



Digital Transformation of Societal Systems

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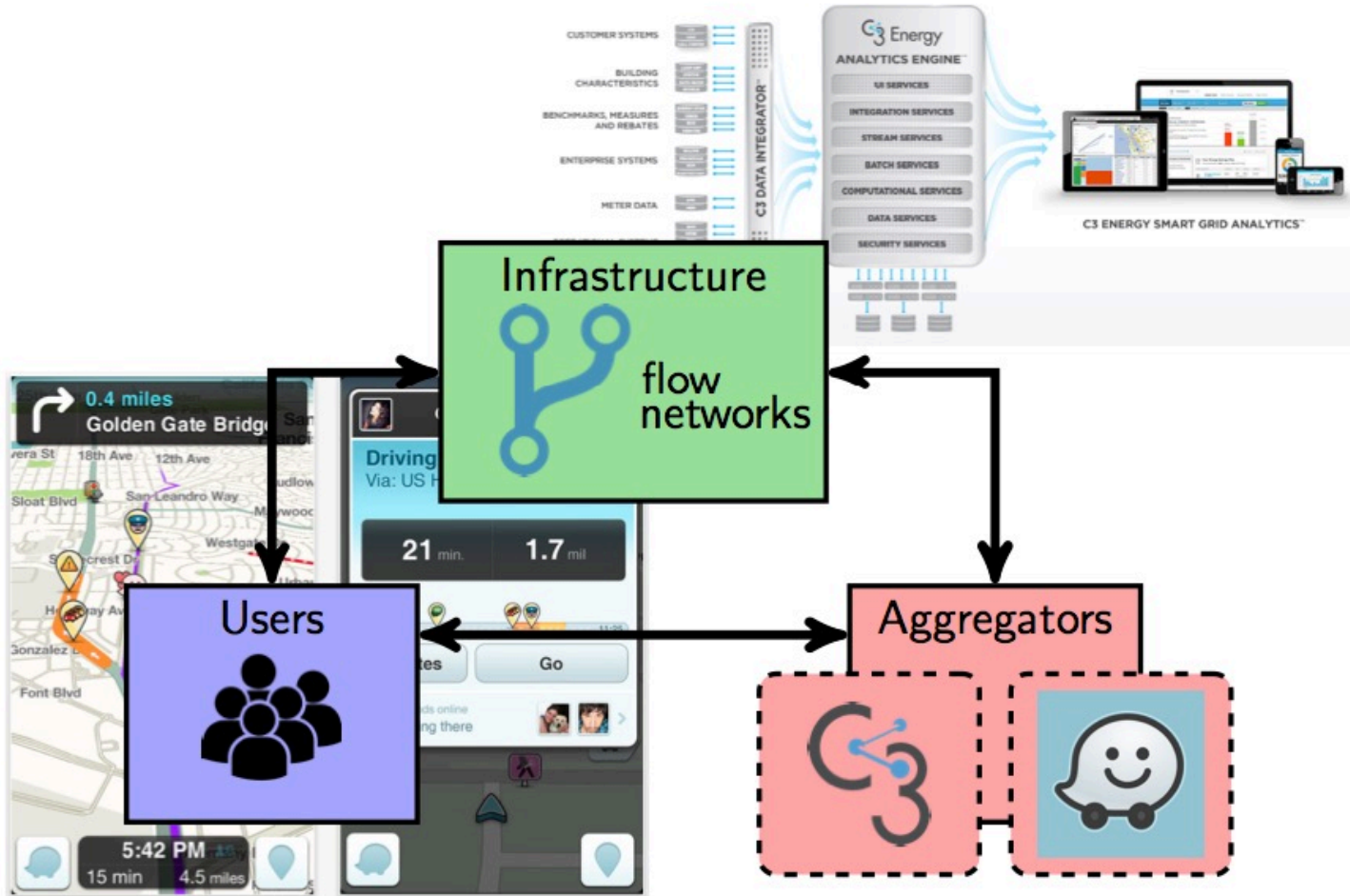
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Sharing Economy: Data as a Commodity



The impact of traffic apps on system dynamics (courtesy Alex Bayen)

Fundamental premise of routing services

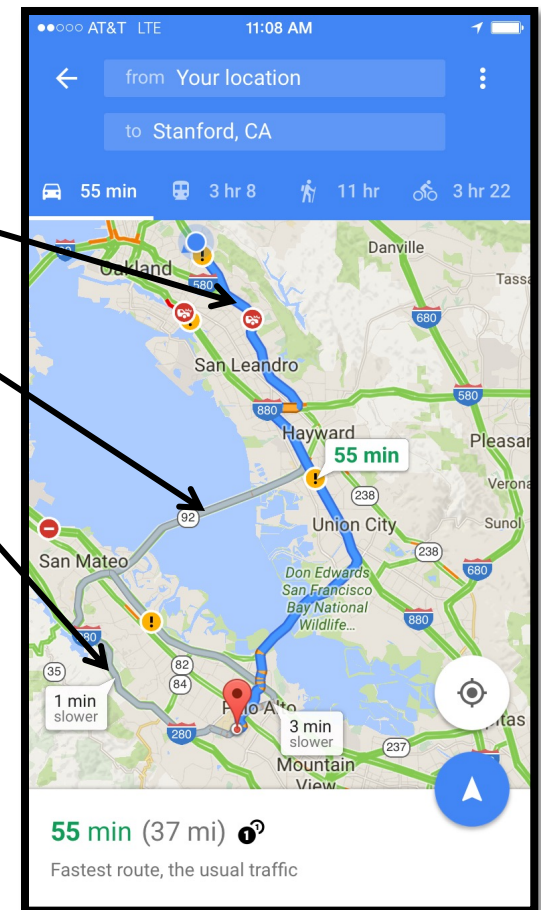
- Each app enabled user receives a [SOTA] shortest path
- Some follow the recommendations

All paths proposed are nearly equal:

- Shortest path (55mins)
- Third shortest path (58 mins)
- Second shortest path (56 mins)

Routing does in general not depend on

- Forecast of the network loading using demand data (incomplete today)
- Forecast of the network using potential impact of routing (i.e. routed users) on the network
- Knowledge of what competitors of the app are doing (in the present case, Apple, INRIX, 511, etc.)



