STATE OF CALIFORNIA - DEPARTMENT OF GENERAL SERVICES

STANDARD AGREEMENT

STD 213 (Rev. 04/2020)

AGREEMENT NUMBER	PURCHASING AUTHORITY NUMBER (If Applicable)
24NS0735	N/A

1. This Agreement is entered into between the Contracting Agency and the Contractor named below:

CONTRACTING AGENCY NAME

California Public Utilities Commission

CONTRACTOR NAME

University of Southern California (USC)

2. The term of this Agreement is:

START DATE

June 16, 2025 "Or upon approval whichever is later"

THROUGH END DATE

September 30, 2027

3. The maximum amount of this Agreement is:

$2,991,856.00 (Two Million, Nine Hundred Ninety-One Thousand, Eight Hundred Fifty-Six Dollars and No Cents)

4. The parties agree to comply with the terms and conditions of the following exhibits, which are by this reference made a part of the Agreement.

	Exhibits	Title	Pages
	Exhibit A	Scope of Work	11
	Exhibit A-1	Resumes	18
	Exhibit B	Budget Detail and Payment Provisions	3
+ −	Exhibit B-1	Cost Sheet	1
+ −	Exhibit C	General Terms and Conditions (GTC 02/2025)	1
+ −	Exhibit D	Special Terms and Conditions	9

Items shown with an asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto.
These documents can be viewed at https://www.dgs.ca.gov/OLS/Resources

IN WITNESS WHEREOF, THIS AGREEMENT HAS BEEN EXECUTED BY THE PARTIES HERETO.

CONTRACTOR

CONTRACTOR NAME (if other than an individual, state whether a corporation, partnership, etc.)

University of Southern California (USC)

CONTRACTOR BUSINESS ADDRESS	CITY	STATE	ZIP
University Gardens BLDG, Suite 205	Los Angeles	CA	90089

PRINTED NAME OF PERSON SIGNING	TITLE
Mark Todd	Vice Provost for Academic Operations

CONTRACTOR AUTHORIZED SIGNATURE	DATE SIGNED
Mark Todd	06/04/2025

STATE OF CALIFORNIA - DEPARTMENT OF GENERAL SERVICES

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AGREEMENT NUMBER	PURCHASING AUTHORITY NUMBER (If Applicable)
24NS0735	N/A

STATE OF CALIFORNIA

CONTRACTING AGENCY NAME

California Public Utilities Commission

CONTRACTING AGENCY ADDRESS	CITY	STATE	ZIP
505 Van Ness Avenue	San Francisco	CA	94102

PRINTED NAME OF PERSON SIGNING	TITLE
Ryan Dulin	Deputy Executive Director, Internal Operations

CONTRACTING AGENCY AUTHORIZED SIGNATURE	DATE SIGNED
Ryan O. Dulin Digitally signed by Ryan O. Dulin Date: 2025.06.10 11:21:35 -07'00'	6/10/25

CALIFORNIA DEPARTMENT OF GENERAL SERVICES APPROVAL	EXEMPTION (If Applicable)

APPROVED

JUN 12 2025
CH:PD:abs

OFFICE OF LEGAL SERVICES
DEPT. OF GENERAL SERVICES

1. **SCOPE OF WORK AND CONTRACT TERMS**

EXHIBIT A – SCOPE OF WORK

1. **Introduction**

The California Public Utilities Commission (CPUC) regulates services and utilities, protects consumers, safeguards the environment, and ensures Californians have access to safe and reliable utility infrastructure and services. The essential services it regulates include electric, natural gas, telecommunications, water, railroad, railroad transit, and passenger transportation companies.

On April 16, 2020, the California Public Utilities Commission (CPUC) approved the merger of Sprint Communications Company L.P. and T-Mobile, USA, Inc. according to California Public Utilities Code section 854. The approval was conditioned on T-Mobile complying with Decision (D.) 20-04-008's Ordering Paragraphs (OP) 2-41 which outlines the conditions, goals and metrics that T-Mobile (or New T-Mobile) must meet to comply with the CPUC's requirements for the merger.

An outside consultant, known as the Compliance Monitor, will review and evaluate T-Mobile's adherence to these requirements. This Compliance Monitor will research, monitor, and analyze T-Mobile's progress towards the requirements of D.20-04-008 and will report findings to the CPUC. The Compliance Monitor shall also implement and maintain the Enforcement Program according to Resolution T-17722 ensuring adherence to the terms, requirements, and conditions of D.20-04-008.

2. **Location of Services and Work Environment**

   A. The services shall be performed primarily at the Contractor's office location, virtually, and/or at locations identified by CPUC. If the CPUC needs a service performed at a location that is different from the Contractor's office location, then the CPUC will notify the Contractor five (5) days in advance of the differing physical location-based request and schedule time to perform the service(s).

   B. The Contractor shall perform services during normal business hours 8:00 a.m. to 5:00 p.m., Monday through Friday, or during mutually agreed upon working hours, except State of California holidays as per the California Department of Human Resources.

   C. The Contractor shall provide all transportation and parking costs for services performed under this Agreement at no additional cost to CPUC.

   D. The Contractor shall not bill CPUC for vacation and sick time used by any of the Contractor's personnel.

3. Contractor Responsibilities

This Agreement is between the California Public Utilities Commission (Contracting Entity) and the Contractor (Compliance Monitor) to provide compliance monitoring services. The Compliance Monitor shall conduct and perform independent research, analyses, and reporting. Information can include reports and data from necessary, valid, and reputable sources, including T-Mobile's reports and data, to make findings on T-Mobile's compliance with, and progress toward, the conditions within D.20-04-008.

The Compliance Monitor shall perform the tasks and complete the deliverables as described herein. Upon engagement, the Compliance Monitor must become familiar with CPUC Decision 20-04-008 approving the merger, most notably the Ordering Paragraphs, and Resolution T-17722. The Compliance Monitor shall manage their own work and report their findings to the CPUC regarding T-Mobile's progress in complying with conditions in D.20-04-008.

The Compliance Monitor must determine and develop the reports from their research and analyses regarding T-Mobile's activities and effectiveness. The Compliance Monitor shall analyze the extent to which T-Mobile's reporting to the CPUC is accurate and thorough.

The Compliance Monitor must work both with and without CPUC to acquire information from T-Mobile and any other relevant entity (e.g., Federal Communications Commission (FCC) and California Emerging Technology Fund (CETF), etc.). The Compliance Monitor's duties shall include tasks such as preparing documents, developing and sending out requests for information, collecting and organizing information, conducting data analyses, developing and submitting semiannual reports, meeting with CPUC staff bi-weekly, and conducting the review process independently from CPUC reviewers. The Compliance Monitor shall also seek clarification of State rules and regulations as necessary to facilitate the execution of these tasks.

The Compliance Monitor shall review T-Mobile's compliance with the terms, requirements, and conditions outlined in D.20-04-008 and Resolution T-17722.

The Compliance Monitor shall prepare and submit quarterly invoices for CPUC's review and approval.

The Compliance Monitor shall prepare the deliverables for review and acceptance by CPUC as specified in this section as follows:

Deliverable No. 1 – Project Work Plan
The Contractor shall develop a detailed draft work plan in preparation for the project kickoff meeting. The project work plan must include strategies and methodologies to successfully meet and complete all the deliverables for the duration of this contract.   The final project work plan must contain:

i.	A clear and effective methodology on the strategy and approach to address Deliverable nos. 2 to 6.
ii.	A work plan that includes but is not limited to, a Gantt chart with milestones, deliverables, discussion questions related to the project, and other items that may arise.

The draft work plan must be completed and submitted to the CPUC Contract Manager fifteen (15) calendar days from the date of the kickoff meeting. The work plan must be accepted and approved by the CPUC Contract Manager prior to the continuation of work.

Tasks:	
1a	The Contractor must designate a single individual (i.e., one and only one person) as the Consultant Project Manager (if working with a team) as the main point of contact for the Contract. The Consultant Project Manager will oversee the Contractor's team and ensure they execute all deliverables according to the schedule.
1b	Become familiar and comply with the state contracting requirements applicable to the project.
1c	Review and understand all the terms, requirements, and conditions that T-Mobile is required to meet under D.20-04-008 and Resolution T-17722 Exhibit A-2, Appendix B.
1d	Establish a clear and effective approach to track and verify all the terms, requirements, and conditions that T-Mobile is required to meet under D.20-04-008.
1e	Should the Compliance Monitor identify a need for additional data beyond what CPUC and T-Mobile provide for evaluating the requirements of Decision 20-04-008, they should propose a plan to address this need to CPUC in a Project Work Plan. This plan should include a timeline and specify their approach, which could involve collecting additional data or procuring data from external sources. The Compliance Monitor will be responsible for executing their plan.

Deliverable No. 2 – Compliance Analysis and Review	
The Contractor shall maintain adequate and timely communication with the CPUC Contract Manager at all times to discuss issues or concerns regarding activities in performing the compliance review, analysis, and reporting tasks.	

Tasks:	
2a	Develop compliance report templates to use in assessing T-Mobile's compliance with all the terms, requirements, and conditions pursuant to D.20-04-008. • The Compliance Monitor report template must be completed and submitted to the CPUC Contract Manager fifteen (15) calendar days from the date of the kickoff meeting. • The compliance report template recommendations are subject to review and approval by the CPUC Contract Manager. • Upon CPUC approval of the compliance report templates, the Contractor shall provide T-Mobile with the compliance report templates.

	• Provide recommendations, if necessary, to improve existing compliance report templates.
2b	Review and analyze all reports filed and/or used to monitor T-Mobile's activities related to the terms, requirements, and conditions required under D.20-04-008. The Contractor must determine the accuracy and correctness of the filings and activities and communicate their findings and recommendations to CPUC twenty-one (21) calendar days from receiving the filings.
2c	Identify documentation needs for verifying T-Mobile's progress towards fulfilling each obligation. If the existing reporting requirements are sufficient or insufficient, the Contractor must state this opinion in writing as part of its reports to the CPUC Contract Manager.
2d	i. Report all findings by the twenty-one (21) calendar days deadline indicated above so that the CPUC can ascertain whether T-Mobile is meeting the milestones and requirements in the aforementioned decision. ii. Communicate with CPUC to take appropriate action.
2e	Review and validate infrastructure investments and identify other methods appropriate to assist in ensuring the compliance goals are met by T-Mobile.
2f	In coordination with the CPUC Contract Manager, the Contractor should send data requests to T-Mobile; collect the results; review and analyze the information; and provide written recommendations and reports.
2g	The Contractor must seek approval from the CPUC Contract Manager before executing or implementing any recommendations, documents/documentation needs, or changes in a pre-established approach/process if the Contractor deems it necessary.
2h	Submit organized reports electronically to the CPUC Contract Manager at Michaela.pangilinan@cpuc.ca.gov and CalSPEED@cpuc.ca.gov.
Deliverable No. 3 – Enforcement Program	
Tasks:	
3a	Implement and maintain the Enforcement Program pursuant to the adopted Resolution T-17722, Exhibit A-2, Appendix B to ensure compliance with terms, requirements, and conditions pursuant to D.20-04-008. This Resolution establishes the rules and processes to implement if T-Mobile fails to fulfill its obligations. The Enforcement Program uses Resolution M-4846 Commission Enforcement Policy, Exhibit A-3, Appendix C as a guiding principle on enforcement approaches and actions to advance the goals of consistent, firm, meaningful, and timely enforcement. i. In the interest of clarity and transparency, the Contractor shall rely on both resolutions to determine the enforcement related processes. ii. Assist and advise the CPUC with the enforcement of the terms and requirements of D.20-04-008.
3b	If/when the Contractor concludes that T-Mobile is not in compliance with any requirement or condition of the D.20-04-008 Ordering Paragraphs, the Contractor shall recommend a penalty to bring T-Mobile into compliance and forward findings and a recommendation to the CPUC's Contract Manager. The Contractor will timely respond to CPUC's changes and perform requests relevant to recommendations. Recommendations must include: i. A rationale for suggesting the consequences by which to hold T-Mobile accountable and any recommended penalty amount.

	ii.	A detailed account of T-Mobile's failures to comply with the OP's, the necessary actions T-Mobile must take to achieve compliance, and the attempts that were made to encourage T-Mobile to remedy identified deficiencies and include the penalty amount.
	iii.	If the Contractor recommends that the CPUC issue citations for T-Mobile's failure to achieve compliance, a summary must be included of the above (3b i.-ii).

Deliverable No. 4 – Meetings and Communications
Upon execution of the Contract, the Contractor will attend a virtual kickoff meeting and subsequent virtual meetings with the CPUC Contract Manager and other CPUC staff to discuss the Contractor's project. The Contractor will be responsible for taking meeting minutes for any meetings related to this contract, including, but not limited to meetings with T-Mobile, CPUC staff, and any other party. The Contractor must maintain meeting minutes and other relevant documentation in the designated CPUC document repository.
Tasks:

	Meetings
4a	The kickoff meeting between CPUC and the Compliance Monitor must occur within ten (10) business days of engagement. During the kickoff meeting, CPUC will clarify any tasks, answer questions, and discuss the methods with which the Compliance Monitor will evaluate T-Mobile's progress in implementing all of the Decision's conditions. CPUC will discuss penalties for non-compliance and what role the Compliance Monitor will have in the citation program.

4b	CPUC requires the Compliance Monitor to meet with CPUC on a bi-weekly basis. The major objective of these bi-weekly meetings will be twofold:
	    a) Identify where T-Mobile has fulfilled or failed to fulfill any commitments, based on the Compliance Monitor's review and analysis; and
	    b) Identify areas where the Compliance Monitor must delve deeper to learn where T-Mobile must take action to meet the conditions of the D.20-04-008.
	    c) Quarterly Meetings (Presentations): The Compliance Monitor should provide a detailed oral presentation for the CPUC staff covering a quarter of the year on contents described in sections a and b above (i.e., Deliverable number 4, task 4b, sections a) and b) during four of the bi-weekly meetings each year, scheduled as follows:
	
	• Spring Quarterly Meeting (Presentation): This meeting will take place in the 2nd week of April and will cover the months of January, February, and March.
	
	• Summer Quarterly Meeting (Presentation): This meeting will take place in the 2nd week of July and will cover the months of April, May, and June.
	
	• Fall Quarterly Meeting (Presentation): This meeting will take place in the 2nd week of October and will cover the months of July, August, and September.
	
