NOTICE OF MEETING
Tuesday, June 7, 2022, 3:30 to 5:00 p.m.
Email Samantha Maheu at smaheu@ucsd.edu to obtain the Zoom link.

ORDER OF BUSINESS

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<td>(c) Update on the Science Research Park (SRP) Planning Jeff Graham, Executive Director, Real Estate Oral</td>
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[Any member of the Academic Senate may attend and make motions at meetings of the Representative Assembly; however, only members of the Representative Assembly may second motions and vote.]
(12) Petitions of Students [none]

(13) Unfinished Business [none]

(14) New Business
SAN DIEGO DIVISIONAL REPRESENTATIVE ASSEMBLY MEETING ZOOM ATTENDANCE INSTRUCTIONS

A  Logging into the Meeting

1  Senate Members who are not Representative Assembly Members & Invited Guests

RSVP prior to the start of the meeting to obtain the meeting link: email Samantha Maheu at smaheu@ucsd.edu.

2  Representative Assembly Members

Representative Assembly members are not required to RSVP for the meeting. The Senate Office will distribute a meeting link to all members via email. Contact Samantha Maheu at smaheu@ucsd.edu if you are an Assembly Representative and you did not receive the meeting link.

B  Meeting Participation

When you join the meeting, you will be placed in a waiting room until the meeting host admits you into the meeting. Please log in 15 minutes early (at 3:15) to ensure that you are admitted to the meeting before it starts (at 3:30).

Your audio will be disabled by default when you enter the meeting; please refrain from turning on your microphone unless called upon by the Chair.

During the meeting, the Chair will call for questions and comments at the appropriate intervals, as usual, and you may raise your electronic hand in Zoom to request to speak. However, discussion may be limited due to the Zoom format of the meeting. Thus, participants are strongly encouraged to review the meeting materials in advance of the meeting and send questions to academicsenateoffice@ucsd.edu with the agenda topic number or proposal title in the subject line of the email, by noon on Friday, June 3, 2022. Your questions will be shared with the presenters so that they may address them in their presentations, and thus help to mitigate the challenge presented by a large Zoom meeting.

Following discussion of items that require a vote, a poll will pop-up on your screen to vote. As with in-person meetings, only Representative Assembly members may vote. Primary Representatives and Alternate Representatives should coordinate their attendance and voting for this meeting. Both may attend; however, Alternate Representatives may only vote in the absence of the Primary Representative. Please coordinate who will attend and cast votes in advance of the meeting.

C  Additional Zoom Meeting Note

Please use your actual first and last name with your Zoom account; the Senate Office must be able to establish your identity in order to admit you into a Representative Assembly meeting.

Instructions on how to manage your Zoom profile can be found here: https://support.zoom.us/hc/en-us/articles/201363203-Customizing-your-Profile.
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Chair Javidi called the meeting to order. A quorum was present (see attached attendance sheet), along with other Academic Senate members and guests. Chair Javidi welcomed everyone to the fourth Representative Assembly meeting of the 2021-2022 academic year. Chair Javidi reviewed the Academic Senate Bylaws governing membership, privileges of the floor, and voting.

MINUTES OF THE MEETING ON APRIL 5, 2022

The April 5, 2022 meeting minutes were approved as submitted.

ANNOUNCEMENTS BY THE CHAIR OF THE DIVISION

Systemwide Updates
On April 20th, Chair Javidi sent out a notice to all academics that the UC Systemwide Academic Senate is currently conducting its 21-22 Survey on Faculty Life. The response deadline is June 25, 2022. Chair Javidi asked members to encourage their colleagues to complete the survey. The responses help the Senate in conveying the broad array of faculty and instructor perspectives and pandemic experiences directly to the UC Administration, the UC Regents, and the California Legislature. [A link to the announcement can be found here: https://adminrecords.ucsd.edu/Notices/2022/2022-4-20-2.html]

Chair Javidi reported that Chancellor Khosla recently sent out an announcement about a second systemwide review of the Draft Presidential Policy on Abusive Conduct in the Workplace. The Academic Senate will be conducting its formal review in the Fall. Faculty may also submit comments during the campus review period through Administrative Records and the comment period ended on May 31st.

Chair Javidi reported that on April 27th, Academic Council issued a statement on Critical Race Theory and Academic Freedom. Their response will be distributed widely in support of higher education and K-12 colleagues throughout the country. [Link: https://senate.universityofcalifornia.edu/_files/reports/ac-statement-crt-academic-freedom.pdf]

Campus Updates
Chair Javidi noted that the Senate elections closed on May 18th.
PROPOSED MEMORIAL TO THE REGENTS ON FOSSIL FUEL COMBUSTION BY
CHAIR JAVIDI AND VICE CHAIR POSTERO

Chair Javidi reported that the Systemwide Academic Senate forwarded a proposed Memorial to the Regents on Fossil Fuel Combustion for a systemwide vote of UC Senate members. The systemwide vote follows consideration of the Memorial by the Systemwide Assembly of the Academic Senate. Memorials are an opportunity to communicate with the UC President and Regents on matters of importance to the Academic Senate. They are used infrequently. For historical reference, the last memorial ballot was in June 2019 and petitioned the Regents to divest the University’s endowment portfolio of all investments in the 200 publicly traded fossil fuel companies with the largest carbon reserves. The 2019 Memorial was supported by 77% of faculty who voted systemwide and transmitted to the Regents via the UC President and presented by the Systemwide Senate Chair at a meeting of the Board of Regents.

Chair Javidi reported that an August 2019 Academic Council statement regarding the Memorial stated that Richard Sherman, Chair of the Regents’ Investment Committee, stated that “Members of UC’s Board of Regents respect and deeply appreciate the Academic Senate’s Memorial that asks the University of California to divest from its investment in fossil fuels. UC faculty from across our 10 campuses voted overwhelmingly in favor of this proposal, which we take very seriously”, along with the commitment that the University is “on a glide path to reduce that investment [in fossil fuel holdings] to zero.” In May 2020, UC announced that it divested from all fossil fuels. Since, the Systemwide Senate has followed up with the UC Office of the President to encourage transparency.

Chair Javidi read the 2022 Memorial ballot’s text: *The University of California Academic Senate petitions the Regents for investments in UC’s infrastructure that will reduce on-campus fossil fuel combustion by at least 60% of current levels by 2030 and by 95% of current levels by 2035.*

Chair Javidi reported that at their December meeting, Academic Council approved a motion to start the Memorial process. It was discussed at their meetings in February and April, and the Memorial text was edited to be what the ballot currently is. Systemwide bylaw requires that the ballot text be distributed to all Academic Senate members and a vote be conducted. The informational packet that was provided by the Systemwide Senate included arguments ‘for’ and ‘against’ the Memorial.

Vice Chair Postero reported that the voting period for the San Diego Division is May 19th through June 3rd. A notice about the Senate vote on the Memorial was distributed to all Senate faculty on May 19th. It included a link to the ballot and to the packet of materials that were included with this meeting’s agenda. Vice Chair Postero asked that representatives follow up with their department colleagues and encourage them to vote. [Link: https://senate.ucsd.edu/current-affairs/news-announcements/memorial-to-the-regents-on-fossil-fuel-combustion/]

Chair Javidi read a question that was received prior to the meeting: *In addition to the Memorial, how can the Academic Senate further pressure the Administration to produce a concrete plan for decommissioning the methane-fueled cogeneration plant?* Chair Javidi responded that Senate
would follow up on implementation plans at UCSD if the Memorial is passed. UCSD has already made progress towards environmental goals due to the formation of the Committee on Campus Climate Change (CCCC) in 20-21. CCCC is tasked with conferring and advising the Senate and Administration on matters pertaining to campus decarbonization, climate change impacts and mitigation, climate change in educational programs, and climate change research. CCCC interacts with many different groups on campus that are involved in the planning of climate-related items.

A member asked if there are technical documents, such as a feasibility study, that would be sent out with the Memorial. Chair Javidi responded that the Memorial packet contains documents ‘for’ and ‘against’ the Memorial with additional details. The Memorial is an aspirational document to notify the Regents on what is important to Senate faculty. The detailed implementation plans would be created later on if the Memorial passes.

COMMENCED ACADEMIC ACTIVITY BY DAVID GARRISON, SENIOR ASSOCIATE REGISTRAR; AND CINDY LYONS, UNIVERSITY REGISTRAR

Dr. Garrison reported that the U.S. Department of Education is requiring the commencement of academic activity for students. Academic activity is defined as attending any class, submitting an assignment, taking an exam, discussion board participation, or a one-on-one conversation with faculty about the class. Commencement of academic activity must be documented once during each academic term, for each student, in each class, and it applies to undergraduate, graduate, and professional school students. All students who receive Federal Title IV funds are subject to the requirements of the Department of Education. If the commencement of academic activity cannot be verified, the student’s financial aid package must be adjusted. Noncompliance puts UCSD at serious financial risk and can impact the University’s ability to award Title IV funds. Instructors can track academic activity in two ways, either by indicating the academic activity manually in the Academic Activity Tracking System (AATS) or assigning a prebuilt assignment in Canvas. It is recommended that an assignment is posted within the first two weeks of the course, and it should remain up for the entirety of the quarter so it is available in case a student adds the class late. If a student drops the class before finishing the assignment, their financial aid is typically adjusted anyhow, depending on when they drop the class.