Initially people “thought” app helped

The screenshot shows the top navigation bar of the City of Los Angeles website. It includes links for 'BLOG', 'MEDIA', 'GET HELP', 'TALK TO US', 'PERFORMANCE', and 'ABOUT'. A language selector for 'ENGLISH' is also present. The header features the 'Eric Garcetti #iamayor' logo. The main content area is titled 'Press Releases' and contains a news item about Mayor Eric Garcetti's agreement with Waze. The article text is partially obscured by a large, semi-transparent image of a fountain. To the right, there is a sign-up form with a 'SIGNUP' button and a Facebook social plugin for Mayor Eric Garcetti's profile, which shows 27,775 likes and a grid of profile pictures.

Eric Garcetti
#iamayor

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Press Releases

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Mayor Garcetti Details Agreement with WAZE to Help Reduce Congestion, Increase Safety, and Improve Driving Experience Around L.A.

Posted by Mayor Eric Garcetti on April 21, 2015 · [Flag](#)

App will feature first-ever hit-and-run notifications and AMBER Alerts to aid public safety

Mayor Garcetti today announced the details of a data-sharing agreement between the City of Los Angeles and Waze, an agreement he previewed in his State of the City Address last week. The Waze app is used by more than 1.3

Building the city of our dreams starts with you, sign up!

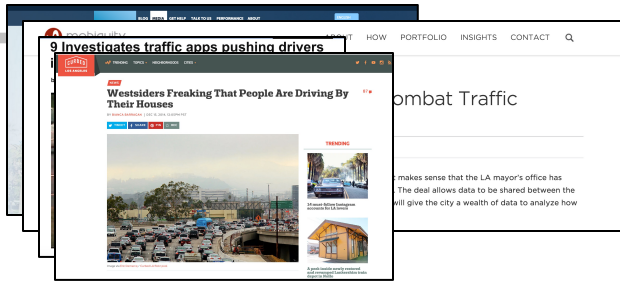
 [SIGNUP](#)
or sign in with [Facebook](#).

Mayor Eric Garcetti [Like](#)

27,775 people like Mayor Eric Garcetti.

Facebook social plugin

Until more and more people started using it



SECTIONS SEARCH

Los Angeles Times

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SDAY FEB. 14, 2017 MOST POPULAR LOCAL SPORTS ENTERTAINMENT POLITICS OPINION PLACE AN AD

California Commute New traffic apps may be pushing cars into residential areas



Vehicles crowd the intersection of Cody and Woodcliff roads in Sherman Oaks. Residents say GPS apps are to blame for the new

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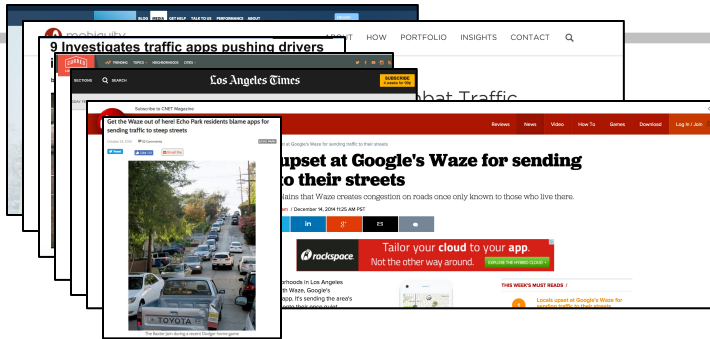
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Related Coverage

Stuck in bad traffic? Good chance it's Thursday evening

NOV. 11, 2014

Specific apps are identified as responsible



Readers React How an app destroyed their streets: Readers count the Waze



Vehicles crowd the intersection of Cody Road and Woodcliff Road in Sherman Oaks on Jan. 5. Residents say the worsening traffic on side streets is partially to blame on Waze. (Los Angeles Times)

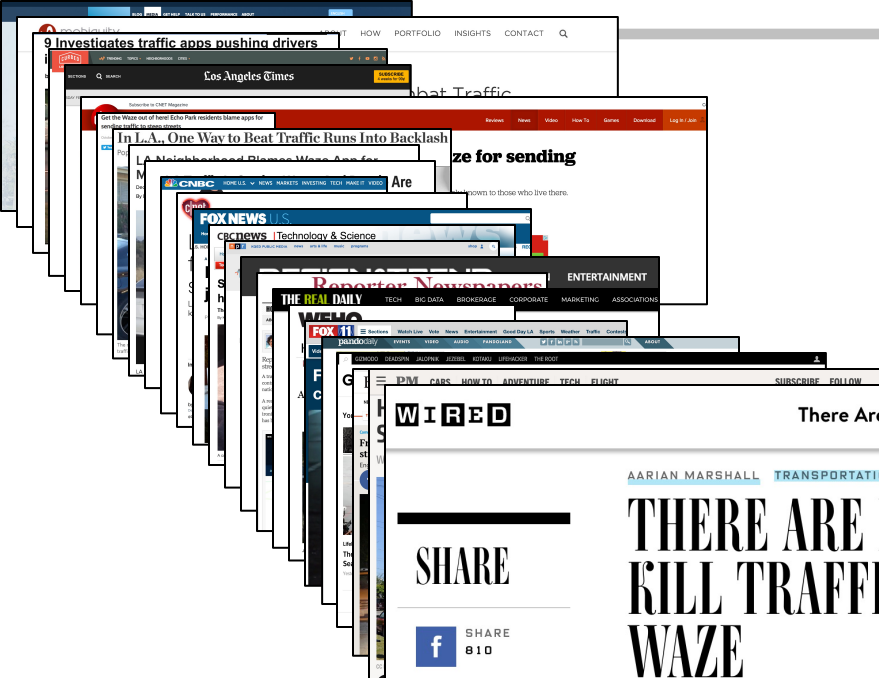
Related Coverage



Time to rein in California's traffic ticket surcharges

MAY 1, 2015

Neighborhoods and cities start to resist



Investigates traffic apps pushing drivers

Los Angeles Times

In L.A., One Way to Beat Traffic Runs Into Backlash

ze for sending

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There Are Better Ways to Kill Traffic Than Lying to Waze

AARIAN MARSHALL TRANSPORTATION 07.05.16 7:00 AM


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No real policy to help elected officials



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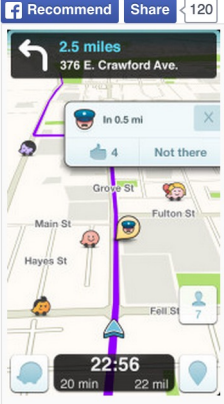
LATEST NEWS La Mirada man accused in murder of his wife in 1992 arrested in Antigua

Home » Government » This Article

'Cut-through' traffic caused by Waze app must stop, L.A. councilman says

POSTED BY JOHN SCHREIBER ON APRIL 28, 2015 IN GOVERNMENT | 10,658 VIEWS | 2 RESPONSES

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A Los Angeles city deal with traffic app Waze may be great, but some local communities are being inundated with "cut-through" traffic that must stop, a Los Angeles City Councilman said Tuesday.