	• Winter Quarterly Meeting (Presentation): This meeting will take place in the 2nd week of January and will cover the months of October, November, and December.

	i. The Compliance Monitor should address all questions from CPUC staff during the meeting. If time does not permit, the Compliance Monitor must provide written responses within three (3) business days after the meeting. ii. The Compliance Monitor should submit the summary of the quarterly presentations to the CPUC contract manager for approval. iii. The summaries of the quarterly presentations should include all major updates of the quarters covered in each presentation.
4c	CPUC requires the Compliance Monitor to maintain frequent communication with T-Mobile and meet with T-Mobile as needed. The Compliance Monitor shall be required to evaluate whether T-Mobile's reporting to the CPUC is accurate. • The Compliance Monitor should communicate professionally with T-Mobile and avoid becoming adversarial with T-Mobile.
4d	Participate in and attend external stakeholder meetings remotely or in-person on behalf of CPUC (e.g., community outreach, tribal discussions, etc.).
4e	The CPUC Contract Manager may request the Contractor to attend, participate in, or facilitate Ad Hoc meetings. The CPUC Contract Manager will instruct the Compliance Monitor to attend and participate in such meetings.
Communications	
4f	The Contractor shall maintain adequate and timely communication with the CPUC Contract Manager at all times to discuss issues or concerns regarding the Contract and/or work activities in performing the compliance monitoring tasks. The Contractor must communicate issues that require action to the CPUC Contract Manager within 48 hours of occurrence.
4g	Coordinate and communicate with CPUC in the Compliance Monitor's efforts to independently acquire and validate information directly from T-Mobile and any other relevant parties.
4h	Develop and retain a detailed Communications and Meetings Log describing when the Contractor participated and gathered with CPUC, T-Mobile, and/or external stakeholders. The Log must include: i. Information on meeting activities that T-Mobile and the settling parties engaged in. ii. At a minimum, but not be limited to the date, time, attendees, duration, summary of discussion, action items pending and completed. iii. The Log must be provided to CPUC on a monthly basis for review and must be accessible to staff upon request from the Contractor. iv. Individual logs for CPUC and external meetings. v. Due five (5) business days after the end of each month.
4i	Identify and develop content for public dissemination on the CPUC's Website about T-Mobile's compliance with terms, requirements, and conditions of D.20-04-008.
4j	Conduct a project close-out meeting and report at project conclusion, including an Executive Summary of all that is contained in the final report.
Deliverable No. 5 – Milestone Reports	
i.	All reports shall be provided in Microsoft format as defined by the CPUC Contract Manager.

ii.	The specific report format will be based on input from the CPUC Contract Manager on development of a draft report to finalize findings. This will ensure all the CPUC's requirements are incorporated.
iii.	Incorporate input from CPUC into the reports.

Tasks:	
5a	**Confidential versions of the six (6) semi-annual reports**
	i. Under this Agreement, the Compliance Monitor shall submit six (6) semi-annual reports.
	ii. The Contractor shall prepare and submit semi-annual reports to CPUC regarding T-Mobile's progress with its compliance with the terms, requirements, and conditions of D.20-04-008 by due dates specified below:
	1. 1st report: Covers September 30, 2023, to March 31, 2024 (Due: 80 days after CPUC Contract Manager approves the contractor's Project Work Plan).
	2. 2nd report: Covers March 31, 2024, to September 30, 2024 (Due: 160 days after CPUC Contract Manager approves the contractor's Project Work Plan).
	3. 3rd report: Covers September 30, 2024, to March 31, 2025 (Due: 240 days after CPUC Contract Manager approves the contractor's Project Work Plan).
	4. 4th report: Covers March 31, 2025, to September 30, 2025 (Due: 320 days after CPUC Contract Manager approves the contractor's Project Work Plan).
	5. 5th report: Covers September 30, 2025, to March 31, 2026 (Due: June 30th, 2026).
	6. 6th report: Covers March 31, 2026, to September 30, 2026 (Due: December 31st, 2026).
	iii. The Compliance Monitor shall organize reports in accordance with the OPs, as specified in Exhibit A-1, Appendix A, and submit them electronically to CPUC. Where due dates exist, and where timelines are established, the Compliance Monitor's reporting shall detail T-Mobile's adherence to these schedules. Where T-Mobile has not fully met its obligations, the Compliance Monitor shall provide a detailed account of T-Mobile's failures to comply and recommend that the Commission issue citations for T-Mobile's failure to achieve compliance. When T-Mobile has met the conditions, the Compliance Monitor's reports should, based on evidence, indicate how T-Mobile meets the requirements.
	iv. Semi-Annual Reports must include:
	• All reports must include California full-time and full-time equivalent employees Headcount
	• Summary of work performed in the past quarter
	• Summary of work planned for the next semi-annual report
	v. The Compliance Monitor shall provide all six (6) semi-annual reports in Microsoft Word as defined by the CPUC Project Manager. The specific report format will be based on input from CPUC Project Manager on development of a draft report to finalize findings. This will ensure all of the CPUC's specific requirements are incorporated.
	vi. The reports should be in a narrative format and quantify the steps T-Mobile has taken to meet the conditions of the D.20-04-008, discuss the quality of these actions, and identify areas where T-Mobile is lagging in its efforts.
	vii. The Contractor shall analyze the extent to which T-Mobile's reporting to the CPUC and other organizations is accurate and thorough. These reports shall be informed by

		thorough research of T-Mobile activities and effectiveness, and should include enforcement-related activities (e.g., violations, penalties issued, etc.) that occurred within that reporting period.
	viii.	The reports shall include summaries of all communications and meetings that occurred during the period that the report covers (see section ii above).
	ix.	The reports shall identify the information for which confidential treatment has been requested.
5b	**Public versions of the six (6) semi-annual reports**	
	i.	The Compliance Monitor shall submit a public version of the compliance report along with each semi-annual report to CPUC for CPUC's consideration. The public versions should exclude all confidential information and should not be labeled as confidential.
	ii.	The Compliance Monitor shall prepare and submit public semi-annual reports to CD staff regarding T-Mobile's compliance with the terms, requirements, and conditions of D.20-04-008 by due dates specified below:
		1. 1st public report: Covers September 30, 2023, to March 31, 2024 (Due: 80 days after CPUC Contract Manager approves the contractor's Project Work Plan).
		2. 2nd public report: Covers March 31, 2024, to September 30, 2024 (Due: 160 days after CPUC Contract Manager approves the contractor's Project Work Plan).
		3. 3rd public report: Covers September 30, 2024, to March 31, 2025 (Due: 240 days after CPUC Contract Manager approves the contractor's Project Work Plan).
		4. 4th public report: Covers March 31, 2025, to September 30, 2025 (Due: 320 days after CPUC Contract Manager approves the contractor's Project Work Plan).
		5. 5th public report: Covers September 30, 2025, to March 31, 2026 (Due: June 30th, 2026).
		6. 6th public report: Covers March 31, 2026, to September 30, 2026 (Due: December 31st, 2026).
	iii.	The Compliance Monitor shall exclude only confidential information from the public versions of the semi-annual reports. Otherwise, the Compliance Monitor must ensure they meet all requirements described for deliverable number 5a (ii-viii) for the six (6) semi-annual reports.
5c	**Confidential version of the final report**	
	i.	Final Report: A comprehensive analysis of T-Mobile's compliance with all of the conditions of the Decision Ordering Paragraphs.
	ii.	The Contractor shall prepare and submit the final report to CPUC regarding T-Mobile's compliance with the terms, requirements, and conditions of D.20-04-008 (Due: June 30th, 2027).
	iii.	The final report must satisfy all tasks described for deliverable number 5a (ii-viii) for the six (6) semi-annual reports.
5d	**Public version of final report**	

	i. The final public report should be a comprehensive analysis of T-Mobile's compliance with all of the conditions of D.20-04-008's Ordering Paragraphs with confidential information being excluded and it should be labeled as "Public". ii. The Contractor shall prepare and submit the public version of the final report to CPUC regarding T-Mobile's compliance with the terms, requirements, and conditions of D.20-04-008 (Due: June 30th, 2027). The only information that must be excluded from the public version of the final report is the confidential information, otherwise, the public version must satisfy all described tasks described for deliverable number 5a (ii-viii) for the six (6) semi-annual reports.
5e	**Ad Hoc Reports**
	The CPUC Contract Manager may request the Contractor to prepare reports in addition to the semi-annual and final reports to address issues with T-Mobile compliance obligations that may have an impact on the CPUC's regulatory oversight, public interest, and/or safety. The Contractor will discuss the need and objectives for these reports in advance with the CPUC Contract Manager and/or designated CD staff and establish an agreed upon deadline for completion and submission. Examples of Ad Hoc reports include but are not limited to: i. Review and analysis related to data requests to T-Mobile as requested by the CPUC The Ad Hoc reports must satisfy all tasks described for deliverable number 5a (ii-viii) for the six (6) semi-annual reports.
5f	**Ad Hoc Requests**
	In addition to the reports discussed above, The CPUC Contract Manager may request the Contractor to submit to the CPUC any data, analysis, or other relevant information regarding T-Mobile's compliance with D.20-04-008 to address issues with T-Mobile compliance obligations that may have an impact on the CPUC's regulatory oversight, public interest, and/or safety. The Contractor will discuss the need and objectives for these requests in advance with the CPUC Contract Manager and establish an agreed upon deadline for completion and submission.
	Deliverable No. 6 - Documentation
	The Compliance Monitor must supply the CPUC with all documentation used in its analyses and development of reports. Such documentation serves as evidence of the findings of the Compliance Monitor and enables the Compliance Monitor and CPUC to substantiate the findings of the reports submitted by the Compliance Monitor to the CPUC. All supporting documents including all references that the Compliance Monitor cites in the reports should be attached to the reports when the Compliance Monitor submits the reports to CPUC. These include any documents for which confidential treatment has been requested. The Compliance Monitor should attach to the reports all information and documents that T-Mobile provides to the Compliance Monitor, including any documents designated as confidential. Regarding webpages, their URLs and screenshots of the materials in the webpages should be attached to the reports. The meeting notes should include the date of the meeting(s) and the name(s)/titles of all parties, companies, agencies, and/or institutions that are present in the meeting. They also should include detailed information on what has been discussed and learned during each meeting.

Each report should include an attachment listing all differences and updates between the current and previously submitted report.

4. Acceptance Criteria for Deliverables

All Deliverables under this Agreement shall be performed to the satisfaction of the CPUC, in the CPUC's sole determination.

All reports submitted by the Compliance Monitor to CPUC must provide sufficient details, evidence, facts, and data to substantiate any claims and conclusions provided in each report, such that a reader of these reports could understand the status of T-Mobile's compliance with each of Decision 20-04-008's (Decision) forty-one ordering paragraphs without the need to search for supporting information elsewhere.

A. Details:

All the Compliance Monitor reports must articulate the progress T-Mobile has made toward meeting its obligations pursuant to each Ordering Paragraph in the Decision. Each progress assessment must be supported by references to and copies of relevant evidence.

The Compliance Monitor should include information regarding the status of T-Mobile's compliance on each and all the OPs during the timeline that each report covers. Statements such as "not yet due" for the ordering paragraphs that their deadlines haven't been reached by the time of a specific report are not acceptable. Also, statements such as "did not have enough data", or any other statements that indicates failure of evaluating T-Mobile's status on any of the OPs are not acceptable. CPUC expects the Compliance Monitor to indicate T-Mobile's progress regarding each OP even if T-Mobile's deadline is not within the timeline covered by a specific report.

The CPUC will oversee the work of the Compliance Monitor. It is the responsibility of the Compliance Monitor to assess the quality, timeliness, and alignment with the metrics and requirements (e.g., percentage of the total and rural population with access to download speeds of at least 50 Mbps, status of wireless service in ten (10) priority fairgrounds, and ten (10) unserved/underserved communities) provided in Decision 20-04-008. It shall be the CPUC's sole determination as to whether any deliverables prepared by the Compliance Monitor are acceptable.

Finally, under Public Utilities Code §§ 581-584, every public utility regulated by the CPUC must furnish any records or documents relating to its business, as the CPUC may direct or require. Regardless of designation by the regulated public utility, the CPUC's Legal Division reviews any potentially confidential information and determines whether it may be released to the public.

The Compliance Monitor must supply the CPUC with all documentation used in its analyses and development of reports.

B. Referencing:

All the supporting documents such as meeting notes, T-Mobile's data and reports, data from any other party, web pages, etc. must be referenced in the reports.

The references must guide the reader of the reports to the exact section and page number(s) of the supporting documents.

Note: If a deliverable is not accepted for approval, the CPUC Project Manager shall provide the rationale for disapproval, in writing, within twenty-one (21) business days of receipt of the deliverable or upon completion of acceptance and approval period. The Compliance Monitor shall revise the report based on the CPUC Project Manager's feedback and resubmit the deliverable to CPUC within twenty-one (21) business days of receipt of feedback from the CPUC Project Manager. The Compliance Monitor should submit the revised deliverable(s) by the due date(s) required by the CPUC Project Manager.

5. CPUC Responsibilities

   A. CPUC shall provide access to business and technical documents at its disposal that it deems relevant for the Compliance Monitor. For example, CPUC can share information collected through CalSPEED field tests.
   B. CPUC staff will oversee the Compliance Monitor performance, completion of requested services, approval of the deliverables, and other reports to CPUC management on the status of the Agreement.
   C. CPUC staff will be available to answer questions.
   D. CPUC staff will review the Compliance Monitor's invoice as specified in Exhibit B, Budget Detail and Payment Provisions, including the Prompt Payment Act.

6. Deliverable and Work Product Ownership

The Contractor shall assign its entire rights, title, interest, including all copyrights and other proprietary rights associated with all deliverables and work products of this Agreement to CPUC.

7. Period of Performance

The period of performance of this Agreement and the administration responsibilities by the Compliance Monitor shall be through 2027 to comply with the terms of T-Mobile's obligations per D.20-04-008.

8. **Contact Representatives Information**
    The Contract Representatives during the term of this Agreement:

State Agency: Public Utilities Commission	Contractor: University of Southern California
Section/Unit: Communications Division	
Name: Michaela Pangilinan	Name: John Heidemann
Phone: 415-703-1890	Phone: 310-448-8708
Email: michaela.pangilinan@cpuc.ca.gov	Email: johnh@isi.edu

    Direct all Administrative inquiries to:

State Agency Public Utilities Commission	Contractor: USC
Section/Unit: Contract Services Section	
Attention: Michelle Thibeaux-Smith	Name: Lisa Inomata-O'Connell
Phone: N/A	Phone: 310-448-8728
Email: michelle.thibeaux-smith@cpuc.ca.gov	Email: inomata@isi.edu

The Contractor shall notify the CPUC Contract Manager (CPUC CM) within 5 working days of a change in the Contractor's Project Manager. The role of the Project Manager is to manage all contractual obligations associated with this Agreement. The Project Manager also acts as the single point of contact and is responsible for resource coordination, issues resolution and issues escalation.