The academic activity will need to be documented by the 10th day of instruction of the quarter. After the second week of instruction, Financial Aid will follow up with instructors and students and will adjust aid packages, as necessary. At UCSD, the tracking of academic activity will begin in Summer Session 1, and will be required for all future quarters. Campus notices will be sent to all instructors each quarter with the required tracking due dates. The Registrar’s Office will provide live training sessions, a help website and PDF documents, and one-on-one help for instructors.

A member asked if Canvas and AATS will track all students or only those receiving Title IV funds. The systems will track all enrolled students since aid packages can be given at any time, but Financial Aid will only follow up on those receiving Title IV funds.
A member asked if it is the faculty’s responsibility to track if the students have completed the required tracking assignment, which will be difficult for very large courses. The goal is to avoid putting faculty in a position where they have to monitor this, but it is not an option for students to self-certify or have staff members track the activity at this time. Using the prebuilt assignment option in Canvas is the best option for large courses.

A member noted that in one of the very large, general education courses that they teach, they do not give a lot of assignments prior to the end of the second week of the quarter, so they would need to change how they structure their course in order to comply with this requirement. The assignment posted to fulfill the tracking requirement does not need to be credit bearing, but it does need to be completed prior to the 10th day of instruction of the quarter. If a student completes the assignment but subsequently does not participate in the class, the onus is not on the instructor since they fulfilled their part of the requirement. The Financial Aid Office will be communicating with students on this requirement as well.

A member commented that they already assign pre-surveys and other assignments in the first two weeks of the quarter, so they were concerned about adding another assignment. Pre-existing assignments can be used to fulfill this requirement as long as they are clearly marked as such and remain available to students for the entirety of the quarter.

A member asked if TAs are responsible for tracking this. Since TAs are not the instructor of record for the course, the instructor has to do it. However, it is an option that may be considered in the future.

A member asked how graduate students who only conduct research in labs should be tracked. The easiest way to track academic activity is by using an assignment submitted in Canvas. However, it is not the only way since manual tracking can be completed in AATS. An instructor can submit tracking in AATS certifying that the student is conducting their work as required in the lab and/or that they have had conversations with the student regarding their work. It does not have to be substantive.

A member asked how the current situation with the pandemic factors into this requirement since many classes are remote. The requirement to track activity is the same regardless of the course modality. Due to the pandemic, more faculty than ever are using Canvas, so it should hopefully be easy for them to continue using it for this requirement.

A member commented that this initiative is a good example of how shared governance can be successful if the Senate is involved early and feedback from faculty is considered throughout the planning process.

**SPECIAL ORDERS** [None]

**REPORTS OF SPECIAL COMMITTEES** [None]
REPORTS OF STANDING COMMITTEES [None]

REPORTS OF FACULTIES [None]

PETITIONS OF STUDENTS [None]

UNFINISHED BUSINESS [None]

NEW BUSINESS [None]

Chair Javidi called for any new business. There being none, the meeting was adjourned.

The meeting was adjourned at 4:38 p.m.

Recorded by Jenna Lucius, Senior Senate Analyst.
# REPRESENTATIVE ASSEMBLY MEMBERSHIP - 2021/2022

## May 17, 2022 Meeting Attendance

### EX OFFICIO MEMBERS

| ☒ JAVIDI, TARA | CHAIR, SAN DIEGO DIVISION |
| ☑ POSTERO, NANCY GREY | VICE CHAIR, SAN DIEGO DIVISION |
| ☐ CONSTABLE, STEVEN C | PARLIAMENTARIAN, SAN DIEGO DIVISION |
| ☐ SIMMONS, ELIZABETH H | EXECUTIVE VICE CHANCELLOR, ACADEMIC AFFAIRS |
| ☐ BRENNER, DAVID ALLEN | VICE CHANCELLOR, HEALTH SCIENCES |
| ☐ LEINEN, MARGARET S | VICE CHANCELLOR, MARINE SCIENCES |
| ☒ CONSTABLE, STEVEN C | IMMEDIATE PAST CHAIR, SAN DIEGO DIVISION |
| ☐ PEEK-ASA, CORINNE LEE | VICE CHANCELLOR, RESEARCH AFFAIRS |
| ☐ RANGAMANI, PADMINI | CHAIR, EDUCATIONAL POLICY |
| ☐ DESAI, ARSHAD B | CHAIR, GRADUATE COUNCIL |
| ☐ BURNEY, JENNIFER A | CHAIR, DIVERSITY & EQUITY |
| ☒ CLELAND, ELSA E | CHAIR, COMMITTEE ON COMMITTEES |
| ☒ PLANT, REBECCA JO | CHAIR, ADMISSIONS |
| ☐ SINHA, SHANTANU | CHAIR, FACULTY WELFARE |
| ☐ DEAK, GEDEON O | CHAIR, PLANNING & BUDGET |
| ☒ BRYDGES, STACEY | CHAIR, UNDERGRADUATE COUNCIL |
| ☐ GILL, PHILIP E | CHAIR, PRIVILEGE & TENURE |
| ☒ CAUWENBERGHS, GERT | CHAIR, RESEARCH |
| ☒ CORTES, JORGE | CHAIR, CAMPUS & COMMUNITY ENVIRONMENT |
| ☐ COSMAN, PAMELA C | CHAIR, ACADEMIC PERSONNEL |
| ☐ WIDENER, DANIEL L | MEMBER, ACADEMIC COUNCIL |
| ☒ FORBES, DOUGLASS JANE | SENIOR REPRESENTATIVE, ACADEMIC ASSEMBLY |
| ☒ CHERNER, MARIANA | SENIOR REPRESENTATIVE, ACADEMIC ASSEMBLY |
ELECTED MEMBERS & ALTERNATES

MARSHALL COLLEGE
☐ DAHL, GORDON BOYACK
   Primary Representative
☐ PARRA, MAX
   Primary Representative
☐ VUL, EDWARD
   Alternate Representative

MUIR COLLEGE
☒ COOKE, JAMES EDWARD
   Primary Representative
☒ SAIER, MILTON H
   Primary Representative
☐ MUSEUS, SAMUEL DAVID
   Alternate Representative
☐ OPATKIEWICZ, JUSTIN PAUL
   Alternate Representative

REVELLE COLLEGE
☐ MUENDLER, MARC ANDREAS
   Primary Representative
☐ RICHARDS, STEPHANIE F
   Alternate Representative

ROOSEVELT COLLEGE
☒ MARTINEZ DIAZ, SONIA
   Primary Representative
☒ STRASSER, ULRIKE
   Primary Representative
☐ COHEN, SHANA R
   Alternate Representative
☐ PATEL, SHAISTA
   Alternate Representative

SIXTH COLLEGE
☒ GOLAN, TAL
   Primary Representative
☐ PITI, RICHARD
   Primary Representative
☐ DUBNOV, SHLOMO
   Alternate Representative
☐ HERMANN, THOMAS C
   Alternate Representative

WARREN COLLEGE
☒ OWENS, MELINDA TSAO-YING
   Primary Representative
☐ XIAO, MING
   Alternate Representative

EMERITUS FACULTY
☒ MADSEN, RICHARD P
   Primary Representative
☐ JACOBY, IRVING
   Alternate Representative

SEVENTH COLLEGE
☒ KENWORTHY, LANE A
   Primary Representative
☒ VOGL, TOM SAUL
   Primary Representative
☐ ARCOS HERRERA, CAROL
   Alternate Representative
☐ POMEROY, ROBERT S
   Alternate Representative

ANESTHESIOLOGY
☐ GABRIEL, RODNEY A
   Primary Representative
☐ SHUBAYEV, VERONICA I
   Alternate Representative

ANTHROPOLOGY
☒ ALGAZE, GUILLERMO
   Primary Representative
☐ MARCHETTO, MARIA CAROLINA
   Alternate Representative
BIOENGINEERING
☐ SILVA, GABRIEL A
   Primary Representative
☐ MALI, PRASHANT GULAB RAM
   Alternate Representative

BIOLOGICAL SCIENCES
☒ SUEL, GUROL MEHMET
   Primary Representative
☒ TRAVER, DAVID
   Alternate Representative
☒ ZHAO, YUNDE
   Alternate Representative

CELLULAR & MOLECULAR MEDICINE
☐ CORBETT, KEVIN DANIEL
   Primary Representative
☒ DOWDY, STEVEN F
   Alternate Representative

CHEMISTRY & BIOCHEMISTRY
☒ O'CONNOR, JOSEPH M
   Primary Representative
☐ GALPERIN, MICHAEL
   Alternate Representative

COGNITIVE SCIENCE
☒ XIA, HAIJUN
   Primary Representative
☐ FLEISCHER, JASON
   Alternate Representative

COMMUNICATIONS
☒ DEWAARD, ANDREW
   Primary Representative
☐ KIDMAN, SHAWNA F
   Alternate Representative

CSE
☒ MICCIANCIO, DANIELE
   Primary Representative
☒ ORAIIOGLU, ALEX
   Alternate Representative
☒ SNOEREN, ALEX C
   Alternate Representative

DERMATOLOGY
☐ SEN, GEORGE L
   Primary Representative
☒ DORSCHNER, ROBERT A
   Alternate Representative