Paul Krekorian introduced a motion to help local neighborhoods, saying Waze should send drivers away from residential streets and onto major roadways as part of the company's data-sharing agreement with the city.

Mayor Eric Garcetti announced last week that the city is sharing road closure data with Waze to improve its service, and in return the city is getting live updates about traffic patterns.

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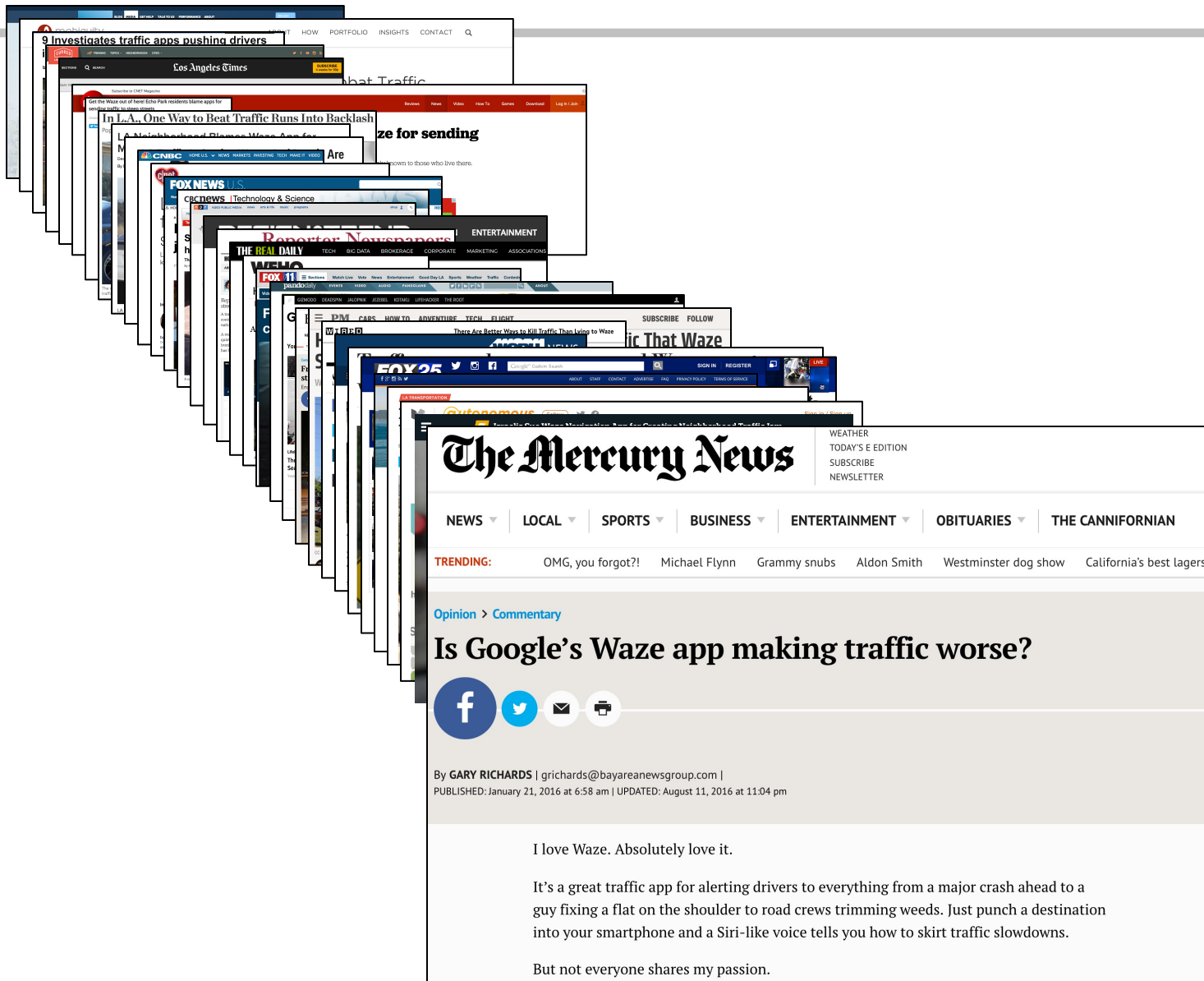
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But few people are asking the right question







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TRENDING: OMG, you forgot?! Michael Flynn Grammy snubs Aldon Smith Westminster dog show California's best lagers

[Opinion](#) > [Commentary](#)

Is Google's Waze app making traffic worse?

