both USAID and their partners could use IFs in their own policy analysis and in the monitoring and evaluation of their programs.

CYBER RISK

In partnership with the Atlantic Council and Zurich Insurance, our team used IFs to explore the global expansion of information communication technology (ICT) and the sector's contribution to economic productivity and growth, as well as the costs of adverse cyber events and the efforts to prevent such events. The joint report found that by 2030, annual ICT-related security costs will likely be higher than incremental annual benefits, especially in high-income countries. However, while annual costs could exceed new benefits, countries will almost certainly still enjoy a very substantial net long-term benefit from ICT. These results are now available for free in IFs and can also be accessed via the project's Cyber Risk Dashboard.

ARTIFICIAL INTELLIGENCE

A recent background report from the Pardee Center, prepared for the National Intelligence Council, gives a wide-ranging synopsis of Artificial Intelligence (AI), its drivers, and its potential future impact across key human-development sectors. Authored by Andrew Scott and Barry B. Hughes, the report also explores how artificial intelligence could be developed and modeled within the International Futures (IFs) integrated assessment platform.

DEVELOPMENT TRENDS IN LATIN AMERICA & THE CARIBBEAN

Pardee provided the quantitative foundation for a report written in partnership with the Inter-American Development Bank and the Atlantic Council to explore the trends and uncertainties that will shape the developmental trajectory of Latin America and the Caribbean over the next 15 years. The region's historical failure to converge to per capita GDP levels of more advanced economies is forecast to become even more of a challenge over this horizon as the region's traditional sources of economic growth begin to wane. Through one-on-one consultations and roundtable meetings with policymakers and issue-experts, the partnership developed various scenarios to explore potential pathways toward a more prosperous future, as well as the implications of inaction.

HEALTH TRENDS IN THAILAND

In November 2015, John McPhee and Professor Randall Kuhn led a training on International Futures for the Thai Ministry of Public Health as part of a World Health Organization sponsored program. The training focused on understanding current health trends in Thailand, forecasting mortality and morbidity across different disease types, and exploring potential policy interventions that could impact health outcomes.

CHIEF OF STAFF OF THE ARMY STRATEGIC STUDIES GROUP

The Pardee Center began a partnership with the Chief of the Staff of the Army Strategic Studies Group in the Spring of 2016. The project explores the future operational environment for The United States Armed Forces. The first stage of the project has been focused on data-gathering including data on national military capabilities, transportation infrastructure, military spending, military personnel, geography and international conflict.

MINERVA RESEARCH INITIATIVE

In 2014, as part of the Minerva Research Initiative, the US Department of Defense initiated a grant to identify and measure how (im)balances in development can lead to abrupt sociopolitical change. In the 2015-16 academic year, Pardee faculty and staff worked alongside Korbel faculty Erica Chenoweth, Cullen Hendrix, Oliver Kaplan, and Tim Sisk to study how the accuracy of established models for predicting political instability has changed across time and to explore the viability of new, alternative models. Together, as part of this grant, our team has also developed a database of structural imbalances, data on Major Episodes of Contention (led by Professor Chenoweth), a new database on qualitative narratives associated with political instability (led by Professors Kaplan and Sisk), and the continued development of DataGator (led by our researchers David Bohl and John McPhee).

DATAGATOR

In June 2016, a select group of researchers began testing the beta release of DataGator, a new data-exploration and transformation tool developed internally by our staff and funded by various clients including the Minerva Initiative. The objective of DataGator is to provide a way for researchers, practitioners and students to explore, transform, combine, share and improve social-science data through an online community. The tool helps overcome common challenges in aggregating, structuring and sharing data, and can significantly expedite the integrated forecasting process. Earlier in the year, the Pardee Center staff traveled to Atlanta to introduce the tool at the 2016 International Studies Association Annual Convention.

SEVERE ACUTE MALNUTRITION

Beginning in November 2015, the Pardee Center collaborated with a consortium of NGOs led by Action Against Hunger (ACF) to build a model capable of estimating and forecasting the global burden of severe acute malnutrition (SAM). SAM is an acute condition that affects children under five, leading to significantly increased rates of mortality and morbidity. In addition to estimating and forecasting the global burden of SAM, the Pardee Center produced a report exploring a number of benefit-cost estimates for SAM treatment globally and regionally. The report was completed in March 2016.