ECE
☒ PAL, PIYA
   Primary Representative
☒ SCHURGERS, CURT
   Alternate Representative
☒ TOURI, BEHROUZ
   Alternate Representative
ECONOMICS
☐ ZHU, YING
   Primary Representative
☒ MECKEL, KATHERINE
   Alternate Representative

EDUCATION STUDIES
☒ MAMAS, CHRISTOFOROS
   Primary Representative

EMERGENCY MEDICINE
☐ VILKE, GARY MICHAEL
   Primary Representative
☒ DAMEFF, CHRISTIAN JORDAN
   Alternate Representative

ETHNIC STUDIES
☒ FUSTE, JOSE IGNACIO
   Primary Representative
☐ SASAKI, CHRISTEN T
   Alternate Representative

FAMILY & PREVENTIVE MEDICINE
☒ TAI-SEALE, MING
   Primary Representative
☐ KALLENBERG, GENE ANDREW
   Alternate Representative

GLOBAL POLICY AND STRATEGY
☐ LYONS, ELIZABETH DEIRDRE
   Primary Representative
☐ PRATHER, LAUREN R
   Alternate Representative

HALICIOGLU DATA SCIENCE INST
☐ MAZUMDAR, ARYA
   Primary Representative
☐ POLITIS, DIMITRIS
   Alternate Representative

HISTORY
☒ EDINGTON, CLAIRE ELLEN
   Primary Representative
☒ PATTERSON, PATRICK HYDER
   Primary Representative

HWSPH
☐ BLOSS, CINNAMON SUE
   Primary Representative
☒ SUAREZ, JOSE R
   Alternate Representative
☐ SHI, YUYAN
   Primary Representative
☐ THOMAS, RONALD G
   Alternate Representative

LINGUISTICS
☒ KEHLER, ANDREW SCOTT
   Primary Representative
☐ ACKERMAN, FARRELL
   Alternate Representative

LITERATURE
☒ BLANCO, JOHN D
   Primary Representative
☐ CARROLL, AMY SARA
   Alternate Representative
☒ KONTJE, TODD CURTIS
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☐ NICOLAZZO, SAL
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ADVISORS

RESEARCH ADVISOR - SIO
☒ ZILBERMAN, NATHALIE
    Primary Advisor
☐ LUCA, CENTURIONI
    Alternate Advisor

GRADUATE STUDENT ADVISOR
☒ BERTELMANN, MIKAH
    Primary Advisor
☐ PAYZANT, PEPIN
    Primary Advisor

UNDERGRADUATE STUDENT ADVISOR
☐ ISAAC, LARA
    Primary Advisor
☒ MANU, AGNI
    Primary Advisor
Tracking the Commencement of Academic Activity

David Garrison, Ed.D.
Sr. Associate Registrar
Enrollment Management
May 17, 2022
Overview

• Recent federal audit findings at several of our sister UC campuses have led to UCOP asking UC San Diego to track the commencement of academic activity for our students.

• Additionally, if the commencement of academic activity is not verified, the student’s financial aid package will be adjusted, leading to a partial or complete loss of funds and the student being billed.

• Starting in summer 2022, UC San Diego instructors will be required to certify whether students have commenced academic activity to satisfy the requirement.
Enforcement of this regulation is increasing

- CSU San Bernardino $500K
- UC Davis $120K (initially)
- University of Missouri $800K
- UC Merced $111K

- If we do not comply with this federal requirement, we are exposing UC San Diego to significant financial risk
- Noncompliance could also put our ability to award Title IV aid at risk
- In 2019 UC San Diego awarded $163.5 million in Federal Title IV aid
What is Academic Activity?

• Academic activity includes*:
  • Attending a class where there is the opportunity for direct interaction between the instructor and the students
  • Submitting an academic assignment
  • Taking an exam, an interactive tutorial, or computer-assisted instruction
  • Discussion board participation
  • One-on-one conversation with faculty about the class

• The instructor must document if a student has participated in class, as opposed to not showing up at all

• Students cannot self-certify – only an instructor can certify that academic activity has occurred

*2021-2022 Federal Student Aid Handbook, Volume 5, Chapter 2, page 5-76
34 CFR 668.22(l)(7) and 600.2
Tracking Academic Activity

• Commencement of academic activity must be documented during each academic term, for each student, in each class
  • Fall, Winter, Spring, and Summer Sessions
  • We will begin Summer Session I 2022

• All students who receive Federal Title IV funds are subject to the requirements of the Department of Education (Ed), therefore the solution needs to encompass undergraduate students, graduate students, and professional school students

• If the commencement of academic activity cannot be verified, the student’s financial aid package must be adjusted and could lead to a loss of funds. Students who are deficient will be billed
Overview of Implementation

1. Instructors can log into the *Academic Activity Tracking System (AATS)* and indicate the commencement of academic activity for students in their classes

   OR

2. Instructors can assign a prebuilt assignment in Canvas

   THEN

3. Financial Aid will follow up with students and instructors, as necessary
1. Academic Activity Tracking System (AATS)

- Instructors can log into the Academic Activity Tracking System (AATS) and indicate the commencement of academic activity for students in their classes.
  - https://aats.ucsd.edu
- Instructors can also look up individual students in their classes or view lists of uncertified students.
- FAS staff will be able to update the tool.
2. Canvas Prebuilt Activities

- Developed in partnership with Teaching+ Learning Commons and Educational Technology Services
- There will be several assignments from which to choose
- After the student completes the assignment, the commencement of academic activity for that class is confirmed
3. Financial Aid Follow-up

- The Financial Aid and Scholarships (FAS) Office will follow-up as needed with students and instructors.
- FAS will adjust aid packages for students who have not been certified in enough units to earn their federal financial aid.
- **Students not certified in enough eligible units will be billed.**
- If academic activity can be later certified, federal aid may be reinstated within regulatory timelines.
Sample Term Timeline – Fall Quarter 2022

- **September 16, 2022**
  Campus CAA notice at start of term

- **September 22**
  Start of instruction

- **October 6**
  10th day of instruction

**To students:**
Due to no CAA you are being billed

**October 10**
FAS first follow-up with deficient students, and instructors who have not taken any action for a class

**October 24**
FAS second follow-up to students, and instructors who have not taken any action for a class

**Note:**
In Summer Sessions, FAS tracking begins after week 1

**To instructors:**
Due to classes that are not certified, students are being billed

**October 25**
Aid packages adjusted, students billed
Resources for Instructors/Questions?

- Training and help will be available:
  - Live training sessions during Summer and Fall
  - Help website and PDF document
  - One-on-one help as needed

- Questions?
February 23, 2022

TARA JAVIDI, CHAIR
Academic Senate, San Diego Division

SUBJECT: Change Name and Scope of Distinguished Service Award

The Committee on Senate Awards committee's bylaws currently contain 4 separate award categories: 1) Distinguished Teaching Awards; 2) Distinguished Research Awards; 3) Donald F. Tuzin Award for Distinguished Service in the UCSD and Systemwide Academic Senate; and 4) Academic Senate Service Award. Only the first two awards are in active use.

The committee recognizes that faculty members at UC San Diego are evaluated in their bio-bibs on research, teaching, and service. We currently have awards for two of these categories. Regarding service, the awards available to give by the committee are restricted to service within the Academic Senate. The committee feels that opening up this award to be inclusive of broader types of service will give opportunities to recognize the amazing service our colleagues provide to the university in general, to the academic senate, public service, and beyond.

The committee thus proposes to combine the two service awards into a single award category called the "Donald F. Tuzin Distinguished Service Awards". This way, the Academic Senate Awards committee will have three award categories to match the three areas of the bio-bib under which faculty are evaluated. In addition, scheduling solicitations for these three awards will be distributed across the three academic quarters at UC San Diego, resulting in pleasing numerology.

To accomplish these changes, the committee requests a change to the bylaws, as shown in the attached bylaw.

It should be noted that this request was in part encouraged by discussions with the Committee on Extended Studies and Public Service, who voiced a desire to have an award that recognized excellence in public service at UC San Diego.

Sincerely,

Patrick Mercier, Chair
Committee on Senate Awards

cc: N. Postero
L. Hullings
241. Senate Awards

A) This committee shall consist of seven ordinary members of the Division. It shall also have one undergraduate student representative and one graduate student representative, who shall not have the right to vote except as noted below. The membership shall typically include past award recipients. [Am 5/19/20]

B) The Committee shall have the following duties:

1) Distinguished Teaching Awards

a) It shall solicit nominations annually for distinguished teaching awards, and present recommendations for recipients to the Representative Assembly, which shall accept or reject each recommendation.

i) It shall recommend up to five Academic Senate members, three non-Senate faculty members, and three graduate students.

ii) For the award to Senate Members, the committee shall recommend up to four members of the Faculties of the undergraduate Colleges, no more than one from each of the following disciplinary areas: arts or humanities; engineering; natural sciences; and social sciences. The committee may recommend one additional member from among the faculties of the graduate and professional schools.

iii) The undergraduate and graduate student representatives shall have the right to vote on nominees for distinguished teaching awards.

b) It shall consider general policies that will enlarge the possibilities for distinguished teaching and consider ways to improve the quality of instruction, including methods of evaluation.
2) Distinguished Research Awards [Am 5/19/20]

   a) It shall solicit nominations annually for members of the faculty or staff at San Diego whose research has made a significant contribution to the advancement of knowledge and present recommendations for recipients to the Representative Assembly, which shall accept or reject each recommendation.

      i) It shall recommend up to two members, one in the Arts/Humanities/Social Sciences and one in the Sciences/Engineering, who shall present a public lecture on a topic of his or her choice.

      ii) The recommendations shall be made to the Representative Assembly or the Division no later than its final meeting in the spring term, and the lectures shall be presented during the following academic year.