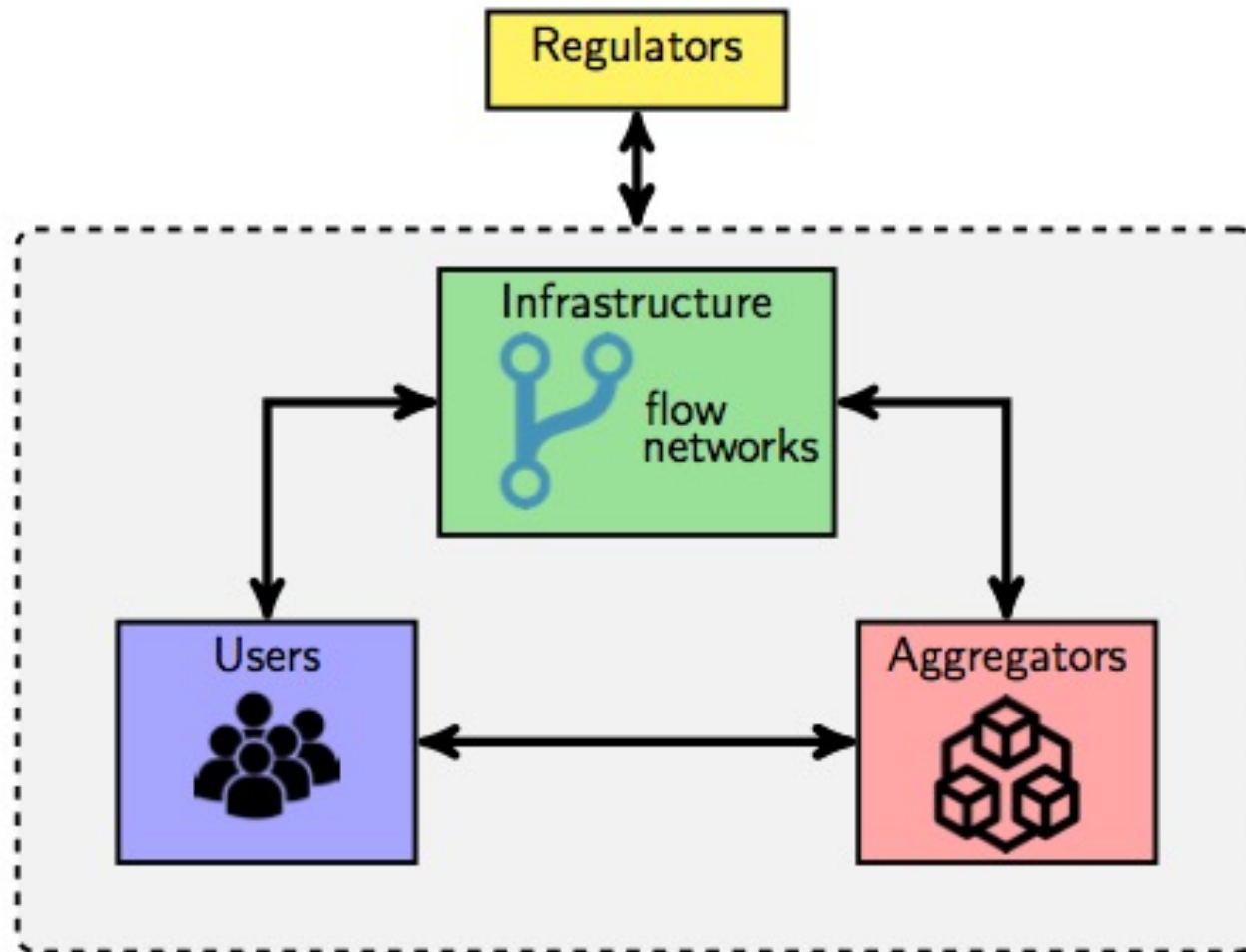
By **GARY RICHARDS** | grichards@bayareanewsgroup.com |
PUBLISHED: January 21, 2016 at 6:58 am | UPDATED: August 11, 2016 at 11:04 pm

I love Waze. Absolutely love it.

It's a great traffic app for alerting drivers to everything from a major crash ahead to a guy fixing a flat on the shoulder to road crews trimming weeds. Just punch a destination into your smartphone and a Siri-like voice tells you how to skirt traffic slowdowns.

But not everyone shares my passion.

Emerging Data Market—Regulation & Policy

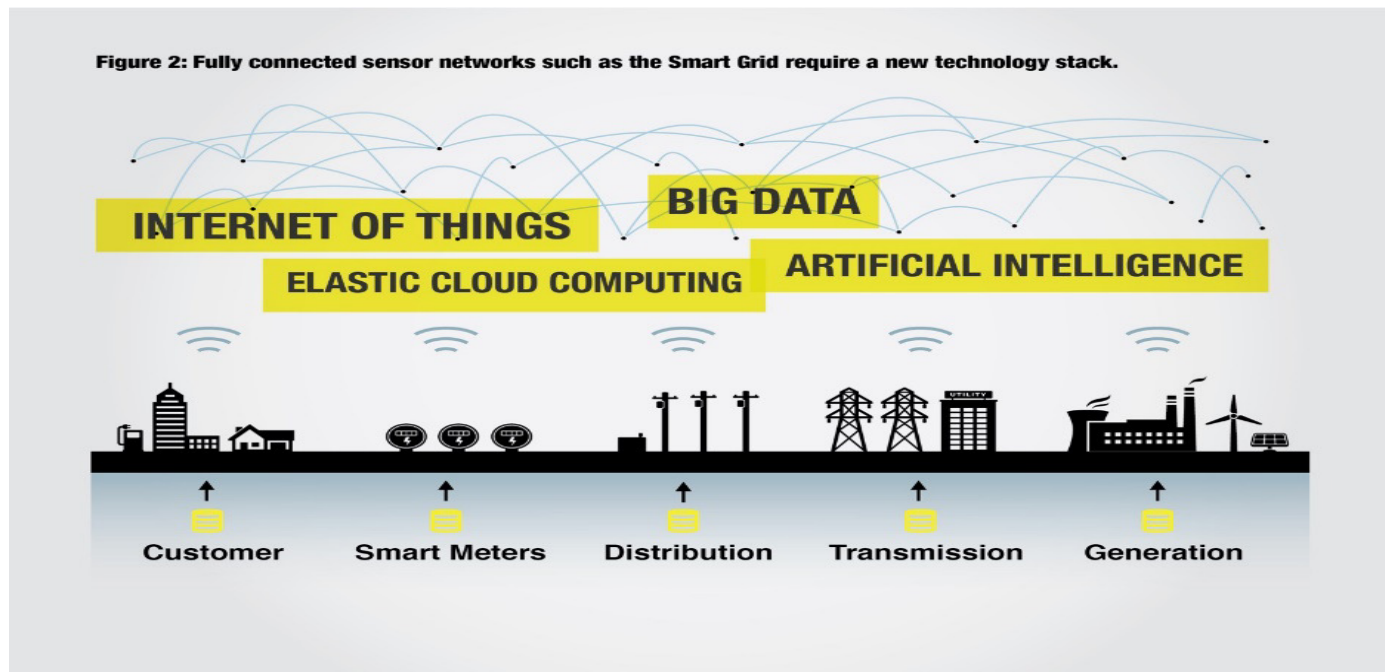


The Power Grid Example

- The electric power grid designed by Edison and Westinghouse 100 years ago was billed by NAE the most significant invention of the 20th Century. The 21st century development of the smart grid is the \$ 2 Trillion IoT sensoring of the electric utility value chain.