4/2025

ADAM ZACHARY ROSE

Price School of Public Policy
University of Southern California
RGL 230, Los Angeles, CA 90089
Phone: (213) 740-1716   Fax: (213) 821-3926   E-mail: Adam.Rose@usc.edu

EDUCATION

Ph.D.	(Economics)	Cornell University	1974
M.A.	(Economics)	Cornell University	1972
B.A.	(Economics)	University of Utah	1970

RESEARCH AND TEACHING FIELDS

Environmental & Ecological Economics

Energy Economics

Regional Science

Natural Hazards & Terrorism

Transportation

Applied General Equilibrium Analysis

PRIMARY POSITIONS

Research Professor, Price School of Public Policy, University of Southern California (USC) Department of Public Policy and Management Department of Urban Planning and Spatial Analysis	2007-
Senior Research Fellow, Center for Risk and Economic Analysis of Threats and Emergencies (CREATE) (Coordinator for Economics, 2006-14; Director, 2019-21)	2005-
Professor, Department of Geography, The Pennsylvania State University	2002-07
Professor, Department of Energy, Environmental, and Mineral Economics, The Pennsylvania State University (Department Head, 1988-02)	1988-02
Professor, Department of Mineral Resource Economics, West Virginia University (Department Chairman, 1986-88)	1984-88
Associate Professor, Department of Mineral Resource Economics, West Virginia University (Department Chairman, 1981-83)	1981-84
Faculty Associate, Regional Research Institute, West Virginia University	1981-88
Lecturer and Assistant Professor, Department of Economics, University of California, Riverside	1975-81
Senior Council Economist, New York State Council of Economic Advisers	1974-75

SELECTED CONCURRENT POSITIONS

Research Professor, Department of Civil and Environmental Engineering, USC	2024-
Senior Research Fellow, Center for Sustainability Solutions, USC	2022-
Senior Research Fellow, Schaeffer Center for Health Policy and Economics, USC	2020-21
Faculty Affiliate, Center for Accelerating Operational Efficiency, Arizona State University	2020-
Faculty Fellow, Risk Institute, Fisher College of Business, The Ohio State University	2017-23
Faculty Fellow, Schwarzenegger Institute on State and Global Policy, USC	2015-
Faculty Affiliate, Critical Infrastructure Resilience Institute, University of Illinois	2015-
Faculty Affiliate, METRANS Center, USC	2015-
Faculty Affiliate, Global Energy Network, USC	2012-
Faculty Affiliate, Sustainable Cities Program, USC	2008-
Faculty Affiliate, Energy Institute, USC (Founding Acting Director, 2007-08)	2007-
Faculty Affiliate, Global Business Strategies Program, Penn State (Acting Director, 1999-00)	1998-07
Faculty Associate, Natural Hazards Center, Penn State	1998-03
Faculty Associate, Center for Integrated Regional Assessment, Penn State	1996-07
Faculty Associate, Earth System Science Center/Earth-Environment Institute, Penn State	1993-07
Faculty Affiliate, Multidisciplinary Center for Earthquake Engineering Research (MCEER)	1993-06
Faculty Appointee, Environmental Assessment Division, Argonne National Laboratory	1991-92
Co-Director, Pennsylvania Economic Forecasting Model Project, Penn State	1990-95

4/2025

SELECTED ADVISORY POSITIONS

National Academies of Science, Committee on Hazard Mitigation and Resilience Applied Research	2022-23
U.S. Army Corps of Engineers-DHS Port Resilience, Technical Advisory Committee	2019
U.S. Government Accountability Office/National Academy of Sciences, Expert Group on Security for Radiological Materials	2018
USC-Tsinghua University-Hertie School, T-20 Policy Brief to the G-20, Team Leader	2017
National Institute of Building Sciences, Mitigation Saves 2 Study, Oversight Committee	2016-18
U.S. EPA Science Advisory Board, Panel on Economy-Wide Modeling	2015-17
The Economist Intelligence Unit, Expert Working Group on Flood Risk Mitigation	2015-16
U.S. DHS, Interagency Working Group on Economic Consequence Analysis of Terrorism	2014-18
National Institute of Building Sciences, Multi-Hazard Mitigation Council Board of Directors	2011-18
Center for National Policy, Resilience Forum Advisory Board	2010-12
Community and Regional Resilience Institute (CARRI), Community Resilience System Initiative Subject Matter Expert Working Group	2009-10
National Academies of Science, Panel on National Earthquake Resilience	2009-11
Centers for Disease Control, Research Review Panel	2008
DOE/NOAA/NASA, State of the Carbon Cycle Review, Coordinating Team	2005-07
Pennsylvania Consortium for Interdisciplinary Environmental Policy (Penn State Representative, 2005-06; Committee on Climate Change and Energy, Chair, 2001-03)	2001-07
U.S. EPA Science Advisory Board, Panel on the Second-Generation Climate Policy Model	2004-06
NSF Site Review Team, Center for Decision-Making under Uncertainty, Chair	2004
National Academies of Science, Panel on Economic Benefits of Improved Seismic Monitoring	2003-05
NSF/EERI, Panel on Research Opportunities for Earthquake Engineering	2001-03
Multidisciplinary Center for Earthquake Engineering Research, Research Committee	2001
National Academies of Science, Panel on the National Helium Reserve	1998-00
U.S. Office of Technology Assessment, Review Panel on Energy and the U.S. Economy	1990

(see below for professional association and university boards and committees

SELECTED HONORS AND AWARD

USC Graduate Policy and Administration Community Lifetime Achievement in Public Policy Award	2024
Society for Risk Analysis Fellow	2022-
Best Border Paper Award, Annual Institute of Electrical and Electronics Engineers Symposium on Technologies for Homeland Security (with F. Roberts and others)	2022
Society for Risk Analysis Resilience Specialty Group Chair	2022-
International Society for Integrated Disaster Risk Management Distinguished Service Award	2020
PACESetter Award for Innovation (with D. Wei)	2020
Outstanding Article of 2018 Award, Journal of Benefit-Cost Analysis (with S. Farrow)	2019
Robert Backoff Award for the Best PhD Student Paper in the Glenn College of Public Affairs, The Ohio State University (co-author with N. Dormady; co-mentor of A. Roa-Henriquez)	2018
Regional Science Association International Fellow	2017-
International Society for Integrated Disaster Risk Management President	2017-
International Input-Output Association Sir Richard Stone Prize for the Best Article in Economic Systems Research in 2013-14 (with D. Wei)	2017
International Society for Integrated Disaster Risk Management Distinguished Research Award	2015
Center for Risk and Economic Analysis of Terrorism Events, Transition Project of the Year Award (Research Team Leader)	2015
Regional Economic Models, Inc. George Treyz Excellence in Economic Analysis Award (with D. Wei and N. Dormady)	2012
Applied Technology Council Award for Outstanding Achievement (Research Team Leader)	2006
Provost's Scholar, Future Fuels and Energy Initiative, University of Southern California	2006-07
East-West Center Fellowship	2003-04
Earthquake Engineering Research Institute Special Service Recognition Award	2003
Penn State University Provost's Award for Collaborative Instruction and Curricular Innovation	1993&96
American Planning Association Outstanding Planning Program Honor Award (Research Team Leader)	1983

SELECTED PUBLICATIONS

Research Dissemination:

http://scholar.google.com/citations?hl=en&user=MdgrwWwAAAAJ&pagesize=100&view_op=list_works
(direct access to publications below)
citations: 20,289
h-Index: 67
i10-index: 195

Books and Monographs:

Economic Consequence Analysis of Disasters: The E-CAT Software Tool, Singapore: Springer, 2017 (with F. Prager, Z. Chen and S. Chatterjee).

Defining and Measuring Economic Resilience from a Societal, Environmental and Security Perspective, Singapore: Springer, 2017.

The Economics of Climate Change Policy: International, National and Regional Strategies, Cheltenham, UK: Edward Elgar Publishing Company, 2009.

Engineering and Socioeconomic Impacts of Earthquakes: An Analysis of Electricity Lifeline Disruptions in the New Madrid Area, Buffalo, NY: Multidisciplinary Center for Earthquake Engineering Research, 1998 (with M. Shinozuka and others).

Books and Journal Issues Edited:

Advances in Spatial and Economic Modeling of Disaster Impacts, Heidelberg, Germany: Springer, 2019 (co-editor with Y. Okuyama).

Proceedings of the U.S.-Japan Joint Seminar on Civil Infrastructure Systems Research, Buffalo, NY: Multidisciplinary Center for Earthquake Engineering Research, 1998 (co-editor with M. Shinozuka).

Refereed Journal Articles:

"Balancing Security and Inconvenience: Perceptions of Countermeasures in U.S. Commercial Facilities," Risk Sciences, electronic preprint.(with Richard John and others)

"Economywide Consequences of Widespread, Long Duration Electric Power Interruptions: Evidence from the Greater Chicago Area," Nature Communications, 16:3335, 2025. (with I. Sue Wing, P. Larsen and others).

"Benefits and Challenges of California Offshore Wind Energy: An Updated Assessment," Energies, Vol. 18, No. 1, pp. 1-32, 2025. (with N. Gundersen, N. Meshkati, and others).

"Applying Earth Observation Technologies to Economic Consequence Modeling: A Case Study of COVID-19 in Los Angeles County, California," International Journal of Disaster Risk Science, Vol. 15, No 1, pp. 18-31, 2024 (with Fynn Prager, C. Huyck and others).

"Regional Economic Impacts of the Los Angeles 100% Renewable Energy Transition," Climate Policy, Vol. 24 No. 5, pp. 660-75, 2024 (with H. Cutler, M. Shields and others).

"The Long Shadow of a Major Disaster: Modeled Dynamic Impacts of the Hypothetical HayWired Earthquake on California's Economy," International Regional Science Review, Vol. 47, Nos. 5-6, pp. 654-96, 2024 (with I. Sue Wing, D. Wei and A. Wein).

"Macroeconomic Consequences of the COVID-19 Pandemic," Economic Modeling, 2023, Vol. 12, No. 106147, 2023 (with T. Walmsley, R. John and others).

"Methods and Lessons for Business Resilience and Recovery Surveys," International Journal of Disaster Risk Reduction, Vol. 93, No. 103743, 2023 (with M. Watson, J. Handmer and others).

"Socioeconomic Impacts of Resilience to Seaport and Highway Transportation Network Disruption, Transportation Research D, Vol. 106, No. 103236, 2022 (with D. Wei, L. Soibelman and others)

"The Co-Benefits of California Offshore Wind Electricity," Electricity Journal, Vol. 35, No. 7: 107167, 2022 (with D. Wei and A. Einbinder); Reprinted in U.S. Senate, How Climate Change Threatens Supply Chains, Hearing before the Budget Committee, 118th Congress, First Session, USGPO, Washington, DC, 2024.

"Behavioral Economic Consequences of Disasters: A Basis for Inclusion in Benefit-Cost Analysis," Economics of Disasters and Climate Change, Vol. 6, No.2, 2022, pp. 213-23.

"The Cost-Effectiveness of Economic Resilience to Disasters," International Journal of Production Economics, Vol. 244, No. 108371, 2022 (with N. Dormady and others).

"Economic Impacts of Spillover Effects of Terrorism Countermeasures at Public Assembly Sites," Journal of Homeland Security and Emergency Management, Vol. 19, No. 1, pp. 87-125, 2022 (with R. John and others).

"Estimating Economic Losses from Cyber-Attacks on Shipping Ports: An Optimization-Based Approach," Transportation Research C, Vol. 137, No. 103423, 2022 (with G. Weaver, D. Wei and others).

"Impacts on the U.S. Macroeconomy of Mandatory Business Closures in Response to the COVID-19 Pandemic," Applied Economics Letters, Vol. 28, No. 15, 2021, pp. 1293-1300 (with T. Walmsley and D. Wei).

"Economic Consequence Analysis of Electric Power Infrastructure Disruptions: An Analytical General Equilibrium Approach," Energy Economics, Vol. 89, No. 104756, 2020 (with I. Sue Wing).

"Evaluating the Role of Resilience in Recovering from Major Port Disruptions: A Multi-Regional Analysis," Papers in Regional Science, Vol. 99, No. 6, 2020, pp. 1691-1722 (with D. Wei and Z. Chen).

"Comprehensive Resilience Assessment Framework for Transportation Systems in Urban Areas," Advanced Engineering Informatics, Vol. 46, No. 101159, 2020. (with E. Koc, D. Wei, L. Soibelman and others).

"Impacts of the Property Assessed Clean Energy (PACE) Program on the Economy of California," Energy Policy, Vol. 37, No. 111087, 2020, pp. 1-13 (with D. Wei).

"Assessing the Benefits and Costs of Homeland Security Research: A Risk-Informed Methodology with Applications for the U.S. Coast Guard," Risk Analysis, Vol. 40, No. 3, 2020, pp. 450-475 (with D. von Winterfeldt, S. Farrow and others).

"Estimating Economic Impacts of the U.S.-South Korea Free Trade Agreement," Economic Systems Research, Vol. 31, No. 3. 2019, pp. 305-23 (with D. Wei and Z. Chen).

"Mitigation and Resilience Tradeoffs for Electricity Outages," Economics of Disasters and Climate Change, Vol. 3, No. 1, 2019, pp. 61-77 (with J. Eyer).

"Dynamic Economic Resilience and Economic Recovery from Disasters: A Quantitative Assessment," Risk Analysis, Vol. 38, No. 6, 2018, pp. 1306-18 (with W. Xie and others).

"Economic Resilience to Transportation Failure: A Computable General Equilibrium Analysis," Transportation, Vol. 95, 2018, pp. 207-26 (with Z. Chen).

"Welfare Analysis: Bridging the Partial and General Equilibrium Divide for Policy Analysis," Journal of Benefit-Cost Analysis, Vol. 9, No. 1, 2018, pp. 67-83 (with Scott Farrow); recipient of the Outstanding Article of 2018 Award in this journal.

"Economic Consequences of Aviation System Disruptions: A Reduced-Form Computable General Equilibrium Analysis," Transportation Research Part A, Vol. 95, 2017, pp. 207-26 (with Z. Chen and others).

"Economic Consequence Analysis of the ARkStorm Scenario," Natural Hazards Review, Vol. 17, No. 4, 2016 (with I. Sue Wing and A. Wein).

"The Impact of High-Speed Rail Investment on Economic and Environmental Change in China: A Dynamic CGE Analysis," Transportation Research Part A, Vol. 92, pp. 232-45, 2016 (with Z. Chen and K. Haynes)

"Improving Catastrophe Modeling for Business Interruption Insurance Needs," Risk Analysis, Vol. 36, No. 10,

pp. 1896-1915, 2016 (with C. Huyck).

"Evaluating Modeling Approaches for Analyzing Macroeconomic Impacts of Microgrid Projects," Journal of Sustainable Energy Engineering, Vol. 4, No. 2, Article 2, 2016 (with Dan Wei).

"Economic Impacts of a California Tsunami," Natural Hazards Review, Vol. 17, No. 2, 2016 (with I. Sue Wing and others).

"Economy-wide Impacts of Reduced Wait Times at U.S. International Airports," Research in Transportation Business and Management, Vol. 16, No. 3, pp. 112–20, 2015 (with F. Prager and D. Wei).

"Competitiveness and Macroeconomic Impacts of Reduced Wait Times at US Land Freight Border Crossings," Transportation Research Part A, Vol. 78, No. 3, 2015, pp. 84–101 (with M. Avetisyan and others).

"A Framework for Analyzing the Economic Tradeoffs between Urban Commerce and Security, Risk Analysis, Vol. 34, No. 8, pp. 1554-79, 2014 (with M. Avetisyan and S. Chatterjee).

"A Post-Audit of Geothermal Development in California's Imperial Valley," Journal of Sustainable Energy Engineering, Vol. 2, No. 2, pp. 166-91, 2014 (with L. White and F. Aminzadeh).

"The Impact on the U.S. Economy of Changes in Wait Times at Ports of Entry," Transport Policy, Vol. 35, No. 2, pp. 162-75, 2014 (with B. Roberts and others).

"Estimating the Economic Consequences of a Port Shutdown: The Special Role of Resilience," Economic Systems Research, Vol. 25, No. 2, 2013, pp. 212-32 (with D. Wei); Recipient of the Sir Richard Stone Prize of the International Input-Output Association for the Best Article in this journal in 2013-14.

"Regional Economic Impacts of a Verdugo Earthquake Disruption of Los Angeles Water Supplies: A Computable General Equilibrium Analysis," Earthquake Spectra, Vol. 27, No. 3, 2011, pp. 881-906 (with S. Liao and A. Bonneau).

"Modeling a Major Source of Economic Resilience to Disasters: Recapturing Lost Production," Natural Hazards, Vol. 58, No. 2, 2011, pp. 163-82 (with J. Park and J. Cho); Reprinted in S. Fuchs and T. Thaler (eds.) Vulnerability and Resilience to Natural Hazards. New York: Cambridge University Press, 2018.