Pardee staff and visitors from NEPAD

Staff celebration as Dr. Moyer is named Director of the Pardee Center

A week of IFs training in Jakarta

EVENTS AND PRESENTATION HIGHLIGHTS

September, 2015 (MARYLAND) **Dr. Jonathan Moyer**
    Presentation on exploring the relationship between structural imbalances and social instability
    University of Maryland Center for Advanced Study of Language and the National Consortium for the Study of Terrorism
    and Responses to Terrorism; Funded by Director of National Intelligence

May, 2016 (DENVER) **Research Workshop**
    'Political Settlements in Fragile and Conflict–Affected States: Measuring Governance Trajectories'
    Sponsored with the Institute of Security Studies at the Korbel School, funded by DFID

May, 2016 (DENVER) **Dr. Jonathan Moyer**
    Build Peace Salon: Charting the Future with Peace Technology - Panel and Networking Event
    Sponsored with the Center for Conflict Resolution at the Korbel School

June, 2016 (VIENNA) **Dr. Barry Hughes**
    Presentation of International Futures at International Institute for Applied Systems Analysis (IIASA)
    and the Wittgenstein Centre
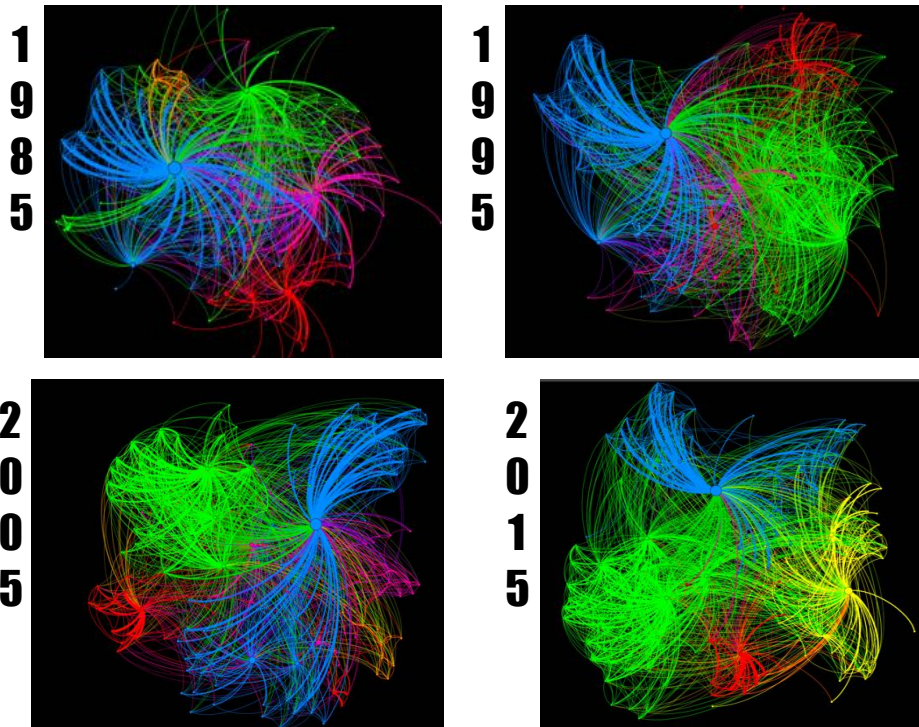
June, 2016 (KIGALI, RWANDA) **Dr. Barry Hughes**
    Keynote Address at the 7th Africa Agriculture Science Week and Forum for Agricultural Research in Africa (FARA)

August, 2016 (WASHINGTON, DC) **Jonathan Moyer**
    Mad Scientist Conference co-sponsored by U.S. Army TRADOC, Georgetown University Center for Security Studies and
    the Chief of Staff of the Army's Strategic Studies Group

GLOBALIZATION: NETWORKS OF BILATERAL INFLUENCE

As part of the Diplometrics project, we have built an influence index from a dyadic dataset that includes 119 different political, economic, security, cultural, and static indicators with over 200 million individual observations.

By measuring the types and magnitudes of connections between states, we can identify the capacity for state to apply pressure within different arenas (political, economic, security, cultural). The major goals of the index are to:

-Identify the countries with the greatest influence capacity and how that capacity has changed across time
-Identify the relative share of influence capacity each country has relative to other states
-Identify the areas (i.e. economic, political, security) where states have the greatest capacity to influence other states.
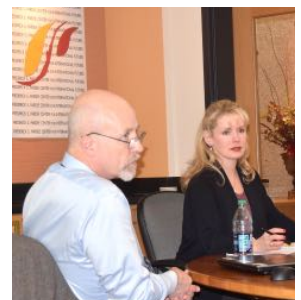
SPONSORS AND PARTNERS