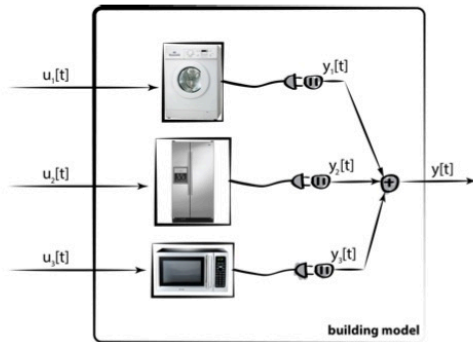
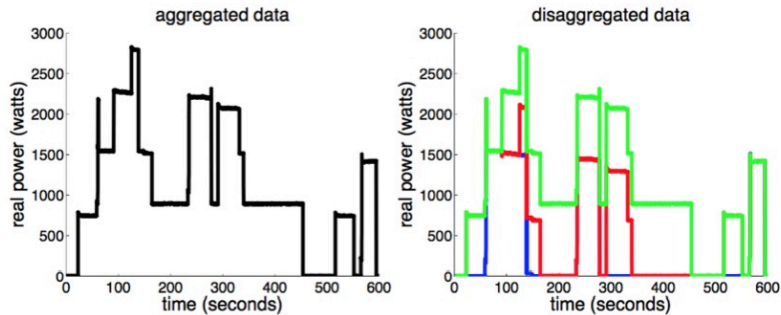
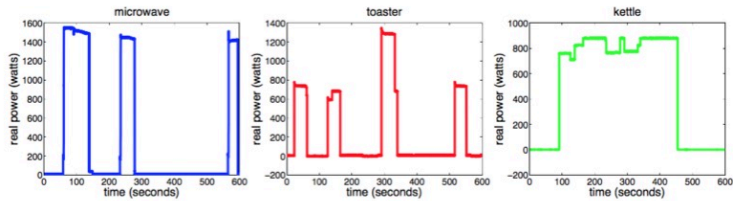
Century of Innovation: Twenty Engineering Achievements That Transformed Our Lives, NAE 2003.

“Estimating the Costs and Benefits of the Smart Grid,” Electric Power Research Institute (EPRI), March 2011.

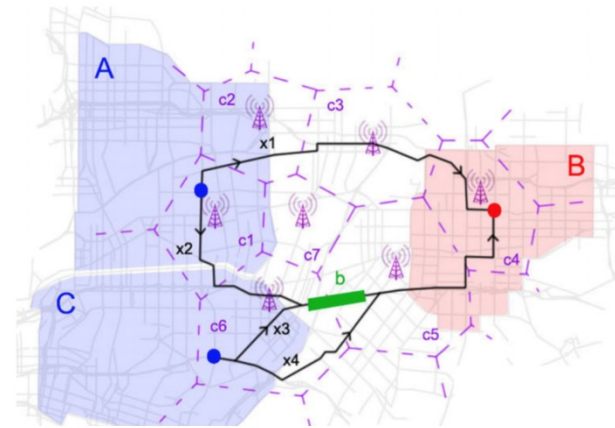


Usage Modeling—Disaggregation

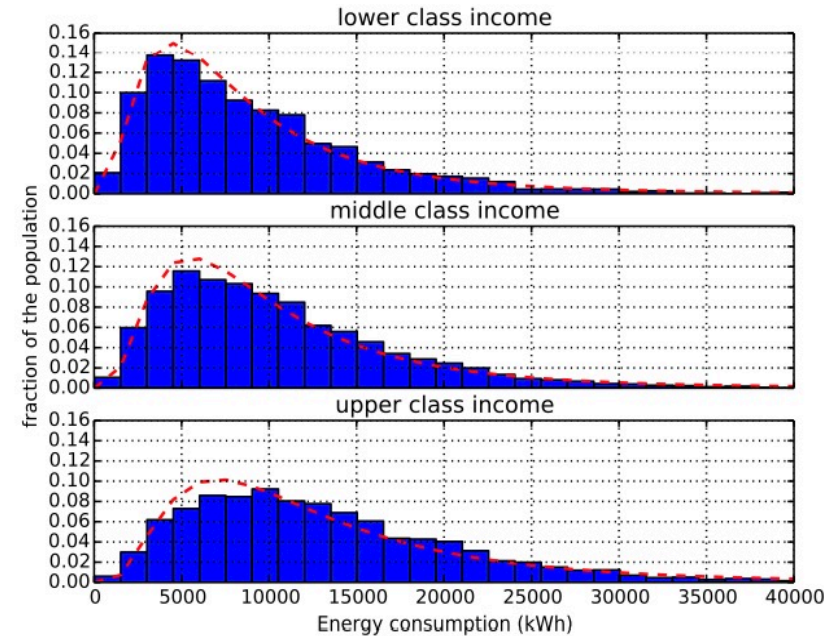
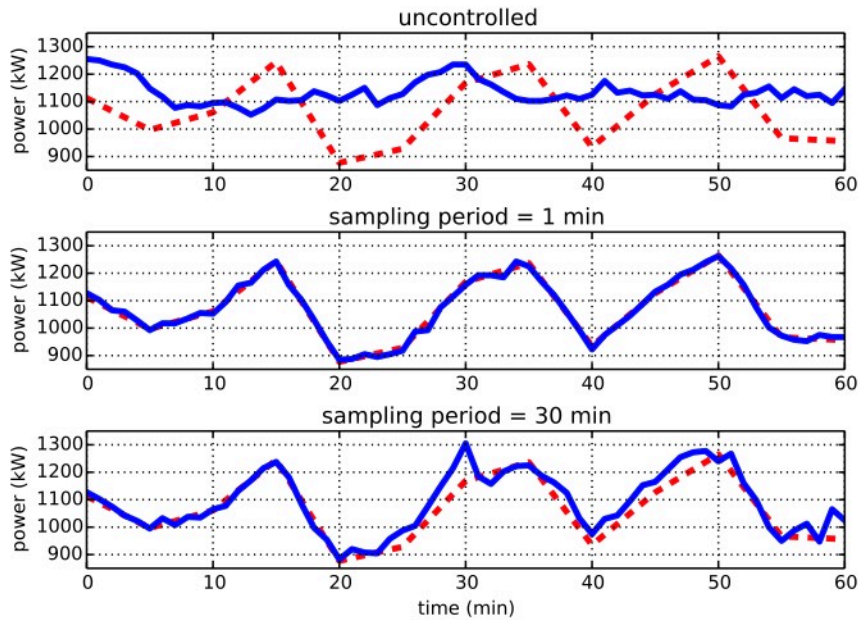
Energy Disaggregation