"The ShakeOut Scenario: A Hypothetical M 7.8 Earthquake on the Southern Andreas Fault" (with K. Porter, L. Jones, D. Mileti, and others); "Economic Impacts of the ShakeOut Scenario" (with D. Wei and A. Wein); "Economic Resilience" (with A. Wein), Earthquake Spectra: Special Issue on the ShakeOut Earthquake Scenario, Vol. 27, No. 2, 2011, pp. 235-61; 539-57; 559-73.

"Business Interruption Impacts of a Terrorist Attack on the Electric Power System of Los Angeles: Customer Resilience to a Total Blackout," Risk Analysis, Vol. 27, No. 3, 2007, pp. 513-31, (with G. Oladosu and S. Liao).

"Benefit-Cost Analysis of FEMA Hazard Mitigation Grants," Natural Hazards Review, Vol. 8, No. 4, 2007, pp. 97-111 (with K. Porter, K. Tierney and others).

Chapters in Books and Selected Proceedings (excludes proceedings papers subsequently published as refereed articles or book chapters)**:**

"Complex Economic Consequence Analysis to Protect the Maritime Infrastructure," Proceedings of the IEEE International Symposium on Technologies for Homeland Security, 2022 (with F. Roberts and others); Recipient of the Best Border Paper Award, Annual **IEEE** Symposium on Technologies for Homeland Security.

"Behavioral Consequences of Disasters," in M. Skidmore (ed.), Handbook on the Economics of Natural Disasters, Cheltenham, UK: Edward Elgar, 2022, pp. 50-71.

"Measurement of Cyber Resilience from an Economic Perspective," in S. Chatterjee, R. Brigantic and A. Waterworth (eds.), Applied Risk Analysis for Guiding Homeland Security Policy and Decision, New York: Wiley, 2021, pp. 253-74 (with N. Miller).

"Resilience to a Cyber-Attack on the Detroit Automobile Industry: A Computable General Equilibrium Approach," in E. Glaser, P. Nijkamp and K. Kourtit (eds.), Urban Empires, Heidelberg: Springer, 2020, pp. 377-94 (with Z. Chen).

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"Economic Effectiveness of Mitigation and Resilience to Cyber Threats," in I. Linkov and A. Kott (eds.), Cyber Resilience of Systems and Networks. Heidelberg: Springer, 2019, pp. 315-51 (with J. Eyer and others).

Selected Research Reports:

Economic Viability, Resilience, and Sustainability of Logistics Systems in Post-Conflict Zones, Final Report to the U.S. Department of Defense Minerva Program, Center for Risk and Economic Analysis of Threats and Emergencies (CREATE), University of Southern California, Los Angeles, CA, 2023 (with K. Donaghy, T. Friesz and others).

Power Outage Economics Tool, Final Report to Commonwealth Edison, Lawrence Berkeley National Laboratory, Berkeley, CA, 2023 (with I. Sue Wing, P. Larsen and others).

"Economic Impacts and Jobs," in LA100 -- The Los Angeles 100% Renewable Energy Study. National Renewable Energy Laboratory, Golden, CO, 2021 (with H. Cutler, D. Wei and others)

Economic Consequences of the HayWired Earthquake Scenario – Digital and Utility Network Linkages and Resilience, in S. Detweiler and A. Wein (eds.), The HayWired Earthquake Scenario – Societal Consequences, U.S. Geological Survey Scientific Investigations Report, 2021 (with I. Sue Wing, D. Wei and A. Wein).

Does Enhanced Security Improve Business Performance? Final Report to the DHS Cyber and Infrastructure Security Agency, CREATE, USC, 2020 (with R. John and others).

Socioeconomic Dimensions of Resilience to Seaport and Highway Transportation Network Disruptions. Final Report to the California Department of Transportation, METRANS Transportation Center, USC, 2020 (with D. Wei and others).

Economic Impacts of the California Institute for Regenerative Medicine (CIRM). Final Report to California Institute for Regenerative Medicine, Schaeffer Center for Health Policy and Economics, USC, 2019 (with D. Wei).

Evaluating Modeling Approaches for Analyzing Macroeconomic Impacts of New York Prize Microgrid Projects, Report to New York State Energy Research and Development Authority, Price School of Public Policy, USC 2017 (with D. Wei).

Development and Application of an Economic Framework to Evaluate Resilience in Recovering from Major Port Disruptions. Final Report to the California Department of Transportation, METRANS Transportation Center, USC, 2016 (with D. Wei and Z Chen).

Selected Expert Testimony:

U.S. Senate Budget Committee Hearing on Climate Change and Supply Chain Issues, Washington, DC, October 2023.

New Mexico Environment Improvement Board, Hearing on Proposed New Greenhouse Gas Cap and Trade Provisions, (Case No. 10-04), Santa Fe, NM, September 2010.

Pennsylvania House of Representatives, Environmental Resources and Energy Committee, Informational Meeting on Climate Change, Springfield, PA, January 2006.

U.S. Department of Energy, Public Scoping Meeting on the York County Energy Partners Cogeneration Project, York, PA, August 1993.

Pennsylvania Public Utility Commission, Hearing on the Cambria Partners Cogeneration Project (Docket No. P910515), Harrisburg, PA, April 1992.

West Virginia Public Service Commission, Hearing on the Harrison Power Station Scrubber (Case No. 91-231-E-CN), Charleston, WV, October 1991.

U.S. Senate Subcommittee on Intergovernmental Relations, Hearing on the Inter-governmental Regulatory Relief Act of 1985 (S.483), Washington, DC, May 1985.

West Virginia Legislature, Special Interim Commission on Economic Development, Hearing on University Research, Morgantown, WV, July 1983

FRANCOIS BAR fbar@usc.edu http://fbar.net Full CV: http://fbar.net/cv	Professor of Communication and Spatial Sciences Associate Dean for Faculty Affairs Annenberg School for Communication & Journalism 3502 Watt Way, ANN 310L University of Southern California Los Angeles, CA 90089

EDUCATION

PhD, University of California, Berkeley, City and Regional Planning, 1990.
M.C.P.   , University of California, Berkeley, City and Regional Planning, 1983.
Master's program in Planning and Public Policy, Harvard University, J.F.K. School of Government (1981-1982)
Diplôme d'Ingénieur Civil, Ecole Nationale des Ponts et Chaussées, Paris, France, 1981.

FULL-TIME FACULTY POSITIONS

2016-present   Professor, Annenberg School for Communication & Journalism, USC.
2019-present   Associate Dean for Faculty Affairs, Annenberg School for Communication & Journalism, USC.
2003-2016   Associate Professor, Annenberg School for Communication & Journalism, USC.
2014-present   Courtesy Appointment in Spatial Sciences, Dornsife College of Letters, Arts and Sciences, USC.
1995-2003   Assistant Professor, Department of Communication, Stanford University.

SELECTED PROFESSIONAL ACTIVITIES

2003-present   Steering Committee, Annenberg Research Network for International Communication (ARNIC), USC
                Annenberg.
2011-present   Member, Research Council, Annenberg Innovation Lab (AIL), USC Annenberg.
2015-present   Faculty Affiliate, The Spatial Analysis Lab, USC Price School
2015-present   Leadership team, Emergent Cities Research Group, USC (http://emergentcities.usc.edu/)

SELECTED PUBLICATIONS

Galperin, H. & Bar, F. (2022-present). Multiple policy reports from the Measuring the Effectiveness of Digital Inclusion
    Approaches (MEDIA) project, analyzing US Digital Inclusion Policy. https://arnicusc.org/research/media/
Bar, F., Galperin, H. & Le, T. (2023). 2023 Statewide Digital Equity Survey – Final Report.
    https://arnicusc.org/wp-content/uploads/2023/12/2023-Statewide-Digital-Equity-Survey-Final-Report.pdf
Zhou, S. (*), Liu, C. (*), Mao S. (*), Brady S. (*) & **Bar. F.** (2023). Automated detection of China's foreign aid projects:
    evaluating information transparency through publicly available sources. PaCSS 2023, *Proceedings of the 2023
    Politics and Computational Social Science APSA Pre-conference*
Stokes, B., Bar, F., Baumann, K., Caldwell, B., & Schrock, A. (2021). Urban furniture in digital placemaking: Adapting a
    storytelling payphone across Los Angeles. Convergence, https://doi.org/10.1177/1354856521999181
DiGuiseppi, G. (*), Corcoran, C. (*), Cunningham, T., Nguyen, H. (*), Noel, M., White, P., & Bar, F. (2021). Mobilizing a
    Community–Academic Partnership to Provide DIY Handwashing Stations to Skid Row Residents During COVID-
    19. Health Promotion Practice, 22(1), 9–12. https://doi.org/10.1177/1524839920953092
Lanz, P. (*), Cunningham, T., Nguyen, H. (*), White, P., & Bar, F. (2021). Skid Row Power Now! A Participatory Co-design
    Project to Power up Digital Devices in Skid Row. Proceedings of the 10th International Conference on Communities
    & Technologies - Wicked Problems in the Age of Tech (C&T '21), June 20–25, 2021, Seattle, WA, USA. ACM,
    New York, NY, USA, 7 pages. Best Case Study Award. https://doi.org/10.1145/3461564.3461595
Galperin, H., Bar, F., & Nguyen, H.(*) (2020). The power divide: Mobile communication in Los Angeles' Skid Row: Mobile
    Media & Communication. https://doi.org/10.1177/2050157920932608
Driscoll, K, Leavitt, A. , Guth, K. , Bar, F., & Mehta, A. . (2018) Beyond Big Bird, Binders, and Bayonets: Public Opinion
    and the Prevalence of Humor among Connected Viewers of the 2012 U.S. Presidential Debates. *Social Media +
    Society*, *4*(1), 2056305118761201. https://doi.org/10.1177/2056305118761201
Shin, J. , Jian, L., Driscoll, K., & Bar, F. (2018) The diffusion of misinformation on social media: Temporal pattern, message,
    and source. *Computers in Human Behavior,* 83, 278–287. https://doi.org/10.1016/j.chb.2018.02.008
Brough, M. , Lapsansky, C. , Gonzalez, C. , Stokes, B. , & Bar, F. (2017). Mobile Voices: Design as a method to explore the
    possibilities and limitations of community participation. *Mobile Media & Communication*.
Busalacchi, N.(*), Jawaid Shaikh, S.(*), Bar, F., & Pendelton-Jullian, A. (2017). World Building Downtown Los Angeles

(DTLA): Academic-Community Collaboration and Methodology for Applied Communication Research. In C. George (Ed.), *Communicating with Power* (Peter Lang). New York, NY, USA. http://dx.doi.org/10.3726/978-1-4331-3945-1

Shin, J., Jian, L., Driscoll, K., & Bar, F. (2016). Political Rumoring on Twitter During the 2012 US Presidential Election: Rumor Diffusion and Correction. *New Media and Society*.

Bar, F., Weber, M. S. , & Pisani, F. (2016). Mobile technology appropriation in a distant mirror: Baroquization, creolization, and cannibalism. *New Media & Society*,

Baumann, K., Stokes, B. , Bar, F., & Caldwell, B. (2016). Designing in "Constellations": Sustaining Participatory Design for Neighborhoods. In *Proceedings of the 14th Participatory Design Conference: Short Papers, Interactive Exhibitions, Workshops - Volume 2* (pp. 5–8). New York, NY, USA: ACM. http://doi.org/10.1145/2948076.2948083

Stokes, B. , Baumann, K. , & Bar, F. (2016). Hybrid Games for Stronger Neighborhoods: Connecting Residents and Urban Objects to Deepen the Sense of Place. In *Proceedings of the 14th Participatory Design Conference: Short Papers, Interactive Exhibitions, Workshops - Volume 2* (pp. 105–106). New York, NY, USA: ACM. http://doi.org/10.1145/2948076.2948103

Sey, A., Bar, F., Coward, C., Koepke, L., Rothschild, C., & Sciadas, G. (2015). There When You Need It: The Multiple Dimensions of Public Access ICT Uses and Impacts. *Information Technologies & International Development*, *11*(1), pp. 71–86.

Stokes, B. , Villanueva, G. , Bar, F., & Ball-Rokeach, S. (2015). Mobile Design as Neighborhood Acupuncture: Activating the Storytelling Networks of South Los Angeles. *Journal of Urban Technology*, *22*(3), 55–77. http://doi.org/10.1080/10630732.2015.1040292

Stokes, B. , Bar, F., Baumann, K. , & Caldwell, B. (2014). Neighborhood Planning of Technology: Physical Meets Digital City from the Bottom-Up with Aging Payphones. *The Journal of Community Informatics*, *10*(3). Retrieved from http://ci-journal.net/index.php/ciej/article/view/1090

Bar, F., Coward, C., Koepke, L., Rothschild, C., Sey, A., & Sciadas, G. (2013). The Impact of Public Access to ICTs: Findings from a Five-year, Eight-country Study. In *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development: Full Papers - Volume 1* (pp. 34–42). New York, NY, USA: ACM. http://doi.org/10.1145/2516604.2516619

Wang, H., Can, D., Kazemzadeh, A., Bar, F., & Narayanan, S. (2012). A System for Real-time Twitter Sentiment Analysis of 2012 U.S. Presidential Election Cycle. In *Proceedings of the ACL 2012 System Demonstrations* (pp. 115–120). Stroudsburg, PA, USA: Association for Computational Linguistics. http://dl.acm.org/citation.cfm?id=2390470.2390490

SELECTED RESEARCH GRANTS

2021-25 Pew Charitable Trusts "Measuring the Effectiveness of Digital Inclusion Approaches (MEDIA). PI.

2023 California Emerging Technology Fund ($98,061 / 1 year) "2023 Statewide Digital Equity Survey". PI.

2022-23 California Emerging Technology Fund (various gifts totaling $23,000) "Understanding California's Digital Divide" and "California Schools Chromebook Distribution Program". PI.

2012-22 USC Neighborhood Outreach. Multiple grants awarded for collaboration with Community Services Unlimited.

2018 The Sol Price Center for Social Innovation. ($23,345/12 months). "Cyber Shelters: Online Resource Seeking and Social Capital Building among the Homeless in Los Angeles." Co-PIs: Hernan Galperin, François Bar, Ellen Helsper (London School of Economics). Awarded 1/1/2018-12/31/2018

2018 USC Neighborhood Outreach ($28,500/1 year) "Garden Gateway Nutrition Education Project". Collaboration with Community Services Unlimited (CSU). Awarded for the 2018-19 fiscal year

2017 James H. Zumberge Faculty Research and Innovation Fund Diversity and Inclusion ($29,845/12 months) "Cyber Shelters: Online Resource Seeking and Social Capital Building among the Homeless in Los Angeles." USC co-PIs: François Bar, Hernan Galperin, Annette Kim. Awarded 1/1/2018-12/31/2018

2013 Bill and Melinda Gates Foundation, Knight Foundation ($3.25 million. 2.5 years) "Media Metrics (MM) Program for Measuring Engagement & Impact" PIs: Johanna Blakley and Dana Chinn, Norman Lear Center. Awarded January 2013-May2015. François Bar served as Investigator, academic year 2014-2015.