- Action Against Hunger
- Atlantic Council
- Institute for Security Studies (South Africa)
- Inter-American Development Bank
- International Commission on Financing Global Education Opportunity
- Minerva Initiative (US Department of Defense)
- National Science Foundation
- New Jersey Center for Teaching and Learning
- New Partnership for Africa's Development (NEPAD)
- PriceWaterhouseCoopers
- Social Science Foundation
- Strategic Studies Group
- Thai Ministry of Health
- UK Department for International Development (DFID)
- USAID Indonesia
- USAID Southern Africa
- USAID Uganda
- U.S. Army Chief of Staff Strategic Studies Group
- Western Cape Government
- Water Research Commission
- Zurich Insurance

The Pardee Center relies on financial support from sponsors and donors.
For more information on the International Futures model and our work,
please contact us: Pardee.Center@du.edu.

Research Associate John McPhee—and student research assistants—work on expanding the Diplometrics project.

Army Chief of Staff Strategic
Studies Group at Pardee

STAFF, FACULTY AND PARTNERS

CURRENT PARDEE CENTER STAFF

Jonathan Moyer, PhD Director

Barry Hughes, PhD Senior Scientist and Mentor

Mohammod Irfan, Phd Research Scientist

José Solórzano, MS Lead System Developer

Steve Hedden, MA Research System Developer

Mickey Rafa, MA Financial and Program Officer

David Bohl, MA Research Associate II

John McPhee, MA Research Associate II

Drew Bowlsby, MA Research Associate I

Andrew Scott, MA Research Associate I

Janet Dickson, MSW Research Consultant

Jessica Rettig, MA Research Consultant

Harry Smythe, MA Research Consultant

Lisa Lane Filholm, MEd Operations & Communications

Faculty Collaborators and 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

Dale Rothman

Timothy Sisk

Thomas Volgy

STAFF TRANSITIONS

In July, 2016, Jonathan Moyer assumed Directorship of the Pardee Center. Founder Barry Hughes, meanwhile, has moved into his new role as Senior Scientist and Mentor. He continues to develop the IFs model and write his manuscript about global futures.

Mickey Rafa married fellow Korbel grad Alyssa Auck (MA International Studies 2013) on September 5. Our forecast: long-term wedded bliss.

In July, Korbel alumnus and our research affiliate Zach Donnenfeld (MA GFTEI 2015) welcomed a baby girl into the world. Meanwhile, Lisa Lane Filholm's eldest child left the nest for a year of service with AmeriCorps.

Pardee Pet Parade - adopted this year: a new puppy (John McPhee), two kittens (Steve Hedden), and three chickens (Jonathan Moyer).

STAFF HIGHLIGHT

A math and philosophy major from Rutgers University, Steve Hedden came to Korbel hoping to translate his abstract theoretical interests into something with impact.

He found that opportunity at the Pardee Center in late 2012, when he joined our team as a Research Assistant. As he earned his MA in International Development, Steve immersed himself in International Futures (IFs), working directly with its creator Dr. Barry Hughes to learn the model code and eventually to build the system's water sub-module from the ground up.

He spent a summer completing the internship required for his degree with our partners at the Institute of Security Studies (ISS) in Pretoria, South Africa, where he returned after graduation to work as a researcher. During his time with the Pardee Center and ISS, he has led IFs trainings and presented his research throughout southern and eastern Africa, making several national media appearances to share his work with policymakers.

Steve also collaborated directly with local experts in Namibia on an analysis of demographic trends and was recently lead author on a report on hunger prepared for the African Union's New Partnership for Africa's Development (NEPAD).

In January 2015, Steve re-joined our team in Denver as a research system developer, managing the ongoing development and documentation of IFs. He also continues to travel internationally to represent our team and plays an active role in projects for USAID, the African Futures Project, NEPAD, and other government clients worldwide.

"I am so grateful for the opportunity to work at the Pardee Center. I get to think creatively with brilliant people about some of the biggest problems facing humanity. What more could one ask?"

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THE FREDERICK S. PARDEE CENTER FOR INTERNATIONAL FUTURES

The challenges facing global policymakers are rarely isolated to single issue areas. Nor do they respect time, geographic boundaries or budgetary cycles. Given this reality, the way we think about policy choices should be as integrated and long-term as the very real-world challenges we aim to address.

At the Frederick S. Pardee Center, we believe that with the right data and methods, we can — and for the sake of each person affected by these policy decisions, we should — look past immediate politics or silos to better understand how actions we take today might play out in the future.

With our center's integrated assessment platform, International Futures (IFs) we have a one-of-a-kind, dynamic tool that helps us bring more structure, data and academic rigor into the integrated forecasting process.

Visit pardee.du.edu to learn more about our work or to download our model for free.

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