3) Donald F. Tuzin Award for Distinguished Service Award in the UCSD and Systemwide Academic Senate

   a) It shall solicit nominations for up to two awards to be given annually to Academic Senate members who have shown an exceptional leadership commitment by serving the Senate to service in a distinguished manner that reflects a deep commitment to shared governance and to the excellence of the University of California broadly defined as university service, Academic Senate service, or public service. Recommendations will be presented and present a recommendation to the Representative Assembly, which shall accept or reject the recommendations.

4) Academic Senate Service Award

   a) It shall entertain nominations for a member of the UC San Diego administration who has not only provided extraordinary service to the campus, but has done so in a manner that honors and advances the tradition of shared governance and strengthens the partnership between the Academic Senate and the Administration, and present a recommendation to the Representative Assembly, which shall accept or reject the recommendation.
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         lecture on a topic of his or her choice.

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          Division no later than its final meeting in the spring term, and the lectures
          shall be presented during the following academic year.

3) Donald F. Tuzin Distinguished Service Award

   a) It shall solicit nominations for up to two awards to be given annually to Academic
      Senate members who have shown an exceptional commitment broadly defined as
      university service, Academic Senate service, or public service and present a
      recommendation to the Representative Assembly, which shall accept or reject the
      recommendations.
March 4, 2022

Tara Javidi, Chair  
San Diego Divisional Academic Senate

SUBJECT: Proposed Amendments to San Diego Senate Bylaw 241, Senate Awards

Dear Chair Javidi,

The Committee on Rules and Jurisdiction (CRJ) reviewed the proposal to amend San Diego Senate Bylaw 241, Senate Awards and found the proposed amendments consonant with the code of the Academic Senate.

Sincerely,

David Tytler, Chair  
Committee on Rules and Jurisdiction

cc: L. Hullings  
N. Postero

Attachments
New School or College Review Process Information for Faculty Reviewers
March 2022

The review process to establish a new school or college has two steps or phases: the pre-proposal phase and the full (final) proposal phase. Both phases involve a review by the Divisional Academic Senate, the systemwide Academic Senate, and the UC Provost. Final approval is requested by the UC President of the UC Board of Regents. The Regents have final approval authority. The process normally takes a minimum of two years from the date a proposal is submitted for review to the date the Regents approve it. If the school or college is not established within seven years of approval by the Regents, a post-proposal update is required.

Pre-Proposal
The pre-proposal is not a final proposal. The purpose of a pre-proposal is to provide the Senate and others an opportunity to offer their input before a final proposal is drafted. Feedback from the review of the pre-proposal is taken into consideration in the drafting of the final proposal.

The Divisional Senate Chair distributes the pre-proposal to standing committees for review, including the Undergraduate Council (UGC), the Educational Policy Committee (EPC), the Committee on Planning and Budget (CPB), and the Graduate Council (GC; for proposals that include graduate education). Following committee review, the pre-proposal is discussed at Senate Council. Senate Council places the proposal on a Representative Assembly meeting agenda for a vote. Following the Divisional Senate review process, the Senate Chair reports back to the Chancellor.

If the Divisional Senate approves the pre-proposal, the Chancellor submits the pre-proposal to the UC Provost. The UC Provost submits the pre-proposal for review to the systemwide UC Academic Senate and to UCOP Academic Affairs for feedback. Systemwide Senate committee review includes the University Committee on Educational Policy (UCEP), University Committee on Planning and Budget (UCPB), and the Coordinating Committee on Graduate Affairs (CCGA). Following committee review, the pre-proposal is discussed at Academic Council. Academic Council’s feedback is transmitted to the proposers, the UC Provost, and the Divisional Senate Chair. The feedback from UCOP Academic Affairs is also sent to the proposers, the UC Provost, and the Divisional Senate Chair.

Full (Final) Proposal
A full (final) proposal is then drafted by the proposers, incorporating feedback from the pre-proposal phase. The full proposal is submitted through the same review process as the pre-proposal phase – Divisional Senate review, systemwide Senate review, and UCOP review. The full proposal must ultimately be approved by the systemwide UC Senate Academic Council before it can be submitted by the UC President to the UC Board of Regents for final approval.
March 24, 2022

Subject: Proposal for a School of Computing, Information and Data Sciences

Dear Chair Javidi,

I am pleased to submit the enclosed proposal to establish a School of Computing, Information, and Data Sciences for review by the Divisional Senate. The proposal outlines the opportunity for UC San Diego to advance its position as a leader in interdisciplinary data and information sciences fields, and has my strong endorsement. We look forward to receiving feedback from the review so that we can move forward with the next stages of planning expeditiously.

With best regards,

Elizabeth H. Simmons
Executive Vice Chancellor

CC: Chancellor Khosla
Dean Antony
Senior Associate Vice Chancellor Continetti
Associate Chancellor Gattas
Director Gupta
Director Hullings
Dean Moore
Vice Chair Postero
Assistant Vice Chancellor Sanders
Professor Subramanian
Director Würthwein
# Proposal for a School of Computing, Information and Data Sciences

## EXECUTIVE SUMMARY

### 1. INTRODUCTION

1.1 Rationale and Vision

1.2 Mission

### 2. FOUNDATIONS for the PROPOSED SCHOOL

2.1. San Diego Supercomputer Center (SDSC)

2.2. Halicioğlu Data Science Institute (HDSI)

2.3. Other Campus Units – Departments, Institutes and Library

2.3.1. Department of Computer Science and Engineering (CSE)

2.3.2. Department of Electrical and Computer Engineering (ECE)

2.3.3. Department of Cognitive Science

2.3.4. Department of Mathematics

2.3.5. California Institute for Telecommunication and Information Technology and the Qualcomm Institute

2.3.6. The UC San Diego Geisel Library

2.4. Other Campus Units – Schools, Divisions and SIO

2.4.1. School of Medicine

2.4.2. H. Wertheim School of Public Health and Human Longevity Science

2.4.3. Skaggs School of Pharmacy and Pharmaceutical Sciences

2.4.4. Scripps Institution of Oceanography (SIO)

2.4.5. Rady School of Management

2.4.6. School of Global Policy and Strategy

2.4.7. Jacobs School of Engineering

2.4.8. Division of Arts and Humanities

2.4.9. Division of Biological Sciences

2.4.10. Division of Physical Sciences

2.4.11. Division of Social Sciences

2.4.12. Division of Extended Studies

### 3. RELATIONSHIP to UC SYSTEM and PEER EDUCATIONAL PROGRAMS, and the COMMUNITY

3.1. National Context

3.2. UC System Initiatives

3.3. Relationship to the California State University and Community Colleges

3.4. Relationship to the San Diego Community and Global Partners

### 4. ACADEMIC CURRICULUM, DEGREE PROGRAMS, and ACADEMIC RIGOR

4.1. Bachelor of Science in Data Science (DSC)

4.2. Graduate Programs

4.2.1. Master of Science in Data Science (MS-DS)

4.2.2. Doctor of Philosophy in Data Science (PhD-DS)

4.2.3. Online Master of Data Science (OMDS)

4.4. Proposed Specializations and Partnerships

4.4.1. 4+1 BS/MS Program in Data Science and Business Analytics
Executive Summary

UC San Diego proposes the creation of a School of Computing, Information and Data Sciences (SCIDS) to provide leadership in research, learning, and technological developments in the emerging areas of data, information and computing sciences. The creation of the new school is consistent with the founding paradigm for UC San Diego as a hub of interdisciplinary inquiry and innovation. Each component essential for the success of this school and the broader vision of computing, information and data science are already present at UC San Diego, such that founding this new school is a natural outcome given the evolution of human inquiry.

In early 2021, UC San Diego constituted a Working Group to explore the creation of a new School of Computing, Information and Data Sciences. In spring of 2021, based on extensive interviews the group conducted with the Deans, Vice-Chancellors and Unit Heads, it was concluded that there was unanimous and enthusiastic support for the creation of SCIDS. The EVC then constituted a Task Force to develop a Proposal for SCIDS. The membership of the Task Force and the Charge to the group are presented in Appendix 1. The Task Force met regularly over Fall and early Winter and have developed this comprehensive proposal for establishing SCIDS.

The proposed school is envisioned to be UC San Diego's next leap forward in addressing the most compelling need of modern times – transforming data into knowledge. Every walk of our day-to-day life, from the continuous myriad measurements of wearable sensors to the vast amounts of temporal data collected across the globe documenting climate change, warrant conversion into actionable knowledge and models. Addressing the data deluge is arguably the greatest intellectual challenge of our time and this will motivate the unprecedented integration of diverse disciplines and development of unforeseen technologies. Developing a trained talent pool to address these issues is an exciting challenge for academic institutions and UC San Diego is uniquely equipped to play a key role in addressing this task. Success in this task will play a critical role in the development of our region, our state and our nation. This proposal outlines the tremendous depth, strengths, and synergies that UC San Diego possesses and provides the framework that will help create a school that will be peerless.