SELECTED PUBLIC SERVICE/TESTIMONY

2003-present Member, Board of Expert Advisors, California Emerging Technology Fund (CETF)

2013 Expert witness, American Civil Liberties Union (ACLU) in *Offer-Westort, et al. v. City and County of San Francisco, et al.*, Superior Court of California, County of San Francisco.

John S. Heidemann

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Education

University of California, Los Angeles. Ph.D. in Computer Science, School of Engineering and Applied Sciences, September 1995. Major field: distributed systems, minors: theory, performance modeling and analysis. Ph.D. dissertation: "Stackable Design of File Systems". Advisor: Gerald Popek.

University of California, Los Angeles. M.S. in Computer Science, School of Engineering and Applied Sciences, December 1991. Master's thesis: "Stackable Layers: an Architecture for File System Development". Advisor: Gerald Popek.

University of Nebraska–Lincoln. B.S. in Computer Science, college of engineering, May 1989. 4.0 major GPA, 3.73 overall. Graduated in three years; graduate, UNL Honors Program.

Research Experience

Research Full Professor, University of Southern California/Computer Science Department. April 2011 to present.
Research Associate Professor, USC/CSD. Nov. 2004 to March 2011.
Research Assistant Professor, USC/CSD. Sept. 1997 to Oct. 2004.
    As a research professor at the University of Southern California I regularly teach and update the graduate-level course in computer networking, and I previously taught graduate operating systems. I also advise multiple PhD students and supervise MS and undergraduate student research.

Principal Scientist, USC/Information Sciences Institute. June 2018 to present.
Senior Project Leader, USC/Information Sciences Institute. July 2003 to May 2018.
Project Leader, USC/Information Sciences Institute. July 2000 to June 2003.
Computer Scientist, USC/Information Sciences Institute. Sept. 1995 to June 2000.
    At ISI I lead several research projects about network measurement and security. Specific contributions include Internet outage detection, DDoS defenses, IP anycast, service performance, and DNS privacy. I lead the ANT (Analysis of Network Traffic) research group group (https://ant.isi.edu). This group includes several projects (each has a web page on the ANT site): PIMAWAT, evaluating privacy in WAN and telematics datasets (from NSF; co-PI Christos Papadopoulos, U. Memphis). A Traffic Map for the Internet, evaluating where Internet users are and what services they access (from NSF; PI: Ethan Katz-Bassett, Columbia). CLASSNET, building labeled datasets for the networking community (from NSF; PI: Mirkovic, co-PIs: Hardaker and Michalis Kallitsis, Merit Networks). A common theme across these these projects is understanding legal and ethical issues in network research, collection of analysis of passive and active network data, and applying big-data techniques to that data.
    Recently concluded work network measurements in ANT includes SABRES, examining 5G infrastructure to improve security (from DARPA; PI: Erik Kline); GAWSEED, detecting weak signals in network data (from DARPA, with Wes Hardaker as co-PI); DDIDD, DDoS defense for DNS (from NSF, co-PIs Jelena Mirkovic and Hardaker); DIINER, building research infrastructure for DNS and Internet identities (from NSF, co-PI Hardaker); EIEIO, developing algorithms to understand and improve Internet reliability and outage detection (from NSF); MINCEQ, measuring the Internet for Covid-Work-from-Home (an NSF RAPID); PAADDOS, exploring anycast for anti-DDoS (DHS funded, jointly with NWO and Aiko Pras at University of Twente, Netherlands); LA-CANIC, Internet traffic analysis and data collection to improve network security (DHS

funded, with co-PI Craig Partridge of CSU); DIVOICE, Internet outage detection (from DHS, also with Partridge); IIOVADR, visualizing outages for disaster recovery (from NSF); LACREND, carrying Internet traffic analysis and data collection to improve network security (DHS funded, with co-PI: Papadopoulos); Retro-Future, with new collect and search network data in light of multi-organization privacy and policies (DHS funded, with co-PIs: Papadopoulos and Dan Massey of CSU and Mike Fisk of LANL). Prior projects have includes large-scale network graph analysis, Internet topology discovery, and use of signal processing techniques for network data.

Before my current focus in network measurement, a second focus of my research was sensor networking through I-LENSE, the ISI Laboratory for Embedded Networked Sensor Experimentation (https://www.isi.edu/ilense), is the nexus of my sensor networking research. This group includes several research projects. NSF funds DATUNR and ORTUN (PIs: me and Urbashi Mitra at USC/EE) to develop underwater network testbeds. METRANS supports a project applying sensor networks to vehicle tracking. Finally, I lead several projects as part of USC CiSoft (Center for Interactive Smart Oil-Field Technology) looking at applying sensornets to oilfields to improve production through inexpensive and high precision monitoring.

Prior work at ISI includes work on MACSS, SAMAN, CONSER, SCADDS, VINT, LSAM, and GOST projects. SISS (PIs: me, Mark Hansen, and Junghoo Cho, both of UCLA) explored sensornet federation and Internet data sharing. over the Internet. SNUSE (PIs: me, Wei Ye, Jack Wills, supported by NSF) developed inexpensive underwater acoustic modems and media access protocols. MACSS (PIs: me and Wei Ye, supported by NSF and Intel) explored energy-efficient MAC protocols for sensornets. SAMAN (PIs: me and Ashish Goel, supported by DARPA/NMS) considered network modeling and simulation. In it I developed new approaches to accurate traffic modeling (with Kun-chan Lan), more robust network protocols (with Xuan Chen), analytic simulation techniques (with Ashish Goel and Debojuti Dutta), and extended the ns-2 modeling tool. In CONSER (PIs: me, Papadopoulos, Estrin) we expanded use of ns-2 for network research and educational use, including development of a library of educational simulations and animations (with Padma Haldar and many students). SCADDS (PIs: myself with Estrin and Govindan, supported by DARPA/SensIT) explored communication architectures for wireless networks of many small devices; it initiated work in sensor networking including protocols such as directed diffusion, topology control (GAF and CEC), localization, and media access control (S-MAC). Related NSF projects in sensor networking include "MAC Protocols Specific for Sensor Networks" (joint with Wei Ye, with matching grants from Intel) considers energy-efficient MAC protocol design for sensor networks, and "Real-Time Wireless Health Monitoring of Utility Lifeline Systems" (joint with Masanobu Shinozuka, UC Irvine) examines sensor networks as applied to monitoring utility systems. In VINT (supported by DARPA), where I examined network simulation scalability. With Deborah Estrin and Polly Haung we explored the use of abstraction techniques such as lightweight representations of TCP and centralized routing. On LSAM (DARPA) I examined the problem of data replica placement and examined issues in web server, HTTP and TCP interaction and optimization. On GOST (DARPA) I evaluated the integration stackable filing with Prospero.

Operator, B-Root, USC/Information Sciences Institute. May 2017 to present.
Lead Operator, B-Root, USC/ISI. Aug. 2014 to Apr. 2017.
Technical Lead, B-Root, USC/ISI. Oct. 2012 to Apr. 2017.

In 2012 I started revitalization of B-Root at USC, helping clarify its role as Research Infrastructure at USC, architecting two generations of deployment including anycast, and helping build and transition operations to a new team. I continue to lead the B-Root program in Research Infrastructure and participate in operations.

Amazon Scholar, Amazon. Dec. 2019 to Dec. 2021.

I was a visiting scholar with the Internet Measurement and Control group in Amazon Web Services, examining challenges in traffic routing to improve performance and reliability for IPv4, IPv6, and IP anycast.

Graduate student researcher, Ficus research project, UCLA. June 1989 to September 1995.

My thesis work focused on stackable layered file-systems, an approach to incrementally add functionality to existing filing environments and to easily and compatibly extend filing interfaces. This work included participation in the Unix International Stackable File Systems Workgroup and integration of the stacking into 4.4BSD Unix (in conjunction with CSRG).

My stacking research takes place in the context of the Ficus replicated filing project. As part of the Ficus project I participated in the design of large scale optimistic file replication. My work here included modification of the replication protocol to accommodate very low bandwidth network connections, adapting the system for "home-use" replication.

Summer undergraduate research assistant, Washington University in St. Louis. June to August 1988.

Installed and worked with X-Windows V11R2 on Sun and DEC workstations. Wrote an image display programs, a simulation of DNA digestion, and contributed to an abstract data type library.

Undergraduate student researcher, Remote Sensing Center, University of Nebraska-Lincoln. May 1985 to March 1988.

Designed and implemented 3-D display for satellite image data. Participated in design and implementation of image database format. Designed and implemented a complete vector-based graphics management system including raster to vector conversion and file storage.

Teaching Experience

University of Southern California, *Machine Learning for a Security Internet* (DSci599): Spring 2025. *Internet Measurement* (CSci652): Fall 2023. *Computer Networking* (graduate level, CSci 551/651): Fall 2024, 2022, 2021, 2020, Spring 2019, 2018, Fall 2015, 2014, 2013, 2012, 2011, Spring 2010, 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002. *Advanced Operating Systems* (CSci 555): Spring 2001, 2000, 1999, 1998. Spring 1997 (co-taught with Ted Faber).

PhD Student Advising

From 1999 to 2025, John Heidemann has advised or co-advised 30 students through their PhD degrees. He currently is working with three PhD students.

Publications

As of 2025, John Heidemann has co-authored 30 journal articles, 100 refereed conference publications, 32 refereed workshop publications, 3 Internet RFCs, 61 technical reports (selected) A full list of publications is at https://www.isi.edu/~johnh/PAPERS/

Selected journal articles relevant to Internet and wireless measurement:

Giovane C. M. Moura, Marco Davids, Caspar Schutijser, Christian Hesselman, John Heidemann, and Georgios Smaragdakis. Deep dive into NTP pool's popularity and mapping. *ACM Proceedings of the ACM on Measurement and Analysis of Computing Systems*, 8(1):30, March 2024. https://doi.org/10.1145/3652963.3655051.

A S M Rizvi, Jelena Mirkovic, John Heidemann, Wes Hardaker, and Robert Story. Defending root DNS servers against DDoS using layered defenses (extended). *Ad Hoc Networks Journal*, 151, December 2023. https://doi.org/10.1016/j.adhoc.2023.103259.

Abdul Qadeer and John Heidemann. Plumb: Efficient stream processing of multi-user pipelines. *Software—Practice and Experience*, 51(2):385–408, 2020. 10.1002/spe.2909.

Calvin Ardi and John Heidemann. Precise detection of content reuse in the web. *ACM*

Computer Communication Review, 49(2):9–24, April 2019. https://doi.org/10.1145/3336937.3336940.

Lan Wei and John Heidemann. Does anycast hang up on you (UDP and TCP)? *IEEE Transactions on Network and Service Management*, 15(2):707–717, February 2018.

Kensuke Fukuda, John Heidemann, and Abdul Qadeer. Detecting malicious activity with DNS backscatter over time. *ACM/IEEE Transactions on Networking*, 25(5):3203–3218, August 2017. 10.1109/TNET.2017.2724506.

Lin Quan, John Heidemann, and Yuri Pradkin. Visualizing sparse Internet events: Network outages and route changes. *Computing*, 96(39):to appear, January 2013. 10.1007/s00607-013-0283-7.

John Heidemann and Walter Willinger. Internet visualization. *Computing*, 96(1):1–2, 2013. (Editorial discussing the First ACM Workshop on Internet Visualization), 10.1007/s00607-013-0284-6.

John Heidemann, Milica Stojanovic, and Michele Zorzi. Underwater sensor networks: Applications, advances, and challenges. *Philosophical Transactions of the Royal Society–A*, 370(1958):158–175, January 2012. doi:10.1098/rsta.2011.0214.

Gautam Thatte, Urbashi Mitra, and John Heidemann. Parametric methods for anomaly detection in aggregate traffic. *ACM/IEEE Transactions on Networking*, 19(2):512–525, August 2010. (Appeared in print April 2011), http://dx.doi.org/10.1109/TNET.2010.2070845.

Joon Ahn, Affan Syed, Bhaskar Krishnamachari, and John Heidemann. Design and analysis of a propagation delay tolerant ALOHA protocol for underwater networks. *Ad Hoc Networks Journal*, 9(5):752–766, July 2010. (Published on-line September, 2010, in print July 2011.), doi:10.1016/j.adhoc.2010.09.007.

Xinming He, Christos Papadopoulos, John Heidemann, Urbashi Mitra, and Usman Riaz. Remote detection of bottleneck links using spectral and statistical methods. *Computer Networks*, 53(3):279–298, February 2009. 10.1016/j.comnet.2008.10.001.

John Heidemann, Urbashi Mitra, James Preisig, Milica Stojanovic, and Michele Zorzi. Guest editorial: Underwater wireless communication networks. *IEEE Journal of Selected Areas in Communication*, 26(9):1617–1619, December 2008. 10.1109/JSAC.2008.4686798.

Kun-Chan Lan and John Heidemann. A measurement study of correlation of Internet flow characteristics. *Computer Networks*, 50(1):46–62, January 2006.

Xuan Chen and John Heidemann. Flash crowd mitigation via adaptive admission control based on application-level observation. *ACM Transactions on Internet Technology*, 5(3):532–562, August 2005. http://doi.acm.org/10.1145/1084772.1084776.

Alefiya Hussain, John Heidemann, and Christos Papadopoulos. Distinguishing between single and multi-source attacks using signal processing. *Computer Networks*, 46(4):479–503, November 2004. this paper is an expanded version of "A Framework for Classifying Denial of Service Attacks".

Nirupama Bulusu, John Heidemann, Deborah Estrin, and Tommy Tran. Self-configuring localization systems: Design and experimental evaluation. *ACM Transactions on Embedded Computing Systems*, 3(1):24–60, February 2004. 98th most cited paper in CS for 2003 according to CiteSeer (as of Feb. 2005), http://doi.acm.org/10.1145/972627.

972630.

Wei Ye, John Heidemann, and Deborah Estrin. Medium access control with coordinated, adaptive sleeping for wireless sensor networks. *ACM/IEEE Transactions on Networking*, 12(3):493–506, June 2004. A preprint of this paper was available as ISI-TR-2003-567, http://dx.doi.org/10.1109/TNET.2004.828953.

Xuan Chen and John Heidemann. Preferential treatment for short flows to reduce web latency. *Computer Networks*, 41(6):779–794, April 2003.

Kun-Chan Lan and John Heidemann. Rapid model parameterization from traffic measurement. *ACM Transactions on Modelling and Computer Simulations*, 12(3):201–229, July 2002.

Lars Eggert, John Heidemann, and Joe Touch. Effects of Ensemble-TCP. *ACM Computer Communication Review*, 30(1):15–29, January 2000.

Lars Eggert and John Heidemann. Application-level differentiated services for web servers. *World-Wide Web Journal*, 2(3):133–142, August 1999. 10.1023/A:1019200806549.

John Heidemann, Katia Obraczka, and Joe Touch. Modelling the performance of HTTP over several transport protocols. *ACM/IEEE Transactions on Networking*, 5(5):616–630, October 1997.

John Heidemann. Performance interactions between P-HTTP and TCP implementations. *ACM Computer Communication Review*, 27(2):65–73, April 1997. https://doi.org/10.1145/263876.263886.

Awards

Best Paper Award at the 2023 IEEE International Conference on Communications Systems and Networks (COMSNETS) for "Defending Root DNS Servers Against DDoS Using Layered Defenses" by A S M Rizvi, Jelena Mirkovic, John Heidemann, Wes Hardaker, and Robert Story.