Route Disaggregation



Utility vs Privacy

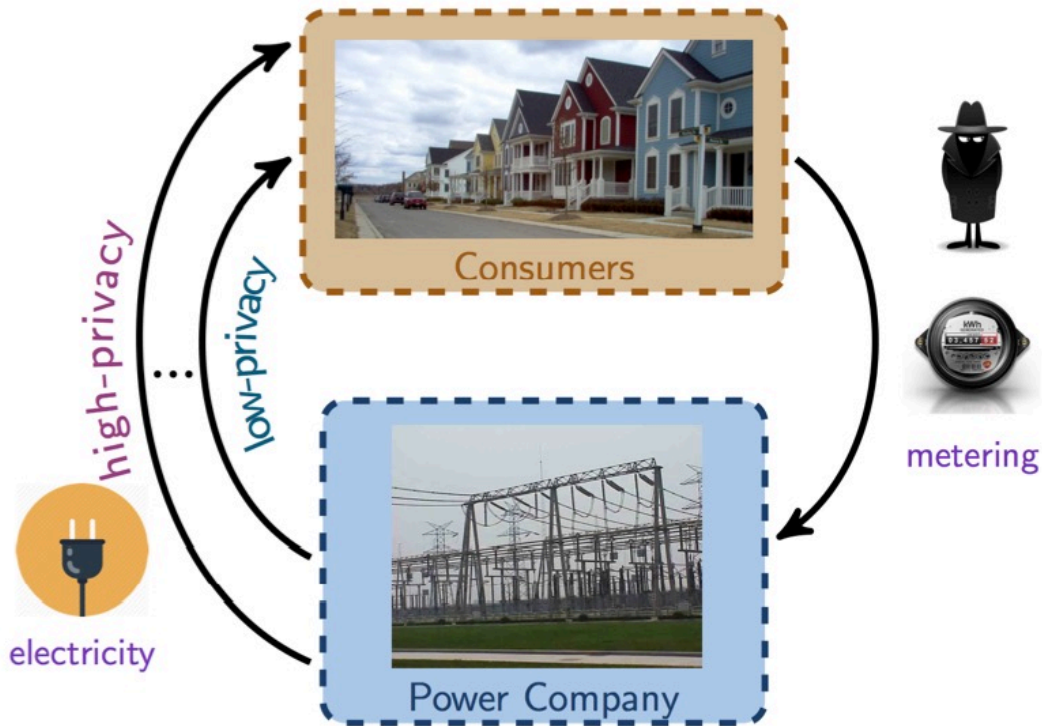


Collecting data can lead to more efficient control, but also exposes users to privacy risk!

e.g. we can infer income class from energy consumption data only and privacy degrades as the fidelity of data collected increases.

Privacy Contracts

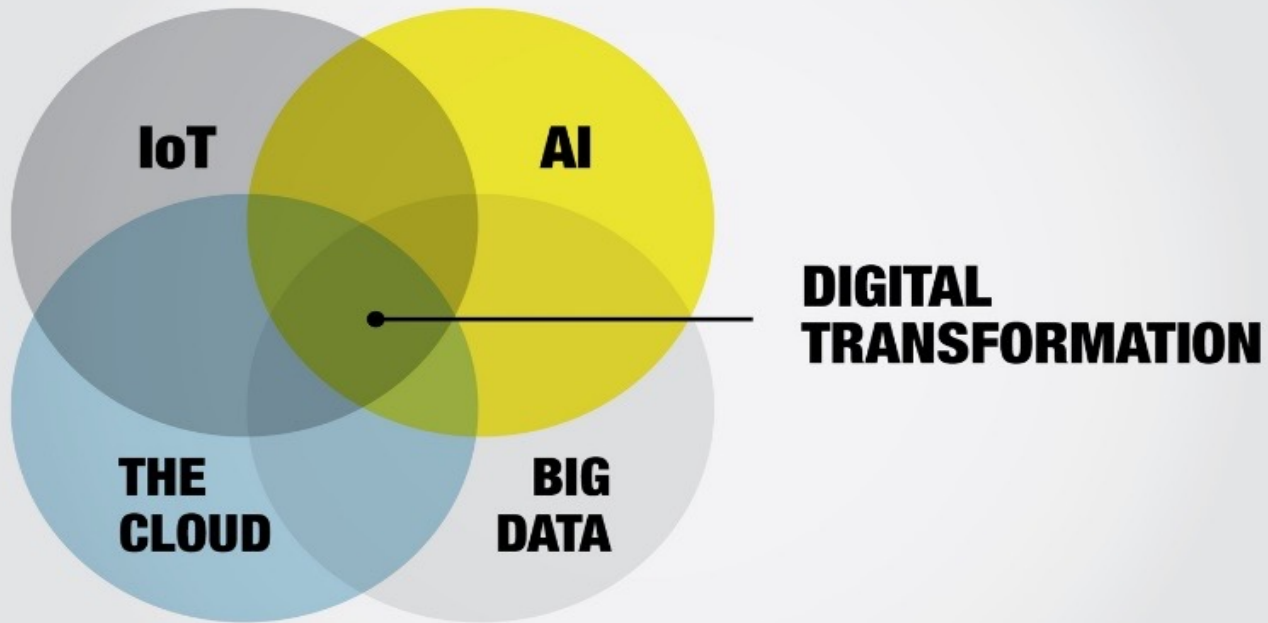
Design service contracts differentiated according to the fidelity of the data collected



- We find that those that value privacy very highly free ride on society.
- Privacy risk leads to tradeoff between investment in security and insurance.
- User valuations of data need to be factored into the design of service models in order to increase social welfare!