The founding units of SCIDS will be the Halicioğlu Data Science Institute (HDSI) and the San Diego Supercomputer Center (SDSC), supported by joint interactions and affiliations with existing Divisions and academic departments, including Computer Science and Engineering (CSE), Electrical and Computer Engineering (ECE), Cognitive Science, and Mathematics. The academic core of the new school will be HDSI. Anticipating the growth in data science, UC San Diego created HDSI with generous philanthropic support. In less than five years, HDSI has established a strong undergraduate program and now has approved graduate degree programs. SDSC will serve as the operational and translational science core, building on its history as one of the four national Supercomputer Centers established by the National Science Foundation nearly four decades ago, leading the development of high performance computing and more recently big data and cloud computing. In addition, SCIDS will have strong academic interactions involving all UC San Diego departments, schools, and divisions supporting the goal of transforming data into knowledge through development of data and information science,
advancing innovative computing paradigms and developing entirely new contextual learning algorithms and methodologies that can transform society. The educational programs that will be designed will train an entirely new generation of qualified professionals who will play a key role in this endeavor.

To be competitive on the national landscape with recently created schools of similar scope (for example the recent Berkeley School of Computing, Data and Society or MIT’s new College of Computing), there will be opportunities for academic units to create formal connections with SCIDS. At inception, a formal connection will be established between SCIDS and CSE and between SCIDS and ECE. The framework for this connection will be described in this proposal.

Establishment of the new school is motivated by powerful intellectual and educational goals, and it will also provide an approach to synergize the stand-alone academic and research units of HDSI and SDSC in an auspicious manner in the highly competitive world of computing, information and data sciences. As stand-alone units, both units are currently overseen by the Senior Associate Vice Chancellor serving in a ‘Dean-designee’ role. The new school will benefit from the appointment of dedicated academic leadership in the form of a new Dean reporting to the Executive Vice Chancellor. This dedicated oversight will position the school to compete successfully in this emerging area. Among our competing institutions, UC Berkeley has a full-time dedicated vice provost and dean for the Division of Computing, Data Science and Society, similar to dedicated deans overseeing such units at Columbia, NYU, MIT, Michigan and other schools. Formation of the school will also regularize how the various bodies of the Academic Senate engage in the review and oversight of the academic programs and student experience. Beyond administrative streamlining, the proposed school will also open multiple possibilities for new academic programs and research initiatives that the faculty and researchers in the school will be able to draw closely together. This will build on recent successes such as the $20M AI Institute TILOS that resulted because of interactions of the type the school will promote. Going forward, we anticipate the combined units to offer training programs for the working professional as well as executive training programs in the areas of big data and artificial intelligence.

The proposal lays the framework for the creation of SCIDS and provides the intellectual, administrative, and capital basis for building SCIDS. The synergies with all campus units and the potential local and national impact are presented in the proposal. The proposal also outlines the impact SCIDS will have in training next generation leaders in computing, information and data science, and enhancing the standing of UC San Diego nationally and internationally.
1. INTRODUCTION

1.1 Rationale and Vision

In 2011, the McKinsey Global Institute report stated\(^1\) that Big Data is the next frontier for innovation, competition, and productivity. They calculated the annual US value of big data to be over a trillion dollars and the projected demand for talent in big data to grow exponentially with a talent gap of \(\sim 60\%\) of the demand. In summer 2012 the National Academies convened a Committee on the Analysis of Massive Data and its report\(^2\) served as a blueprint for national change. In 2012, the Obama administration launched the Big Data Research and Development Initiative\(^3\) to “develop Big Data technologies, demonstrate applications of Big Data, and train the next generation of data scientists,” and in 2015 launched the National Strategic Computing Initiative\(^4\) to “maximize the benefits of HPC for economic competitiveness and scientific discovery”. Similarly the AI Initiative\(^5\) was launched in 2019 motivated by the promise of AI “to drive growth of the United States economy, enhance our economic and national security, and improve our quality of life.” Responding to the growing need for talent and workforce in data analytics, several Universities have responded by creating academic units ranging from departments to schools to train students with expertise in data analytics. Top ranked Data Analytics/Science programs according to US News and World Report rankings 2022 are UC Berkeley, CMU, MIT, U Washington, Cornell, Georgia Tech, Columbia University, University of Illinois, University of Michigan, Caltech, and UCSD ranked equally with UCLA. A significant number of the top ten Schools listed above have either institutes, divisions or schools associated with data science. Some institutions, like Michigan (MIDAS – Michigan Institute for Data Science), have faculty from across campus units and offer several educational programs. Berkeley, top ranked in Data Sciences, launched the Division of Computing, Data Science and Society (DCDSS) through a major donation from the Gordon and Betty Moore Foundation and the Alfred P. Sloan Foundation, drawing together faculty from throughout the campus. The University of Virginia has launched a new School of Data Science and the leadership has provided a perspective on launching a new school.\(^6\) MIT launched the Institute for Data, Systems and Society (IDSS), with a mission to advance education and research in state-of-the-art analytical methods in information and decision systems, statistics and data science, and the social sciences, and to apply these methods to address complex societal challenges in a diverse set of areas such as finance, energy systems, urbanization, social networks, and health. Institutions like Cornell, Columbia, NYU, and several others have initiated Data Science units on their campus. The number of faculty in these new units range from 20 to a few

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\(^2\) [https://www.nap.edu/read/18374/chapter/1](https://www.nap.edu/read/18374/chapter/1)
\(^3\) [https://obamawhitehouse.archives.gov/blog/2012/03/29/big-data-big-deal](https://obamawhitehouse.archives.gov/blog/2012/03/29/big-data-big-deal)
hundred and most offer undergraduate major/minor, Master’s and doctoral degrees in data sciences and allied computing fields.

UC San Diego has a deep and long history in computing and computational sciences. The San Diego Supercomputer Center was one of four major institutions the National Science Foundation (NSF) supported back in the 1980’s that revolutionized academic scientific computing and large scale simulations and data processing for the national user community in the United States. In fact, the emergence of computing and data sciences have their origins in the funding the NSF invested in these institutions. The Telnet (forerunner of modern internet), the world wide web and high performance computing are a direct product of these investments. Throughout its more than 35-year history, SDSC has excelled in transitioning ideas and concepts invented in both industry and academia into practical research and education cyberinfrastructure serving research and education communities across all disciplines. In the academic arena, the engineering departments of Computer Science and Engineering (CSE) and Electrical and Computer Engineering (ECE) have played a major role over several decades in areas of Artificial Intelligence and Information Theory. ECE faculty led the formation of the California Institute for Telecommunications and Information Technology (CalIT2), a state-funded entity in partnership with UC Irvine. Information Theory (IT) became one of the foundational pillars of this Institute. CSE played a seminal role in the creation of Data Science academic programs at UCSD. Owing to generous funding from CSE alumnus Taner Halicioğlu, UCSD launched the Halicioğlu Data Science Institute (HDSI), which has had a meteoric growth over the five years of its existence. The formation of HDSI was spearheaded by faculty from several departments including CSE, Mathematics, Cognitive Science and ECE. CSE was the original home for the interdisciplinary Data Science Undergraduate Program, launched in 2017. The program has now moved to HDSI, the first undergraduate students have graduated and the demand for the major is growing dramatically. The recruitment of high quality faculty across diverse foundations and applications of data sciences in HDSI has been exceptional. The rapidly increasing need for trained data scientists with expertise in computing, the presence here of SDSC, and the launch of HDSI with its strong academic programs, offer an unprecedented opportunity to create a “whole is greater than the sum of its parts” integrated entity that combines all these elements. The realization of the potential synergies between education, training, and research, and the potential for revolutionary applications can be best accomplished through the creation of a School of Computing, Information and Data Sciences (SCIDS) as described in this proposal.

1.2 Mission of the Proposed School of Computing, Information, and Data Sciences

The broad mission of the proposed School will include student training and experience, research excellence, and development and sustenance of the next generation data infrastructure. The educational mission is manifold. The new School will provide a home for the increasing student population in the Data Science Undergraduate and Graduate Programs and serve as a nerve center for data and computational science-related educational activities bridging all academic units on campus. SCIDS will help bring all academic units on campus into a modern “big data” era and train next generation domain specialists who efficiently use emerging disciplinary data to engender new knowledge. This cross-fertilization will be accomplished through joint teaching and practical training
activities. The school will initiate a “Data Innovation Laboratory” that will provide the students with opportunities to use big data as a playground to learn the tools and techniques that will transform their preparedness for the “big data” world. SCIDS will also serve the new paradigm that no higher learning is complete without a sound training in domain-specific data science knowledge.

On the research front, it is becoming increasingly clear that every discipline of human endeavor, be it Arts and Humanities, Social Sciences, Natural Sciences, Engineering or Medicine, has data at the core. Confronting the future mandates expertise in the world of data analytics. SCIDS will serve as the bridge between disciplinary areas and computing technology through active engagement in cross-disciplinary data science research. The joint recruitment of faculty and research associates across SCIDS and other Schools and Divisions will create a roadmap for cutting edge research as well as entirely new sources of research funding support. SCIDS will also serve as the nucleus for centers that solve grand challenge problems in data science relating to multiple subjects including human health, environment, climate, and population-driven disciplines.