Best Paper Award at the 2022 Passive and Active Measurement Conference (PAM) "Old but Gold: Prospecting TCP to Engineer and Live Monitor DNS Anycast" by Giovane C. M. Moura, John Heidemann, Wes Hardaker, Pithayuth Charnsethikul, Jeroen Bulten, João M. Ceron, and Cristian Hesselman.

Runner-up for Best Student Paper Award at The Web Conference 2021 for "Auditing for Discrimination in Algorithms Delivering Job Ads" by Basileal Imana, Aleksandra Korolova, and John Heidemann.

2020 SIGCOMM Networking Systems award for the ns-family of network simulators, recognizing a tool used over more than 20 years by thousands of researchers. (My contribution was to ns-2 from 1997 to 2004.)

Best Paper Award at the Passive and Active Measurement Conference (PAM) 2017 for "Anycast Latency: How Many Sites Are Enough?", by Ricardo de Olivera Schmidt, John Heidemann, and Jan Harm Kuipers.

2015 ISI Institute Acheivement Award. For pioneering work in mapping and understanding the Internet.

Larisa Owen, PhD, MBA

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A Service-Disabled Veteran-Owned Small Business
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AREAS OF EXPERIENCE

- Performance measurement
- Policy & Legislative Analysis, Decision Making and reporting
- Data extraction, Quality assurance, Data Analysis, Data Visualizations & Reporting
- Needs Assessments, Community mapping, Focus groups, Stakeholder engagement & Surveys
- Project management, project planning & implementation
- Strategic planning, Funding & Sustainability
- Legal Research and Analysis
- Compliance & Ethics
- Facilitating cross-systems collaboration & Collaborative practice

STATE & FEDERAL CONTRACT EXPERIENCE

- California Department of Public Health
- County of Orange
- Judicial Council of California
- California Department of Education
- Department of Justice
- Veterans Administration
- Administration of Children and Families
- Substance Abuse and Mental Health Services Administration
- Office of Juvenile Justice and Delinquency Prevention

EDUCATION

- *PhD, Public Policy and the Law, with Honors*	*2015*
- *Masters Business Administration with High Honors*	*2005*
- *Bachelor of Arts, Criminology with minor in Political Science*	*1993*
- *Associate in Arts, Legal Studies*	*1993*

MILITARY SERVICE

California State Guard   **2010- Present**
Major

- *Unit Assignments:*
  - Officer Candidate School
  - Judge Advocate General
  - Joint Training Command
  - Strategic and Policy Initiatives
  - Legislative Division
  - Inspector General's Office
- *Deployments:* COVID-19 Public Health Emergency (PHE)
- *Awards*
  - California Accommodation Medal, California State Guard
  - California Achievement Medal, California State Guard

CERTIFICATIONS

- Military Emergency Management Specialist (EMS)
- Project Management (PM)
- Protecting Human Research Participants (PHRP)
- Data Analytics Certification

COMMUNITY INVOLVEMENT

2021 – 2023   Appointed by Secretary McDonough, Veterans Administration to the VA Federal Advisory Committee of Veteran Families, Survivors and Caregivers
2020-Present   Family, Client, Leadership Mental Health Service Oversight and Accountability Committee

Wes Hardaker

E-Mail: hardaker@isi.edu **linkedin.com/whardaker**
Phone: (530) 404-0099 **github.com/hardaker**

Drive global technical specifications and policies to improve the Internet communication ecosystem. Excellent at coordination and mediation to achieve consensus with both technical and policy advocates. Extensive knowledge of Internet protocols from development to implementation to large scale deployment.

EDUCATION

Master of Science, Electrical Engineering, University of California at Davis.
    Thesis: Design and implementation of a computer aided design environment for analog systems design
Bachelor of Science, Electrical Engineering, University of California at Davis.

CAREER EXPERIENCE

Senior Computer Scientist, Lead Scientist
    USC/Information Sciences Institute — Networking and Cybersecurity Division   *August 2016 - Present*
    Principle Investigator responsible for developing research ideas, securing funding sources and overseeing teams executing networking and security research.

- **Current Research:** Principal Investigator for the DNS, Identity, and Internet Naming for Experimentation and Research (DIINER) project, the Community Labeling and Sharing of Security and Networking Test datasets (CLASSNET) project, and the Platform for Innovative use of Vehicle Open Telematics (PIVOT) project. Operational manager of the Internet's B-Root DNS critical infrastructure, handling 1/13th of all the world's top level DNS requests.

- **Internet Governance roles:** Serving as a member of the ICANN board of directors, Principal representative for B-Root in the Root Server System Advisory Committee (RSSAC) in the multi-stakeholder Internet Corporation for Assigned Names and Numbers (ICANN) organization, Chair of the ICANN board's Risk Committee, and Principal representative for B-Root in the Governance Working Group, seeking to define and establish a global governance system for the top of the operation of the Internet's naming system.

- **Internet standardization roles**: Member of the Internet Architecture Board (IAB) from 2019-2025; chair of the IETF's DANCE and SATP Working Groups (WGs); chair of the IAB's M-TEN and NEMOPS workshops; member of the security area directorate; author of 17 RFCs including RFC4509, defining the DNS's current cryptographic parent-child linkage, RFC7671 and RFC7672 establishing the foundation for securing server-to-server E-Mail transmissions, and RFC8914 which significantly improves DNS error handling; lead of the IETF Guides program; founder of Net-SNMP, the most widely distributed open source SNMP reference toolkit.

- **Past research:** Principal Investigator of the Global Analysis of Weak Signals for Enterprise Event Detection (GAWSEED) project, and the Defense in Depth for DNS (DDIDD) projects, Enabling Anycast in the Research Root (EARR), Naming and Internet Protocol Experimentation Testbed (NIPET), and other smaller projects.

Lead Research Scientist
    PARSONS, Inc.   *June 2003 - August 2016*
    Technical Director of the Networking Security Research Group (NETSEC) within Parsons Government Services. Responsible for procuring research grants and overseeing the technical strategy of the NETSEC team.
    Led engineering teams to design, implement and deploy multiple network security projects for the NETSEC group that included government and commercial contracts about network management, DNS security, IPsec, and secure routing technologies. Created, developed and deployed Internet Protocol standards with a focus on security and deployability. Led research initiatives to design, standardize, implement a certificate-based secure transport extension for the SNMPv3 protocol. Spearheaded multiple projects to enhance government networking systems with improved network management capabilities. Led a project to design and implement an operational DNSSEC toolkit. Played a key role in NETSEC's effort to define, implement and promote the IETF's new secure routing technologies.

Research Scientist
    Network Associates, Inc.   *November 2000 - June 2003*
    Led a project to conduct extensive research identifying requirements of a national facility to evaluate DDoS defense technologies. Designed and led the development of a scalable system for managing IP security services. Developed security-enhanced software for two SNMPv3-protocol reference toolkits. Authored and contributed to IETF network management and DNS protocol specifications.

SIGNIFICANT CONTRIBUTIONS

- Member of the *The Internet Corporation for Assigned Names and Numbers* board of directors 2022-Present
- Member of the *Root Server System Advisory Committee* 2017-Present
- Member of the *Root Server System Governance Working Group* 2017-Present
- Member of the *Internet Architecture Board* 2019-2025
- Operational manager of the *b.root-servers.net DNS root server* 2015-Present
- Founder and lead developer of the NET-SNMP network management package (http://www.net-snmp.org/)
- Founder and lead developer of the DNSSEC-TOOLS package (http://www.net-snmp.org/)

AWARDS

- APWG E-Crime-2022 Best Student Paper (Mentored)
- PAM-2022 Best Paper
- ACM IMC-2019 Distinguished Paper

VOLUNTEER ROLES

- Leadership team: Davis Community Emergency Response Team
- Associate Emergence Coordinator: Yolo Amateur Radio Emergency Service
- Alternate net control Sacramento Valley Amateur Emergency Noon Amateur Radio Net
- Founder of the Sacramento Valley Community Emergency Response Team Amateur Radio Net
- Communication support for public vents
- Guides lead of the Internet Engineering Task Force
- Programming and photography mentor for the Citrus Circuits First Robotics Team
- Photographer of the Network and Distributed System Security (NDSS) Symposium
- President of the Fred T. Korematsu Elementary School Parent Teacher Organization
- Webmaster of multiple public service communities
- Self defense instructor

SELECTED PUBLICATIONS

Hardaker, Wes, 2022. Content delivery networks (cdns) overview and illicit material considerations. https://publicexchange.usc.edu/wp-content/uploads/2022/10/ USC-Thorn-Report_CDNs-Overview-and-Illicit-Material-Considerations.pdf.

Moura, Giovane C. M., **Heidemann, John**, **Hardaker, Wes**, **Charnsethikul, Pithayuth**, **Bulten, Jeroen**, et al., 2022. Old but gold: Prospecting TCP to engineer and live monitor DNS anycast//Proceedings of the Passive and Active Measurement Workshop. virtual: Springer: to appear. https://www.isi.edu/%7ejohnh/PAPERS/Moura22a.html. DOI: tbd.

Randall, Audrey, **Hardaker, Wes**, **Voelker, Geoffrey M**, **Savage, Stefan**, **Schulman, Aaron**, 2022. The challenges of blockchain-based naming systems for malware defenders//2022 APWG Symposium on Electronic Crime Research (eCrime). IEEE: 1-14. https://www.sysnet.ucsd.edu/~voelker/pubs/bdns-ecrime22.pdf. DOI: 10.1109/eCrime57793.2022.10142131.

Moura, Giovane C. M., **Castro, Sebastian**, **Hardaker, Wes**, **Wullink, Maarten**, **Hesselman, Cristian**, 2020. Clouding up the internet: How centralized is dns traffic becoming?//IMC '20: Proceedings of the ACM Internet Measurement Conference. New York, NY, USA: Association for Computing Machinery: 42–49. https://doi.org/10.1145/3419394.3423625.

Moura, Giovane C. M., **Heidemann, John**, **Schmidt, Ricardo de O.**, **Hardaker, Wes**, 2019. Cache me if you can: Effects of dns time-to-live//IMC '19: Proceedings of the Internet Measurement Conference. New York, NY, USA: ACM: 101-115. http://doi.acm.org/10.1145/3355369.3355568.

Müller, Moritz, **Thomas, Matthew**, **Wessels, Duane**, **Hardaker, Wes**, **Chung, Taejoong**, et al., 2019. Roll, roll, roll your root: A comprehensive analysis of the first ever dnssec root ksk rollover//IMC '19: Proceedings of the Internet Measurement Conference. New York, NY, USA: ACM: 1-14. http://doi.acm.org/10.1145/3355369.3355570.

de Vries, Wouter B., **de O. Schmidt, Ricardo**, **Hardaker, Wes**, **Heidemann, John**, **de Boer, Pieter-Tjerk**, et al., 2017. Verfploeter: Broad and load-aware anycast mapping//Proceedings of the ACM Internet Measurement Conference. London, UK. http://www.isi.edu/%7ejohnh/PAPERS/Vries17b.html. DOI: https://doi.org/10.1145/3131365.3131371.

Hardaker, Wes, **Kindred, Darrell**, **Ostrenga, Ron**, **Sterne, Dan**, **Thomas, Roshan**, 2002. Justification and requirements for a national DDoS defense technology evaluation facility. Network Associates Laboratories Report:02-052.

SELECTED INTERNET STANDARDS

Moura, Giovane, **Hardaker, Wes**, **Heidemann, John**, **Davids, Marco**, 2022. Request for comments: number 9199 Considerations for Large Authoritative DNS Server Operators. RFC Editor. https://www.rfc-editor.org/info/rfc9199. DOI: 10.17487/RFC9199.

Kumari, W., **Hunt, E.**, **Arends, R.**, **Hardaker, W.**, **Lawrence, D.**, 2020. Internet request for comments: number 8914 Extended DNS Errors. Fremont, CA, USA: RFC Editor. https://www.rfc-editor.org/rfc/rfc8914.txt. DOI: 10.17487/RFC8914.

Dukhovni, V., **Hardaker, W.**, 2015a. Internet request for comments: number 7671 The DNS-Based Authentication of Named Entities (DANE) Protocol: Updates and Operational Guidance. Fremont, CA, USA: RFC Editor. https://www.rfc-editor.org/rfc/rfc7671.txt. DOI: 10.17487/RFC7671.

Dukhovni, V., **Hardaker, W.**, 2015b. Internet request for comments: number 7672 SMTP Security via Opportunistic DNS-Based Authentication of Named Entities (DANE) Transport Layer Security (TLS). Fremont, CA, USA: RFC Editor. https://www.rfc-editor.org/rfc/rfc7672.txt. DOI: 10.17487/RFC7672.

Hardaker, W., 2011. Internet request for comments: number 6168 Requirements for Management of Name Servers for the DNS. Fremont, CA, USA: RFC Editor. https://www.rfc-editor.org/rfc/rfc6168.txt. DOI: 10.17487/RFC6168.

Hardaker, W., 2006. Internet request for comments: number 4509 Use of SHA-256 in DNSSEC Delegation Signer (DS) Resource Records (RRs). Fremont, CA, USA: RFC Editor. https://www.rfc-editor.org/rfc/rfc4509.txt. DOI: 10.17487/RFC4509.

SELECTED INTERNET GOVERNANCE

Akkerhuis, Jaap, **Baker, Fred**, **Bellis, Ray**, **Blanchet, Marc**, **Fujiwara, Kazunori**, et al., 2021. Rssac057 - requirements for measurements of the local perspective on the root server system//12. https://www.icann.org/en/system/files/files/rssac-057-09sep21-en.pdf.

RSSAC, 2020. RSSAC023v2: History of the root server system. ICANN. https://www.icann.org/en/system/files/files/rssac-023-17jun20-en.pdf.

RSSAC, 2019. RSSAC047: RSSAC rssac advisory on metrics for the dns root servers and the root server system. ICANN. https://www.icann.org/en/system/files/files/rssac-047-12mar20-en.pdf.

RSSAC, 2018a. RSSAC037: A proposed governance model for the DNS root server system. https://www.icann.org/en/system/files/files/rssac-037-15jun18-en.pdf.

RSSAC, 2018b. RSSAC038: RSSAC advisory on a proposed governance model for the DNS root server system. https://www.icann.org/en/system/files/files/rssac-038-15jun18-en.pdf.

Kumari, Warren, **Hardaker, Wes**, **Hoffman, Paul**, **Kerr, Shane**, **Mundy, Russ**, 2016. RSSAC024 - key technical elements of potential root operators. https://www.icann.org/en/system/files/files/rssac-024-04nov16-en.pdf.

SELECTED TALKS

Hardaker, Wes, 2024. High level government meeting panel on the success of the multi stakeholder model. https://icann.zoom.us/rec/play/Hi1wSYEX8-JRn0dJsFrKQbyd-gU0b9YF4hK73GTXmy6rpZWZ8cxfqjHWVVfbWn4pt4r_egJ8grTrrYMf.0A_D3PRSFeH5911B?canPlayFromShare=true&from=share_recording_detail&startTime=1717917851000&componentName=rec-play&originRequestUrl=https%3A%2F%2Ficann.zoom.us%2Frec%2Fshare%2FHttgG6pZ55TqmeURYO5tkE2Ris3rzySU7nPjWa4bpw8CKmojHqJr9gUMvoFtFpW5.ECF9F4vymKs1WhbU%3FstartTime%3D1717917851000.

Hardaker, Wes, 2022. Dns security. https://www.youtube.com/watch?v=NFFY20VAs9s.