Digital Transformation of Societal Systems

Figure 1: Convergence of disruptive technologies are driving Digital Transformation.



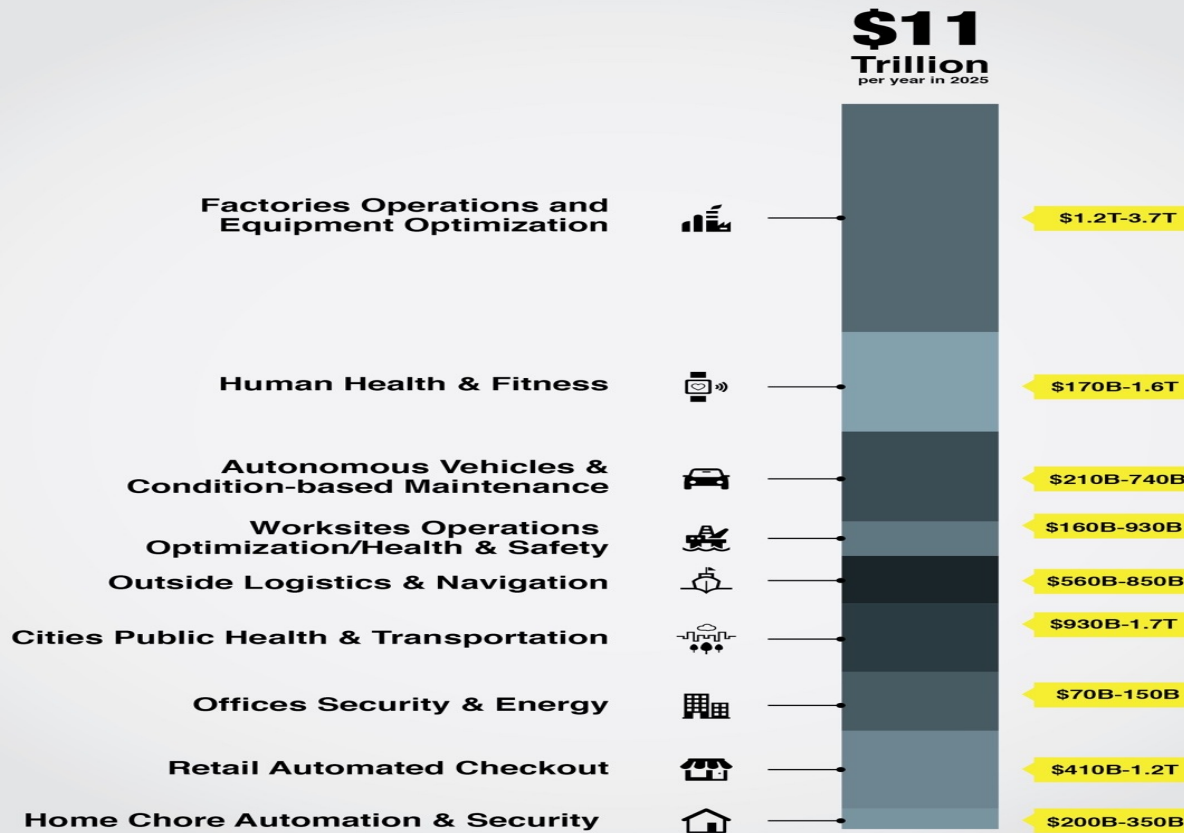
This is Much More than Big Data!!

- With “Big Data” we perform calculations on all the data. This brings “back again” a renaissance to the promise of AI to evolve a new kind of CPS machine learning to perform precise predictive analytics.
- At the convergence of IoT, Cloud Computing, Data Analytics, and AI is Digital Transformation.
- The value that industries and governments will create from IoT Digital Transformation will range from \$3- \$11 trillion per year in 2025.

“The Internet of Things: Mapping the Value Beyond the Hype,” McKinsey Global Institute, June 2015.

Economic Impact: Off the Charts!

Figure 6: The potential economic impact of IoT is a staggering \$11 trillion per year in 2025.



SOURCE: McKinsey Global Institute: "The Internet of Things: Mapping the Value Beyond the Hype," June 2015

**C3.ai Digital
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C3.ai DTI's mission is to attract the world's leading scientists to join in a coordinated and innovative effort to advance the digital transformation of business, government, and society.



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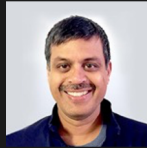


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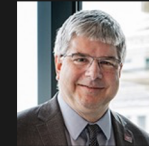
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C3.ai DTI Programs Overview

- 01 Research Awards
- 02 Visiting Professors & Scientists
- 03 Curriculum Development
- 04 Data Analytics Platform
- 05 Educational Program
- 06 Industry Program
- 07 Open Source

01

C3.ai DTI Research Awards

Bi-annual call for research proposals

Purpose to advance the science of digital transformation

Reviewed and awarded by university leads

26 research awards granted each year ranging from \$100,000 - \$250,000

Awards will be for 12 months in duration

Multidisciplinary and multi-institution projects will be favored

Recipients encouraged to conduct breakthrough research and to pursue and establish larger research projects with federal and other funding sources

First Call for Proposals: Mitigation of COVID-19 and Future Pandemics









Advance AI techniques to mitigate pandemic.