SCIDS will also play an important role in creating a unique niche at UC San Diego for establishing rich and rewarding collaborations with the thriving local industry in San Diego. It will provide the much needed data hub that will link the burgeoning regional industries (biotech, communication and other) and provide the information highway. It will link the UC San Diego Rady School of Management with emerging new companies in the region as well as with established industry partners. In addition to the commercial and entrepreneurial enrichments, SCIDS will also serve the Southern California community with new opportunities for retraining to face the data-rich world.

2. FOUNDATIONS FOR THE PROPOSED SCHOOL

UC San Diego has a long and noteworthy history, in the 62 years since its founding, of serving as the harbinger and paradigm for new and innovative disciplines. The Scripps Institute of Oceanography spearheaded the launch of marine biosciences. The San Diego Supercomputer Center was at the heart of revolutionary technologies including the Telnet. UC San Diego established the first departments of Cognitive Science and Nanoengineering. The list is long and laudatory.

Over a period of three years from 2013 to 2016, various faculty members drawn from Mathematics and Computer Science and Engineering had examined the need for a major and/or minor in data science as a subject area. A steering committee of faculty members drawn from CSE, Math, and Bioengineering pulled together a formal proposal for the Data Science undergraduate major that was approved and launched in 2016. Around the same time, CSE and SDSC had also launched a professional Master’s degree program in Data Science and Engineering (DSE). Today both programs continue to thrive. Responding to a challenge by the Chancellor in Winter 2016, the campus held several townhall meetings and empaneled a Senate-administration task force to examine how a campus-wide Data Science Initiative could be organized. These activities led to the formation and launch of the Halicioglu Data Science Institute (HDSI) as the campus hub for Data Science in March 2018. HDSI was approved by the Academic Senate at UC San Diego and Systemwide and accorded status of an academic unit in June 2018. The Data Science major and minor were transferred to the Institute in 2019.
Over the past three years, the Institute has made significant progress in building its academic programs and community. With over 800 students in its major and 200+ students in its minor, the Institute has graduated the first two cohorts of data scientists who have been eagerly absorbed into academic and industry careers. The Institute has recruited 16 new faculty members, while a few faculty members have transferred partial appointments to the Institute thus creating a faculty council of 25 Senate faculty members as its primary governing body. Presently the Institute is in the process of launching its approved MS and PhD programs in Data Science as well as an online Master of Data Science program in collaboration with the CSE department.

The presence of the San Diego Supercomputer Center (SDSC) and the newly established Halicioğlu Data Science Institute (HDSI) offers an unprecedented opportunity for UC San Diego to establish a premier School that in addition to bridging the entire campus will serve as an exemplar for institutions of higher education. The founding pillars for this proposed new School are SDSC and HDSI, supported by the existing academic Divisions and Schools, a California Institute for Sciences and Innovation, and a premier University Library. We provide a broad view of existing foundations and potential synergies in the proposed School in the schematic below

SCIDS Connections and Synergies

2.1. San Diego Supercomputer Center (SDSC)

The San Diego Supercomputer Center (SDSC) is one of the nation’s premier centers for high-performance and data-intensive computing, and the only center of its kind in the University of California system. The scope in computing and expertise (in scale, nationally, and across domains) at SDSC, backed up by expansive computing infrastructure, ongoing grants and contracts, and funded partnerships with industry will immediately catalyze the collaborative research and experiential learning opportunities in SCIDS.

SDSC was established as one of the nation’s first supercomputer centers under a cooperative agreement by the National Science Foundation (NSF) in collaboration with
UC San Diego and General Atomics (GA) Technologies, opening its doors in 1985. Since then, it has grown and stewarded a national reputation as a pioneer and leader in high-performance and data-intensive computing and cyberinfrastructure. Located on the campus of UC San Diego, SDSC provides resources, services and expertise to UC San Diego, the UC System, State of California, the national research community, and the private sector. SDSC supports a wide range of multi-disciplinary programs that engage tens of thousands of individual researchers and users, spanning a wide variety of domains from astrophysics, biology, and earth sciences to bioinformatics and health information technology.

Some important dates in the evolution of SDSC are noted below. An extensive, interactive timeline of SDSC’s history is available at: https://timeline.sdsc.edu.

- **1985**: Founding of SDSC, following award of unsolicited proposal by the Founding Director, Sid Karin, SDSC open its doors under a cooperative agreement with General Atomics and UC San Diego. That same year, a Cray X-MP entered production operations as SDSC’s inaugural supercomputer.

- **1997**: A partnership led by UC San Diego is one of two winners selected in NSF’s Partnerships for Advanced Computational Infrastructure (PACI) competition. As a result, UCSD assumes oversight for SDSC, taking over operational responsibility of the center, and transferring all staff from being GA employees to being UC San Diego employees. At this time the State of California also formalized the broad role of SDSC through line-item funding in the State budget. Over the years, this has evolved from direct funding from the state to funding from UCOP via UC San Diego. Today, UCOP funding makes up roughly half of the core budget of SDSC.

- **2005**: NSF awards funding to SDSC as part of the Extensible Terascale Facility (ETF), also called TeraGrid, TeraGrid which at the time, is the world’s largest, most comprehensive distributed cyberinfrastructure for open scientific research.

- **2011**: NSF awards funding to SDSC as part of the Extreme Science and Engineering Discovery Environment (XSEDE), the successor to the TeraGrid project. In 2016, NSF extended XSEDE (XSEDE 2.0) another 5 years, where it remains in operation. Proposals for the XSEDE follow-on are currently under review and we expect SDSC will be part of one or more awards under that program.

- **2013**: UC San Diego and SDSC establish the Triton Shared Computing Cluster (TSCC), a campus computing facility operated via a condominium business model, i.e., researchers buy hardware from a menu of choices offered by SDSC, and SDSC operates the system on behalf of the researchers. UC San Diego provides support for the operating expenses with the understanding that this is more cost effective than researchers deploying hardware in their own buildings. SDSC also offers part of its data center as a UC San Diego-supported co-location facility for hardware owned and operated by UC San Diego researchers, again reducing the

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7 [https://timeline.sdsc.edu](https://timeline.sdsc.edu)

overall cost of ownership to the university in terms of space and utilities, while providing better value to the researchers.

- **2016 – present:** In a series of back-to-back awards, SDSC received funding for high-performance computing systems, Gordon, Comet, Expanse, Voyager, and the National Research Platform, ensuring SDSC’s leadership in supercomputing for the next decade (see Appendix 2 for additional details on these and other computing infrastructure at SDSC.)

Today, SDSC has close to 40 PIs who obtain extramural funds with expenditures totaling more than $30M per year supporting more than 200 researchers and staff. SDSC has no faculty lines, and thus no explicit teaching mission within the context of UC San Diego. Nevertheless, SDSC has significant education, outreach, and training activities within its other scopes that have been growing significantly over the last 5 years or so. This is discussed elsewhere in detail.

SDSC consistently ranks among the top 5 organizational units by grant funding among the 68 such units on the general campus of UC San Diego.

### 2.2 Halicioğlu Data Science Institute (HDSI)

In 2015, faculty presented the Chancellor a blueprint for creating a data science and engineering initiative – an activity that encompassed academic, research, and infrastructure components to place UC San Diego on the “big data” map. In 2016, a distinguished alumnus, Taner Halicioğlu, provided significant funding to support the launch of a data sciences institute. With the support of the Academic Senate, the Halicioğlu Data Science Institute was formed as a transdisciplinary academic unit with the ability to appoint faculty and develop undergraduate and graduate academic programs in 2018. The undergraduate major in Data Science was initially developed as a multidisciplinary program shepherded by the Department of Computer Science and Engineering and was transferred to HDSI. In 2020 HDSI graduated its first class of bachelor’s students and initiated a Master’s and Ph.D. program. Faculty who were 100% in HDSI grew to 12 with over 15 joint and adjunct faculty. HDSI was also successful, owing to its academic excellence, in garnering significant extramural research funding amounting to over $20M. The undergraduate student population has now reached a steady state of 800 Data Science Major students, with demand exceeding capacity. In addition, HDSI also offers a Minor in Data Science, and this population is steadily growing from a current size of 200 students. HDSI is also in the process of offering joint M.S. programs with other units, such as a joint M.S. program with Bioengineering and a M.S.-M.D. program with Health Sciences. This rapid and dramatic growth, while in tune with the growing demand for data scientists, also attests to the pre-eminence of HDSI and UCSD. HDSI also has witnessed exceptionally strong collaborations with SDSC leading to exciting and innovative educational initiatives. This explosion in educational and research initiatives warrants a broader umbrella and the creation of SCIDS would enhance the objective, sustenance and success of the data science initiative at UC San Diego.

At the administrative and operational levels, HDSI functions much like a department, albeit reporting to the Senior Associate Vice Chancellor for Academic Affairs who serves
as the Dean Designee overseeing HDSI and SDSC. Given the growth in HDSI and the unique infrastructure supporting computation and applied data science in SDSC, dedicated administrative oversight through formation of a school with an academic dean reporting to the Executive Vice Chancellor will be the optimum way to support the development of these two growing units, providing another strong motivation for the proposed School. The Dean of the proposed School will serve to oversee the activities and growth of HDSI and SDSC in addition to building partnerships with other campus units to build transdisciplinary research and education in Computing, Information and Data Sciences.