Hardaker, Wes, 2020a. Technical deep dive on dns. https://www.youtube.com/watch?v=DV0q9s94RL8.

Hardaker, Wes, 2020b. Global analysis of weak signals for enterprise event detection. https://youtube.com/watch?v=6TRwJTjkUZ4.

Hardaker, Wes, 2020c. Clouding up the internet. https://www.isi.edu/~hardaker/presentations/2020-09-28-cloud9-for-dnsoarc.pdf.

Hardaker, Wes, 2019. DNSKEY analysis of USC/ISI root traffic 2019-01-09 - 2019-01-16. https://icann.zoom.us/recording/play/OYJ4R7IQCxnF5Rw6Kk_nnJQqrp4037W7eS9eeJegKbC-CoPrxa9Z2YpD-594FNJR?startTime=1552439865000.

Moura, Giovane C. M., **Heidemann, John**, **Schmidt, Ricardo de O.**, **Hardaker, Wes**, 2019. Cache me if you can. https://youtu.be/tLcZc6HwKGc?t=4132.

Hardaker, Wes, 2018a. The ksk roll: From concern to calm(ish). http://audio.icann.org/meetings/bcn63/bcn63-OPEN-2018-10-24-T0636-113-en-DNSSEC-Workshop-1-of--3.m3u.

Hardaker, Wes, 2018b. RFC8145 / KSK-2010 signal analysis. https://youtu.be/VK4MAKgwXEg?t=2h10m54s.

Hardaker, Wes, 2018c. Analyzing and mitigating privacy with the dns root service. https://youtu.be/9YYH8JFH_bY?t=21m00.

Viktor Dukhovni, Wes Hardaker, 2018. DANE/SMTP usage report. http://audio.icann.org/meetings/bcn63/bcn63-OPEN-2018-10-24-T1129-113-en-DNSSEC-Workshop-3-of-3.m3u.

Hardaker, Wes, 2017a. Ndss2017 – changing dns usage profiles for increased privacy protection. https://drive.google.com/file/d/0B5gNT4RRJ0xPYmdEQmFHT2xOMTQ/view.

Hardaker, Wes, 2017b. Dns-oarc – verfploeter: Broad and load-aware anycast mapping. https://www.youtube.com/watch?v=ZCDi-Yj7PS0&t=3524s.

Hardaker, Wes, **Monteith, Eric**, **Mundy, Russ**, **O'Brian, Eric**, **Ostrenga, Ron**, et al., 2001. Designing a test bed for evaluating DDoS defense research. https://www.nanog.org/meetings/nanog23/presentations/hardaker.ppt.

EXHIBIT B — BUDGET DETAIL AND PAYMENT PROVISIONS

1. **Invoicing and Payment**

   A. **Payments**

   As compensation for the services specified in Exhibit A and upon receipt and approval of Contractor invoices by the CPUC, the Contractor shall be entitled to a sum not to exceed the total dollar amount noted on the STD 213 and/or its Amendment. Payments shall be based on the rates and or schedule as set forth and specified in Exhibit B-1, Cost Sheet which is attached hereto and made a part of this Agreement.

   If Contractor discovers it has received an overpayment, Contractor must notify the State and refund the overpayment immediately.

   B. **Budget Transfer Request**

   A Budget Transfer Request (BTR) is an informal written statement requesting the movement of existing contract funds from one deliverable to another. The BTR must specify which deliverable's funding are being adjusted, by how much and include justification for these adjustments. A BTR may be requested by either the Contractor or the CPUC. The BTR must be agreed to in writing by both parties.

   The BTR cannot be used to increase the total dollar amount of the Agreement or add new deliverables to the Scope of Work.

   C. **Invoice Details**

   Each invoice shall include the following details:
   - I. Contract Number
   - II. Contractor Name
   - III. Contractor Billing Address
   - IV. Percentage of Deliverable completed
   - V. Total Invoice Amount
   - VI. Invoice Number
   - VII. Invoice Date
   - VIII. Service Date(s)
   - IX. Contact Information
   - X. SB/DVBE Certification Number

   Should an invoice be disputed, Contractor will correct any/all disputed items on the invoice and resubmit the invoice as indicated above. Failure to provide and resubmit corrected invoice will result in a delay of payment.

   D. **Invoice Submission**

Contractor shall submit the invoice in duplicate (including original invoice) not more
frequently than monthly in arrears to:

APInvoice@cpuc.ca.gov

OR

California Public Utilities Commission
Fiscal Office, Room 3000
505 Van Ness Avenue
San Francisco, CA 94102
ATTN: Account Payable Technician

E. Travel

Travel costs will **not** be reimbursed by CPUC separately. Contractor's rates shall include all

travel expenses required to perform the services in accordance with this Agreement.

F. Reporting Requirement of Small Business and DVBE Subcontractors

The Contractor invoices shall include a subtotal that enumerates the amounts spent on DGS
certified Small Business and DGS certified DVBE subcontractors for the period of the
invoice, and a total-to-date for Small Business and DVBE spending. This requirement is in
addition to reporting requirement of Section 19 of Exhibit C, General Terms and Conditions.
Pursuant to Mil. & Vet. Code Section 999.7, ten thousand dollars ($10,000) will be withheld
from the final payment, or the full final payment if less than ten thousand dollars ($10,000),
until the prime contractor complies with the certification requirements of subdivision (d) of
Mil. & Vet. Code Section 999.5. This requires the Prime contractor to fill out and submit a
STD 817 form certifying the actual amount paid to DVBE subcontractors. Prime contractor
shall be given 30 days' notice to cure the defect. If, after 30 calendar days from the date of
notice, the prime contractor refuses to comply with the certification requirements, CPUC
shall permanently deduct ten thousand dollars ($10,000) from the final payment, or the full
payment if less than ten thousand dollars ($10,000).

G. Retention of Records and Audit Requirement

2. **Budget Contingency Clause**

   A. It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the program, this Agreement shall be of no further force and effect. In this event, the CPUC shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.

   B. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, the CPUC shall have the option to either cancel this Agreement with no liability occurring to the CPUC or offer an agreement amendment to Contractor to reflect the reduced amount.

3. **Prompt Payment Clause**

   Payment will be made in accordance with, and within the time specified in, Government Code Chapter 4.5, commencing with Section 927.

Attachment 14 - Cost Sheet

Deliverable	Task	Staff	Hourly Rate	Total Estimated Hours	Total Price
Deliverable 1 - Project Work Plan	Draft Work Plan	(1)	$ 306.19	93.60	$ 28,660
Deliverable 1 - Project Work Plan	Final Work Plan	(1)	$ 306.19	62.40	$ 19,106
Total Deliverable 1					$ 47,766
Deliverable 2 - Compliance Analysis and	2a. Compliance report templates	(2)	$ 268.10	366.65	$ 98,299
Deliverable 2 - Compliance Analysis and	2b. Review and analyze filed reports	(2)	$ 276.66	1599.10	$ 442,406
Deliverable 2 - Compliance Analysis and	2c. Identify documentation needs for verifying progress.	(2)	$ 276.66	1599.10	$ 442,406
Deliverable 2 - Compliance Analysis and	2d. Report findings to ascertain if milestones are being	(2)	$ 276.36	1325.95	$ 366,436
Deliverable 2 - Compliance Analysis and	2e. Review and validate infrastructure investments	(2)	$ 276.57	646.31	$ 178,750
Deliverable 2 - Compliance Analysis and	2f. Data requests, collect results, analyze, write reports,	(2)	$ 276.79	1259.28	$ 348,563
Total Deliverable 2					$ 1,876,859
Deliverable 3. Enforcement Program	3a, Implement and maintain Enforcement Program	(1)	$ 361.85	327.60	$ 118,543
Deliverable 3. Enforcement Program	3b. Recommend rationale and penalty if no compliance	(1)	$ 361.85	218.40	$ 79,029
Total Deliverable 3					$ 197,573
Deliverable 4. Meetings and	4a. Kickoff meeting	(1)	$ 282.51	14.04	$ 3,967
Deliverable 4. Meetings and	4b. Bi-weekly meetings	(1)	$ 276.04	360.36	$ 99,472
Deliverable 4. Meetings and	4b. Quarterly presentations	(1)	$ 276.04	360.36	$ 99,472
Deliverable 4. Meetings and	4d. External stakeholder meetings	(1)	$ 276.28	46.80	$ 12,930
Deliverable 4. Meetings and	4e. Ad Hoc meetings	(1)	$ 277.84	37.44	$ 10,402
Deliverable 4. Meetings and	4h. Develop/retain communications and meetings log	(1)	$ 277.84	37.44	$ 10,402
Deliverable 4. Meetings and	4i. Identify and develop content for CPUC website	(1)	$ 277.72	60.84	$ 16,896
Deliverable 4. Meetings and	4j. Project close-out meeting and report	(1)	$ 270.04	18.72	$ 5,055
Total Deliverable 4					$ 258,597
Deliverable 5. Milestone Reports	5a. Confidential versions of 6 semi-annual reports	(1)	$ 282.14	440.44	$ 124,265
Deliverable 5. Milestone Reports	5b. Public versions of 6 semi-annual reports	(1)	$ 282.14	280.28	$ 79,078
Deliverable 5. Milestone Reports	5c. Confidential version of final report	(1)	$ 281.61	45.76	$ 12,886
Deliverable 5. Milestone Reports	5d. Public version of final report	(1)	$ 281.61	29.12	$ 8,200
Deliverable 5. Milestone Reports	5e. Ad Hoc Reports	(1)	$ 282.09	44.20	$ 12,468
Deliverable 5. Milestone Reports	5f. Ad Hoc Requests	(1)	$ 282.09	44.20	$ 12,468
Total Deliverable 5					$ 249,366
Deliverable 6. Documentation	Documentation for analyses and reports development.	(1)	$ 323.52	1118.00	$ 361,695
Total Deliverable 6					$ 361,695
GRAND TOTAL		(2)	$ 286.68	10436	$ 2,991,856

*Bidder may add additional rows to cost   See key at right for staff:

(1): Heidemann, Haradaker, Regalado
(2): Heidemann, Hardaker, Regalado, Yuri, Bar, Rose, Inteliquest

*1: Per 2 CFR 200 USC bids, collects and certifies labor by level-of-effort per person rather than by labor categories and labor hours. Estimated labor hours and labor rates are provided for informational purposes as requested in the IFB and are based on a 2080 hour year.

*2: Hourly rate is average cross all staff for that particular line item, weighted by level-of-effort on that item. It therefore varies by sub-deliverable.

*3: Workload varies month-by-month over the two year period.

PAYABLE MILESTONES SCHEDULE		
Organization Name: University of Southern California		
Milestones	**Due**	**Payment**
1st semi-annual report - confidential version (covers 09/30/23-03/31/24)	80 days after approval of Project Work Plan (est. 10/13/2025)	$475,047
2nd semi-annual report - confidential version (covers 03/31/24-09/30/24)	160 days after approval of Project Work Plan (est. 01/02/2026)	$354,177
3rd semi-annual report - confidential version (covers 09/30/24-03/31/25)	240 days after approval of Project Work Plan (est. 03/23/2026)	$320,641
4th semi-annual report - confidential version (covers 03/31/25-09/30/25)	320 days after approval of Project Work Plan (est. 06/10/2026)	$211,682
5th semi-annual report - confidential version (covers 09/30/25-03/31/26)	June 30, 2026	$135,041
6th semi-annual report - confidential version (covers 03/31/26-09/30/26)	December 31, 2026	$738,660
Final Report - confidential version	June 30, 2027	$756,608
Payment*		**$2,991,856**
* Milestone and Payment is for all Deliverables.		

EXHIBIT C – GENERAL TERMS AND CONDITIONS

The General Terms and Conditions, GTC 02/2025 will be included and adhere to in the Agreement by reference to the following link:
https://www.dgs.ca.gov/OLS/Resources/Page-Content/Office-of-Legal-Services-Resources-List-Folder/Standard-Contract-Language

If Contractor does not have Internet access, a hard copy will be provided by contacting the State's Contract Manager listed in the scope of work.

EXHIBIT D – SPECIAL TERMS AND CONDITIONS

1. **Excise Tax**

   The State of California is exempt from federal excise taxes, and no payment will be made for any taxes levied on employees' wages. The State will pay for any applicable State of California or local sales or use taxes on the services rendered or equipment or parts supplied pursuant to this Agreement. California may pay any applicable sales and use tax imposed by another state.

2. **Dispute Resolution**

   A dispute for purposes of this section is a disagreement between Contractor and CPUC in the performance of the Agreement, which is unable to be resolved between Contractor and Program Staff ("Dispute"). In the event of a Dispute, Contractor shall file a "Notice of Dispute" with the California Public Utilities Commission, Executive Director, or designee within ten (10) days of discovery of the problem. Within ten (10) days, the Executive Director or designee shall meet with the Contractor and Contract Manager for purposes of resolving the dispute. The decision of the Executive Director or designee shall be final.

   In the event of a dispute, the language contained within this Agreement shall control over any other.

   State reserves the right to issue an order to stop work in the event that a dispute should arise, The stop work order will be in effect until the dispute has been resolved.

3. **Subcontracts**

   A. No work shall be subcontracted without the prior approval of the State's Contract Manager. Upon termination of any subcontract, the State shall be notified immediately.

   B. If the terminated subcontractor is a DVBE, the contractor must replace that subcontractor with another DVBE subcontractor, and such replacement must be approved by the Commission. Failure to adhere to DVBE Participation will be reported to DGS DVBE program for possible enforcement action, including without limitation be cause for contract termination and recovery of damages under the rights and remedies due the state under the default section of the contract.

   C. Nothing contained in this Agreement or otherwise, shall create any contractual relation between the State and any subcontractors, and no subcontract shall relieve the Contractor of his responsibilities and obligations hereunder. The Contractor agrees to be as fully responsible to the State for the acts and omissions of its subcontractors and of persons either directly or indirectly employed by any of them as it is for the acts and omissions of persons directly employed by the Contractor. The Contractor's obligation to pay its subcontractors is an independent obligation from the State's obligation to make payments to the Contractor. As a result, the State shall have no obligation to pay or to enforce the payment of any moneys to any subcontractor.

D. It is the intention of the parties than no subcontractors shall be deemed an employee of the State. Contractor agrees to take any and all actions necessary to comply with this intention.

E. Failure of a subcontractor to perform for any reason shall not relieve Contractor of the responsibility for competent and timely performance of duties under this contract.

4. **Commission Staff**

Commission staff will be permitted to work side by side with Contractor's staff to the extent and under conditions directed by the Commission's Contract Manager. In this connection, Commission staff will be given access to all data, working papers, etc., which Contractor may seek to utilize.

Contractor will not be permitted to use State personnel for the performance of services which are the responsibility of Contractor.

5. **Commencement of Work**

Performance will start not later than five (5) business days, or on the express date set by the State and the Contractor, after all approvals have been obtained and the agreement is fully executed. Should the Contractor fail to commence work at the agreed upon time, the State upon five (5) days written notice to the Contractor, reserves the right to terminate the agreement.

6. **Ownership of Data**

Data developed for this contract shall become the property of the State. Contractor shall not disclose data without the permission of the Commission's Contract Manager. Each report shall also become the property of the State and shall not be disclosed except in such manner and such time as the Commission's Contract Manager may direct, with the exception of data which have become part of the public records of the State, as discussed in Paragraph 7.