Topics for Research Awards may include but are not limited to the following topics:



1. Applying machine learning/AI methods to mitigate the spread of the COVID-19 pandemic
2. Genome-specific COVID-19 medical protocols, including precision medicine of host responses
3. Biomedical informatics methods for drug design and repurposing
4. Design and sharing of clinical trials for collecting and analyzing data on medications, therapies, and interventions
5. Modeling, simulation, prediction of COVID-19 propagation and efficacy of interventions
6. Logistics and optimization analysis for design of public health strategies and interventions
7. Rigorous approaches to designing sampling and testing strategies
8. Data analytics for COVID-19 research harnessing private and sensitive data, including the role of edge computing/IoT for gathering data
9. Improving societal resilience in response to the spread of COVID-19 Pandemic
10. Broader efforts in biomedicine, infectious disease modeling, response logistics and optimization, public health efforts, tools, and methodologies around the containment of rising infectious diseases, and response to pandemics so as to be better prepared for future infectious diseases

26 Proposals Selected for Funding - \$5.4M







Mathematical Modeling, Control, and Logistics

-  Pandemic Resilient Urban Mobility: Learning Spatiotemporal Models for Testing, Contact Tracing, and Reopening Decisions
-  Toward analytics-based clinical and policy decision support to respond to the COVID-19 pandemic
-  Dynamic Resource Management in Response to Pandemics
-  Reinforcement Learning to Safeguard Schools and Universities Against the COVID-19 Outbreak
-  Algorithms and Software Tools for Testing and Control of COVID-19
-  Targeted interventions in networked and multi-risk SIR models: How to unlock the economy during a pandemic
-  Spatial Modeling of Covid-19: Optimizing PDE and Metapopulation Models for Prediction and Spread Mitigation
-  Modeling and Control of COVID-19 Propagation for Assessing and Optimizing Intervention Policies



Computational Biology

-  Mining diagnostics sequences for SARS-CoV-2 using variation-aware, graph-based machine learning approaches applied to SARS-CoV-1, SARS-CoV-2, and MERS datasets
-  AI Enabled Deep Mutational Scanning of Interaction between SARS-CoV-2 Spike Protein S and Human ACE2 Receptor


AI for epidemiology, social good and clinical use

-  Using data science to understand the heterogeneity of SARS-COV-2 transmission and COVID-19 clinical presentation in Mexico
-  Improving Fairness & Equity in COVID-19 Policy Applications of Machine Learning
-  Modeling the impact of social determinants of health on COVID-19 transmission and mortality to understand health inequities
-  Bringing Social Distancing to Light: Crowd Management Using AI and Interactive Floor Projection
-  Detection and Containment of Emerging Diseases Using AI Techniques
-  COVID-19 Medical Best Practice Guidance System





Imaging/Computer Vision

-  Adding Audio-Visual Cues to Signs and Symptoms for Triage of Suspected or Diagnosed COVID-19 Patients
-  Machine learning support for emergency triage of pulmonary collapse in COVID-19


Intelligent Databases and Search

-  COVIDScholar: An NLP hub for COVID-19 research literature


Vaccine and Drug Discovery

-  Effective cocktail treatments for SARS-CoV-2 based on modeling lung single cell response data
-  Machine Learning Based Vaccine Design and HLA Based Risk Prediction for Viral Infections
-  Scoring Drugs: Small Molecule Drug Discovery for COVID-19 using Physics-Inspired Machine Learning
-  Data-driven, high-dimensional design for trustworthy drug discovery


Distributed Computing

-  Secure Federated Learning for Clinical Informatics with Applications to the COVID-19 Pandemic

AI for Medical Images

-  Medical Imaging Domain-Expertise Machine Learning for Interrogation of COVID

Social Impact of COVID-19

-  Housing Precarity, Eviction, and Inequality in the Wake of COVID-19

Second Call for Proposals

Digital Transformation and AI for Energy and Climate Security

Topics for Research Awards may include but are not limited to the following topics:

1. Sustainability
2. AI for Carbon Sequestration
3. AI for Leaks and Emissions Detection
4. Safe Hydrocarbon Production and Transportation Infrastructure
5. AI for Advanced Energy and Carbon Markets
6. Cybersecurity of Power and Energy Infrastructure
7. Smart Grid Analytics
8. Distributed Energy Resource Management
9. AI for Energy-Efficient Buildings and Factories
10. AI for Improved Natural Catastrophe Risk Assessment
11. Resilient Energy Systems
12. AI for Improved Climate Change Modeling

21 Proposals Selected for Funding

\$4.3 Million in Total Funding

Sustainability



Learning in Routing Games for Sustainable Electromobility



AI-Driven Materials Discovery Framework for Energy-Efficient and Sustainable Electrochemical Separations

AI for Advanced Energy and Carbon Markets



Quantifying Carbon Credit over the U.S. Midwestern Cropland Using AI-Based Data-Model Fusion



The Role of Interconnectivity and Strategic Behavior in Electric Power System Reliability

AI for Carbon Sequestration



Optimization of Agricultural Management for Soil Carbon Sequestration Using Deep Reinforcement Learning and Large-Scale Simulations



Affordable Gigaton-Scale Carbon Sequestration: Navigating Autonomous Seaweed Growth Platforms by Leveraging Complex Ocean Currents and Machine Learning

Smart Grid Analytics



Scalable Data-Driven Voltage Control of Ultra-Large-Scale Power Networks



Offline Reinforcement Learning for Energy-Efficient Power Grids

21 Proposals Selected for Funding (cont.)

\$4.3 Million in Total Funding

Cybersecurity of Power and Energy Infrastructure



Private Cyber-Secure Data-Driven Control of Distributed Energy Resources



Cyberattacks and Anomalies for Power Systems: Defense Mechanism and Grid Fortification via Machine Learning Techniques



A Joint ML+Physics-Driven Approach for Cyber-Attack Resilience in Grid Energy Management

Distributed Energy Resource Management



Machine Learning for Power Electronics-enabled Power Systems: A Unified ML Platform for Power Electronics, Power Systems, and Data Science



Sharing Mobile Energy Storage: Platforms and Learning Algorithms



Data-Driven Control and Coordination of Smart Converters for Sustainable Power System Using Deep Reinforcement Learning

21 Proposals Selected for Funding (cont.)

\$4.3 Million in Total Funding

AI for Improved Climate Change Modeling



Machine Learning to Reduce Uncertainty in the Effects of Fires on Climate



AI-Based Prediction of Urban Climate and Its Impact on Built Environments



Interpretable Machine Learning Models to Improve Forecasting of Extreme-Weather-Causing Tropical Monster Storms

AI for Improved Natural Catastrophe Risk Assessment



AI for Natural Catastrophes: Tropical Cyclone Modeling and Enabling the Resilience Paradigm



Multi-Scale Analysis for Improved Risk Assessment of Wildfires Facilitated by Data and Computation

Resilient Energy Systems



A Learning-Based Influence Model Approach to Cascading Failure Prediction



Reinforcement Learning for a Resilient Electric Power System