2.3. Other Campus Units - Departments and Centers

2.3.1. Department of Computer Science and Engineering

UCSD has one of the top-ranked Computer Science departments in the U.S. Besides training a very large cohort of students in computer science, the Department has outstanding research faculty whose expertise spans all areas of computer science and engineering ranging from AI to embedded systems. The department provided a foundation for the establishment of HDSI, with significant shared faculty and research themes. While CSE includes much more than computing, information and data science research and SCIDS will span multiple areas beyond those covered by CSE, it is important to recognize the significant overlap between the Department of CSE and SCIDS. The two units will unequivocally benefit mutually, and this will enhance the stature and standing of UC San Diego as a leading institution in both computer and data science research and training. Given the overlap and presence of several joint faculty (between CSE and HDSI), it will be beneficial for CSE to have an affiliation with SCIDS, even while retaining its primary status in the Jacobs School of Engineering. We propose this approach in designing the administrative structure of SCIDS and discuss it later in the Proposal.

2.3.2. Department of Electrical and Computer Engineering

The Electrical and Computer Engineering (ECE) department traces its roots back to the establishment of the Applied Electrophysics department in 1965. Through a succession of department realignments today’s ECE emerged in 1987, when the then-combined Electrical Engineering and Computer Science department was split into two departments. Since then, ECE has earned a world-class reputation for producing top-notch engineers for industry and academia. Information and communication theory, intelligent systems, and robotics and control have been major emphasis areas in ECE. ECE faculty have led national and international projects that have served as the underpinnings of modern information theory with significant applications to data sciences. ECE was instrumental in the formation of the California Institute for Telecommunication and Information Technology and played an important role in the creation of HDSI. The strong existing interactions between ECE and HDSI lead us to propose a formal administrative affiliation, like CSE, that will be addressed in section 7.1 of the proposal.
2.3.3. Department of Cognitive Science

The Department of Cognitive Science is home to faculty and students conducting research over a wide range of scientific disciplines including computation, data science, machine learning, artificial intelligence, education, human animal cognition, psychology, ethnography, neuroscience, genetics, design, human-computer interaction, and linguistics. In all these areas, the application of data science and large-scale computational methodologies is key to the development of modern research programs. Accordingly, many of the faculty currently composing Cognitive Science have been leaders in their fields with respect to the design and execution of large-scale, data and computation intensive research initiatives on an international scale. These areas include work in organization of communities-wide urban planning, computational and statistical approaches to genomic and imaging data, the adaptation of data science practice to neuroscience, the development of widely-distributed instructional practices in data science, the development of media to foster skill-building in programming techniques (e.g., Python Tutor), and machine learning approaches to computer vision and language processing.

Cognitive Science has had, and will continue to have in the future, a close relationship to the work of SCIDS. Several faculty including the late Professor Jeff Elman have been involved in the creation of HDSI and are expected to play an important role in SCIDS. There is significant overlap in research and educational interests between the Department of Cognitive Science and SCIDS. The two units will unequivocally benefit mutually, and this will enhance the stature and standing of UC San Diego as a leading institution in data science research and training and their applications to the highly diverse set of data types examined and processed in the practice of Cognitive Science. Given the overlap and presence of several joint faculty between Cognitive Science and HDSI, it is likely that Cognitive Science will have a formal affiliation with SCIDS, similar to CSE and ECE, even while retaining its position with the Division of Social Sciences.

2.3.4. Department of Mathematics

The constant flow of ideas between various branches of mathematics and various data intensive sciences has been instrumental in advancing both — increasingly so in the modern world where data is becoming ever more abundant, along with the challenges and opportunities associated with it. On the one hand, there is an ever-growing need for computational methods that can handle large amounts of data and model ever-larger and more complex systems. At the same time, the advent of such computational methods often precedes a deep theoretical understanding of their potential and limitations. As such, mathematics, both pure and applied, will play a critical role in the research mission of SCIDS.

Mathematicians working in Applied and Computational Harmonic Analysis, Approximation Theory, and Functional Analysis, motivated by application areas ranging from seismology to machine learning, are continuing to develop fundamental, rigorous methods that have benefited the scientific community at large. Examples of their successes include Wavelets, with their applications in signal and image processing, in computational methods for solving differential equations, and Compressed Sensing with
its insights into reducing the complexity and cost of data acquisition. As another example, the interaction between mathematicians, computational scientists and data scientists has leveraged insights from graph theory and geometry to empower scientists to model, analyze, and understand complex networks. Optimization Theory and Numerical Analysis will continue playing a critical role in developing and analyzing computationally efficient algorithms for solving scientific problems. Indeed, there is no shortage of examples of current and potential future engagements between mathematics, computing, and data, including those aimed at revealing the mathematical underpinnings of novel, powerful computational techniques like deep learning, among others. Statistics also plays a central role in data analysis and acquisition, as has been the case since its consolidation as a field of research over more than a century. Its more mathematical specialties --- some well-represented among the statisticians residing in the Mathematics Department --- play a similar role with respect to the broader field of Statistics in that the developed theory helps bring a deeper understanding of the problems and methods used to solve them. The interaction with Applied Mathematics in the area of Approximation Theory and Optimization has been very fruitful and has led to a tremendous amount of research over the years, including in the aforementioned areas of Wavelet Analysis and Compressed Sensing developed at the intersection of these fields with Statistics. Additionally, Statistics is perhaps uniquely placed to derive inference for data, which is after all its ‘mission statement’.

Given this background on how, for the past many decades, Applied Mathematics and Statistics in their various forms have contributed methods and theory to the betterment of data collection and analysis, it is only natural that these disciplines and the faculty in the Mathematics Department in these specialties will play an important role in the development of SCIDS: Several faculty members in Mathematics have been associated with the creation of HDSI. Creation of SCIDS will bring some focus to this symbiotic relationship, which will likely manifest as further joint appointments. Ultimately it may make sense for the Department of Mathematics to also engage more formally with SCIDS in a manner similar to CSE and ECE, as discussed in the section on administrative structure (section 7.1).

2.3.5. California Institute for Telecommunication and Information Technology (CalIT2) and the QUALCOMM Institute (QI)

CalIT2 was born as a result of funding from the State of California to support the establishment of leading research institutes at the University of California. Amongst three such funding initiatives, CalIT2 was established jointly between UC San Diego and UC Irvine, and is now being expanded to include UC Riverside. The UC San Diego manifestation of CalIT2 is the Qualcomm Institute, and was established to foster work on Telecommunications and Information Technology. Over the last two decades of operation, it has developed two broad capabilities and collaborative programs the presence of which at UC San Diego will be of significant academic value to SCIDS.

To sustain advances in data science, access to new types and larger amounts of data will be critical. In this regard, QI’s experimental facilities, regionwide deployments and technical expertise in Nanotechnology, Wireless and Photonics will help develop new kinds of sensors that are sure to enhance the impact of research conducted within SCIDS.
QI offers to SCIDS a combination of advanced experimental facilities to probe the physical world and technical professionals to foster intellectual collaborations. Furthermore, SCIDS researchers will be able to develop collaborations that could result in the invention of new data sensing modalities.

As the benefits of AI and machine-learning (ML) techniques grow, their use will become more pervasive. There are already growing concerns that the unchecked use of these techniques could lead to undesirable societal consequences. QI’s programs, especially the Gallery@QI and Digital Exploration of Arts and Sciences, have fostered critical engagement between the arts and technology that can help illuminate the new futures that SCIDS faculty may wish to explore. Finally, QI’s experience in developing robust interdisciplinary collaborations could inform planning for the future of SCIDS. QI has shown that sustained investments in facilities, expertise and programming ultimately leads to widely recognized boundary crossing work. There are numerous examples of collaborations that were critically enabled by researchers and technical professionals working in shared use labs in QI.

2.3.6. The UC San Diego Geisel Library

The UC San Diego Geisel Library will play an important role in supporting the new school. The Library will build on existing investments in data acquisition and curation, expand on existing collaborations with HDSI and SDSC and consider new investments in staffing, information resources and spaces to meet the expanded needs of undergraduate and graduate students. These investments would create an opportunity for the Library to further act on its vision to serve the emerging forms of scholarship at UC San Diego in computing, information and data science, and are in harmony with the goal of supporting the student-centered and research-intensive mission of the university.

As a national leader working to advance research and practice in data preservation, open access and data publishing, the Library already has considerable staffing and resources dedicated to supporting data-intensive research. This includes a Research Data Curation Program (RDCP) dedicated to data curation and data science and existing services in data publishing, data sharing, Geographic Information System (GIS) and data visualization. Existing collaborations with HDSI, SDSC, Research IT and other departments include an emerging partnership to build a platform for ‘research ready’ datasets for undergraduate learning, in-library labs to support GIS and Digital Humanities work and investment in data preservation and data sharing services based on SDSC infrastructure. While the Library already dedicates resources to acquiring datasets from publishers, additional investments at the UC San Diego and UC-wide level would be beneficial in ensuring that students and faculty have access to data to support innovative learning and research.