7. **Confidentiality of Data/Nondisclosure Agreement**

The Contractor, by signing this agreement recognizes they may be required to have access to data, information and documents within the knowledge and possession of various entities under the regulatory jurisdiction of the Commission. The Contractor recognizes that some of this data, information and documents may be proprietary, confidential, or privileged in nature.

The Contractor further recognizes that Commission staff has broad statutory authority to compel the production of such information subject to the provisions of Public Utilities Code 583 and General Order 66-D. The Contractor understands that these legal provisions generally preclude public disclosure of information obtained in confidence except during the course of a public hearing or with permission of the Commission.

The Contractor acknowledges that it has received a copy and read Public Utilities Code Section 583 and General Order 66-D and agrees to be subject to and to fully comply with these legal

provisions in discharging its responsibilities. Such compliance includes abiding by the terms of prohibiting public disclosure of confidential information and submitting to the jurisdiction of the Commission for the purposes of enforcing Public Utilities Code Section 583.

The Contractor further recognizes that the data, information and documents obtained during the course of its work for the Commission may be subject to other requirements for nondisclosure which include, but are not limited to, attorney work product privilege, the official information privilege, the attorney-client privilege, and other prohibitions precluding disclosure of confidential information and Contractor may not disclose such data, information and documents without the prior written consent of the Commission or its Staff..

The Contractor agrees not to disclose any information regarding its work to third parties except with the Commission staff's express prior written consent, and to return all data, information and documents obtained during the course of the Agreement immediately upon request or termination. The Contractor agrees to immediately notify the Commission staff of any inquiries from third parties which request disclosure of any data, information, or documents.

The Contractor will not comment publicly to the press or any other media regarding its work, or the Commission's action on the same, except to the Commission staff, Signatory's own personnel and/or subcontractors involved in the completion of tasks under this agreement, or at a public hearing, or in response to questions from a legislative committee.

In addition, the Signatory agrees that prior to commencement of any work associated with this Agreement, the signatory shall: (1) provide a copy of this section of the Agreement, Public Utilities Code Section 583 and General Order 66-D to all who will be performing tasks under this Agreement; and (2) inform all those working under this Agreement that they are bound by these legal provisions and must comply with Confidentiality of Data Agreement/Nondisclosure Section.

The requirements of this Section are in addition to, not in substitution, of any separate Non-Disclosure Agreement or similar agreement which may be required by Commission staff prior to accessing CPUC data, information, or documents

Ninety days after any document submitted has become a part of the public records of the State, Contractor may at its own expense, publish or utilize the same but shall include the following legend:

LEGAL NOTICE
This report was prepared as an account of work sponsored by the California Public Utilities Commission. It does not necessarily represent the views of the Commission or any of its employees except to the extent, if any, that it has formally been approved by the Commission at a public meeting. For information regarding any such action, communicate directly with the Commission at 505 Van Ness Avenue, San Francisco, California 94102. Neither the Commission nor the State of California, nor any officer, employee, or any of its contractors or subcontractors makes any warranty, express or implied, or assumes any legal liability whatsoever for the contents of this document.

8. **Termination for Convenience**

   State may at its option terminate this contract, with or without cause, at any time upon giving thirty (30) days' notice in writing to Contractor. In such event, Contractor agrees to adhere to the instructions provided in such termination notice, including immediately stopping work, and to use all reasonable efforts to mitigate its expenses and obligations hereunder. In such event, State shall pay Contractor for all services satisfactorily rendered prior to such notice of termination and for all reasonable expenses incurred by Contractor prior to said termination which are not included in charges for service rendered prior to termination and which could not by reasonable efforts of Contractor have been avoided.

9. **Termination in Event of Breach**

   In the event of any breach of this contract after notice and failure to cure a default, the State may without any prejudices to any of its other legal remedies terminate this contract upon five days' written notice to the Contractor.

10. **Waiver**

    No waiver of any breach of this contract shall be held to be a waiver of any other or subsequent breach. All remedies afforded in this contract shall be taken and construed as cumulative: that is, in addition to every other remedy provided herein or by law. The failure of State to enforce at any time any of the provisions of this agreement, or to require at any time performance by Contractor of any of the provisions thereof, shall in no way be construed to be a waiver of such provision nor in any way to affect the validity of this agreement or any part thereof or the right of State to thereafter enforce each and every such provision.

11. **Gratuities**

    A. The State may, by written notice to the Contractor, terminate the right of Contractor to proceed under this contract if it is found, after notice and hearing by the State or by Executive Director of the Public Utilities Commission or duly authorized representative, that gratuities were offered or given by the Contractor, or any agent or representative of the Contractor, to any officer or employee of the State with a view toward securing a contract, securing favorable treatment with respect to award amendment, or the evaluation of performance of such contract, provided that the facts upon which either the Commission or the Executive Director makes such findings may be reviewed in any competent court.

    B. In the event this contract is terminated, State shall be entitled (i) to pursue the same remedies against Contractor as it could pursue in the event of the breach of the contract by the Contractor, and (ii) to a penalty in addition to any other damages to which it may be entitled by law, and to exemplary damages in an amount which shall be not less than three nor more than ten times the cost incurred by the Contractor in providing any such gratuities to any such officer or employee.

       The rights and remedies of State provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

12. **Conflict of Interest**

Contractor agrees to refrain from entering into any relationship which could result in a conflict of interest in the performance of this Agreement; and to notify the Commission's Contract Manager promptly of any potential conflict of interest, including subcontractors. The Commission may exercise its option to terminate this Agreement if a conflict is found.

13. **Complete Agreement**

Other than as specified herein, no document or communication passing between the parties hereto shall be deemed a part of this Agreement.

14. **Captions**

The clause headings appearing in this agreement have been inserted for the purpose of convenience and ready reference. They do not purport to and shall not be deemed to define, limit, or extend the scope or intent to the clauses to which they appertain.

15. **Force Majeure**

Neither party shall be liable to the other for any delay in or failure of performance, nor shall any such delay in or failure of performance constitutes default, if such delay or failure is caused by "Force Majeure." As used in this section, "Force Majeure" is defined as follows: Acts of war and acts of god such as earthquakes, floods, and other natural disasters such that performance is impossible.

16. **Tax Delinquencies**

Public Contract Code Section 10295.4 provides that a State agency shall not enter into any contract for goods or services with a contractor whose name appears on either list of the 500 largest tax delinquencies pursuant to Section 7063 or 19195 of the Revenue and Taxation Code. Franchise Tax Board (FTB) and California Department of Tax and Fee Administration (CDTFA) will post and periodically update lists of the 500 largest tax delinquencies on their websites as required by law. If the Commission determines that the Contractor or any of its subcontractors are on either the FTB or CDTFA list at any time before or during the contract term, this will be grounds for termination of the contract.

17. **Registration with Secretary of State**

All business entities doing business within the State must be admitted and registered with the State of California Secretary of State and maintain applicable State of California licenses as required by law. All businesses who do not possess active State of California licenses required to perform the contract services in the scope of work, or who are not admitted or registered with the Secretary of State as required by law during the Agreement term may have their Agreement terminated at the discretion of the Commission.

18. **Amendments**

A. No amendment or variation of the terms of this Agreement shall be valid unless made in writing, signed by the parties, and approved as required. No oral understanding or agreement not incorporated in this Agreement is binding on any of the parties.

B. CPUC reserves the right to amend this Agreement through a formal written amendment, signed by both the parties for additional time to complete the SOW.

19. **Insurance Requirements**

Upon notice of intent to award, the Contractor shall have 10 business days to furnish to the State certificate(s) of insurance and endorsement(s) evidencing that the contractor has met all the insurance requirements outlined below. All coverage shall be maintained in force throughout the contract term.

A. Workers Compensation and Employers Liability
By signing this Agreement, the Contractor shall maintain statutory worker's compensation and employer's liability coverage for all its employees who will be engaged in the performance of the Contract. Employer's liability limits of $1,000,000 are required. The insurer waives any right of recovery the insurer may have against the State because of payments the insurer makes for injury or damage arising out of the work done under contract/permit with the State. A Waiver of Subrogation or Right to Recover endorsement in favor of the State must be attached to the certificate.

B. Commercial General Liability
By signing this Agreement, the Contractor shall maintain general liability on an occurrence form with limits not less than $1,000,000 per occurrence and $2,000,000 aggregate for bodily injury and property damage liability. The policy shall include coverage for liabilities arising out of premises, operations, independent contractors, products, completed operations, personal and advertising injury, and liability assumed under an insured Agreement. This insurance shall apply separately to each insured against which claim is made, or suit is brought subject to the Contractor's limit of liability.

C. General Provisions Applying to All Policies

1. Coverage Term – Coverage needs to be in force for the complete term of the contract. If insurance is set to expire during the term of the contract, a new certificate must be received by the day the new policy goes into effect. Any new insurance must still comply with the original terms of the contract.
2. Policy Cancellation or Termination & Notice of Non-Renewal – Contractor and/or Permittee is responsible to notify the State within five business days before the effective date of any cancellation, non-renewal, or material change that affects required insurance coverage. In the event Contractor and/or Permittee fails to keep in effect at all times the specified insurance coverage, the State may, in addition to any other remedies it may have, terminate this Contract upon the occurrence of such event, subject to the provisions of this Contract.

3. Deductible – Contractor and/or Permittee is responsible for any deductible or self-insured retention contained within their insurance program.

4. Primary Clause – Commercial General Liability insurance contained in this contract shall be primary, and not excess or contributory, to any other insurance carried by the State.

5. Insurance Carrier Required Rating – All insurance companies must carry a rating acceptable to the Office of Risk and Insurance Management. If the Contractor and/or Permittee is self-insured for a portion or all of its insurance, review of financial information may be required.

6. Endorsements – Any required endorsements requested by the State must be physically attached to all requested certificates of insurance and not substituted by referring to such coverage on the certificate of insurance.

7. Inadequate Insurance – Inadequate or lack of insurance does not negate the contractor and/or Permittee's obligations under the contract.

8. Available Coverages/Limits - All coverage and limits available to the contractor shall also be available and applicable to the State subject to the types of insurance and coverage limits listed above.

9. Subcontractors - In the case of Contractor and/or Permittee's utilization of subcontractors to complete the contracted scope of work, contractor and/or Permittee shall include all subcontractors as insured under Contractor and/or Permittee's insurance or supply evidence of insurance to The State equal to policies, coverages and limits required of Contractor and/or Permittee.

D. The certificate of insurance must include the following provisions:

- The California Public Utilities Commission must be listed as the "Certificate Holder" and list the following:
  State of California
  California Public Utilities Commission
  Administrative Services Division, Management Services Branch
  505 Van Ness Avenue
  San Francisco, CA 94102

- The State of California, its officers, employees, and servants are hereby listed as additional insured under Commercial General Liability but only with respect to work performed for the State of California, under the contract (SCM 7.40).

20. SB/DVBE Participation Programs

A. Contractor understands and agrees that should award of this contract be based in part on their commitment to use a Disabled Veteran Business Enterprise (DVBE) subcontractor(s) identified in their bid or offer, per Military and Veterans Code section 999.5, subdivision (e), a DVBE subcontractor may only be replaced by another DVBE subcontractor and must be approved in writing by the Department of General Services (DGS) Office of Small Business and DVBE Services (OSDS). Changes to the scope of work that impact the DVBE subcontractor(s) identified in the bid or offer and approved DVBE substitutions will be documented by contract amendment.

B.   Failure of Contractor to seek substitution and adhere to the DVBE participation level identified in the bid or offer may be cause for contract termination, recovery of damages under rights and remedies due to the State, and penalties as outlined in Military and Veterans Code section 999.9, or Public Contract Code sections 10115.10 or 4110 (applies to public works only).

C.   If for this agreement Contractor made a commitment to achieve DVBE participation, upon completion of the awarded contract, the Contractor must certify to the awarding department all of the following:
1)   The total amount the contractor received under the contract.
2)   The name and address of the DVBE that participated in the performance of the contract and the contract number
3)   The amount and percentage of work the Contractor committed to provide to one or more DVBE under the requirements of the contract and the amount each DVBE received from the Contractor.
4)   That all payments under the contract have been made to the DVBE(s). Upon request by the awarding department, the Contractor shall provide proof of payment for the work.

D.   STD 817 shall be used for Contractor's certification and provided to the State's Contract Administrator within 60 days of the end of the contract term. STD 817 is located at the following internet site:
https://www.documents.dgs.ca.gov/dgs/fmc/pdf/std817.pdf

E.   A person or entity that knowingly provides false information will be subject to a civil penalty for each violation. (Mil. & Vet. Code, § 999.5, subd. (d).)

21. **DVBE Audit**
Contractor agrees that the State or its delegate will have the right to review, obtain, and copy all records pertaining to Contractor's compliance with the Disabled Veteran Business Enterprise (DVBE) requirements as contained in Public Contract Code sections 10115 et. seq. Contractor agrees to provide State or its delegate with any relevant information requested and shall permit State or its delegate access to its premises, upon reasonable notice, during normal business hours for the purposes of interviewing employees and inspecting and copying such books, records, accounts, and other material that may be relevant to a matter under investigation for the purpose of determining compliance with the DVBE requirements. Contractor further agrees to maintain such records for a period of three (3) years after final payment under this Agreement.

22. **Evaluation of Contractor**

Performance of the Contractor under this Agreement will be monitored throughout the terms of the Agreement. Upon completion of the scope of work or termination of the Agreement, a final evaluation shall be prepared on Contract/Contractor Evaluation Sheet (STD 4) and maintained in the Agreement file. For consultant agreements over $5,000 in total contract value a copy of a negative evaluation will be sent to the Department of General Services, Office of Legal Services.

23. **Change of Personnel**

Contractor and Subcontractor's key personnel as indicated in the attached resumes may not be substituted without the Commission's Contract Manager's prior written approval. Any proposed key personnel substitutes must maintain the same levels of expertise and must be charged at the same hourly rates.

24. **Russia Sanctions**

On March 4, 2022, Governor Gavin Newsom issued Executive Order N-6-22 https://www.gov.ca.gov/wp-content/uploads/2022/03/3.4.22-Russia-Ukraine-Executive-Order.pdf regarding Economic Sanctions against Russia and Russian entities and individuals. "Economic Sanctions" refers to sanctions imposed by the U.S. government in response to Russia's actions in Ukraine, as well as any sanctions imposed under state law. The EO directs state agencies to terminate contracts with, and to refrain from entering any new contracts with, individuals or entities that are determined to be a target of Economic Sanctions. Accordingly, should the State determine Contractor is a target of Economic Sanctions or is conducting prohibited transactions with sanctioned individuals or entities, that shall be grounds for termination of this agreement. The State shall provide Contractor advance written notice of such termination, allowing Contractor at least 30 calendar days to provide a written response. Termination shall be at the sole discretion of the State.

25. **Conditions of Service**

A. Contractor will abide by all State and Federal laws in performance of this contract.

B. Contractor and all subcontractors shall abide by all health and safety mandates issued by federal, state, and local governments and/or public health officers as well as those issued by DGS, and worksite specific mandates. If multiple mandates exist, the Contractor and subcontractors shall abide by the most restrictive mandate. The term "employee", "worker", "state worker" or "state employee" in health and safety mandates includes contractor and subcontractor personnel.

C. It is unlawful for a State Contractor to assist, promote, or deter union organizing by employees who are performing work on a service contract for the State or a State agency. This action is subject to fines in accordance with Government Code section 16645 et seq.