In addition to supporting the school through increased investment in datasets appropriate to undergraduate and graduate student research the Library will be able to build new partnerships that support closer collaboration and support between librarians, faculty and students. The Library will have a unique leadership role to play in Information Science topical areas including data description, curation, publishing, ethical use of information and socio-political constructs of data and information. This work may include the development of expertise in existing roles that directly support faculty and student needs.
around research data access, analysis, publishing and management. Additionally, through the present network of nearly sixty librarians the Library will expand on existing work supporting research to include better support for the interdisciplinary goals of SCIDS.

Finally, the physical infrastructure of the Library can play an important role. Recognizing that the students in this newly established school will seek out academically-focused spaces that support their learning and research, the Library plans to better equip spaces to support data-intensive research (e.g. spaces that are connected to data and compute resources through high-speed networks, spaces equipped with tools to support data visualization and collaboration and virtual spaces that enable students to quickly access and share data and code connected to their learning). In other words, the UCSD Library will become a living learning laboratory for our students with access to data and information in a seamless and knowledge-driven manner.

2.4. Other Campus Units – Schools, Divisions, and SIO

2.4.1. School of Medicine

Health Sciences has emerged as the largest generator and consumer of “big data” sciences. The School of Medicine (SOM) at UC San Diego has data analytics needs that relate to basic, translational, and clinical research, as well as the quality of patient care and other operational initiatives. Partnership with data scientists from SCIDS will strengthen biomedical data science efforts already underway in various basic science and clinical departments. For example, the Divisions of Biomedical Informatics and Medical Genetics in the Department of Medicine, the Division of Genomic Science in the Department of Pediatrics, the Divisions of Informatics in the Departments of Ophthalmology and Anesthesia, the Epigenomics Center in the Department of Molecular and Cellular Medicine and bioinformatics faculty in various other units are dually trained in specific clinical specialties as well as informatics, data science, or statistics. For basic research, we envision SCIDS partnerships focused on developing algorithms and tools to extract novel biological information from the combined analysis of large and complex omics (genomic, epigenomic, metabolomics) public datasets. For translational and clinical research, SCIDS will benefit from partnerships with the SOM faculty as they will serve as a gateway for access to real clinical data and/or genomic data from human subjects. The regulatory issues surrounding these data are well understood by SOM faculty and will extend to SCIDS collaborators. We envision the partnerships to evolve around solving real problems that serve as motivation for the development of new algorithms and tools to process, harmonize, and ultimately compute with sensitive data using novel approaches that balance data sharing and privacy protection of patient data.

Faculty in the SOM face several challenges in the generation and accessing of large-scale sequence data sets. A large fraction of the SOM faculty generates such datasets for their research and most of this is done at the UCSD IGM Genomics Center. Some other generate images or physiologic signals. All these require specific types of pre-processing and analyses. Currently, the Genomics Center is transferring all their system administration responsibilities to the SDSC including data storage, software maintenance, creating customer portals (about 200 customers) and database management. This will support basic researchers in the SOM and better enable (faster data transfer) them to
utilize the SDSC USS storage system. A separate issue faced by many researchers in the SOM is the arduous task of getting permissions and the storage space required to access and download large publicly available datasets (e.g., UK Biobank). These issues faced by the SOM faculty will exponentially increase over the next decade. A service component with oversight from SCIDS could help SOM faculty with these current and upcoming issues. Such a component could simultaneously serve as a large source of revenue (recharge) to support the expansion of computational resources needed by the SCIDS faculty. This component of SCIDS could also serve to train individuals (e.g., Masters programs) in how to efficiently perform system administration of large-scale datasets, currently a skill set in high demand in both academic and industry settings. It is expected that the demand for individuals with such skills will skyrocket over the next five to ten years. Management of HIPAA- and FISMA-compliant environments for research and education would also be an asset to UCSD in general.

The research and training needed for the future of health sciences and the School of Medicine strongly warrants the creation of a School that will provide a unique opportunity to serve as the next-generation data-driven health care incubator. An exemplar peer program is the Innovative Joint Program in Computational Precision Health at UC Berkeley and UCSF that promises to improve quality and equity of health care.

2.4.2. Herbert Wertheim School of Public Health and Human Longevity Science

The UC San Diego Herbert Wertheim School of Public Health and Human Longevity Science (SPH) was established in 2019, although UCSD has a longstanding activity in public health activities with emphasis on data analytics. Public health has been described as the intersection of epidemiology and social justice. Events of the last year have certainly emphasized this observation. The Master of Public Health Program (MPH) at UC San Diego strives to address these critical aspects of public health with a program of academic rigor and an emphasis on equity and social justice across the MPH program and the SPH. 2020 was a year of firsts for the UC San Diego MPH. The first class graduated in June 2020, and two new concentrations: Public Mental Health and Technology and Precision Health were added. And perhaps most importantly, the MPH is one of the seven initial education programs of the new SPH. Recognizing the need for public health data and analytics, SPH has already partnered with HDSI in joint faculty recruitment.

More than any other time, the COVID pandemic has pointed to the need for vast data analytics in the context of greater San Diego, the border region, and Southern California in the global context of disease transmission. At the local level, UCSD has taken leadership in wastewater-based analytics leading to early detection of SARS-CoV-2 and to geographic spread of the infection. Such tracking has largely led to diminished infection rates and pointed to the important need for data gathering, analytics and predictive computing. The establishment of SCIDS will accelerate the efforts to bring data science in a major way to SPH and establish UCSD as a leader in Public Health and Human Longevity science.
2.4.3. Skaggs School of Pharmacy and Pharmaceutical Sciences (SSPPS)

The advent of modern genomics has led to precision medicine approaches to pharmacy and pharmacology. Two large initiatives, spearheaded by SSPPS involve systems pharmacology with a foundation in the deep analyses of multimodal data from human physiology, pathology and precision pharmacology. The key underlying feature in these analyses is the application of data science methods to understand individualized responses to therapeutics studied in humans and human model systems. The data intensive nature of modern pharmacology is already being harnessed by SSPPS as well as sister institutions in California, especially UC San Francisco.

SSPPS already has an extensive data analytics presence through recruitment of outstanding faculty involved in data and computation and are now partnering with HDSI in establishing a data-rich pharmacy program. In addition to the PharmD program, SSPPS is exploring options and opportunities for joining with HDSI and SDSC in establishing data-intensive training programs in Pharmacology. The creation of SCIDS will enhance unique opportunities for creating a premier Pharm-Data Analytics program.

2.4.4. Scripps Institution of Oceanography

The Scripps Institution of Oceanography (SIO) is a world leader in earth environmental sensing; obtaining data to advance basic science and to inform environmental policy and public health. The Keeling Curve, the first data to show the 20th century increase in global CO₂ (the central graphic within the lobby of the National Academy of Sciences) is a prime example. With the ever-increasing amounts of observational data (from ships, gliders, moorings, satellites, pier monitoring, land-based sites) and the rapidly increasing diversity of variables being monitored (ecological, geologic, atmospheric, seismological, hydrological, fire, microbial, genomic, sustainable commercial resources, epidemiological) there is a growing awareness of the interdisciplinary breadth, holistic thinking, and most importantly, the technical expertise required to make breakthroughs that best serve society. We believe that establishing SCIDS will be an enormous benefit to help maintain and accelerate SIO’s mission in basic research and education in environmental and earth science. Moreover, SIO can in turn contribute extensive data resources and connections to critical environmental problems as grist for collaboration within SCIDS. This will be key in areas where data and expertise from other domains (e.g., economics and public health) can open new directions for high profile data-driven research (e.g., understanding complex causal networks that might include economic concerns, industrial climate impacts, fire pollution, respiratory disease, environmental inequity etc.). Identifying specific sets of problems and ambitious signature applications will fulfill a key goal for establishing a UCSD brand in data-driven fundamental and applied science.

Several data-centric research themes relevant to SIO and SCIDS are echoed in the first figure in section 6 of this proposal. This includes advances in forecasting (in particular, detecting early warning signs of critical transitions and systems collapse), data assimilation, empirical systems modelling, identifying causal linkage between variables, etc. The ever-growing quantity and quality of hyper-dimensional data (e.g., satellite and ground-based observations), presents an unprecedented opportunity and challenge to engage computational and data-driven assets to advance our understanding of nature.
and society. Among the many important cross-cutting research themes and problems that can be synergistically pursued, improving data archiving and accessibility is probably paramount, and is essential to all data-driven research. It is nationally and globally important that the highly complex earth and environmental monitoring data are preserved and made easily accessible (and can be synchronized with data streams from other domains). An SIO-SCIDS collaboration could provide important support and attract major funding for improving data synchronization and accessibility. Institutional incentives could be created to help communities of interested faculty and students coalesce around the growing data hubs. SIO currently has courses in data-driven discovery that could easily be incorporated into an SIO-SCIDS curriculum. The unique data acquisition capabilities of SIO combined with the expertise and focus that SCIDS can bring to these problems could provide an enormous boost to the standing of UC San Diego as a leader in fundamental and applied sciences.

2.4.5. Rady School of Management

High-powered computations and the ability to store, manipulate, and analyze very large data sets play a crucial role in the research and teaching mission at the Rady School of Management. Data are used in research projects in economics, finance, accounting, marketing, and information systems spanning topics such as small business ownership and lending to women and minorities, eye-tracking and consumer choice, mutual fund investment decisions, and predictability of firm-level profits. Computing power is also used to solve complicated non-linear optimization problems in areas such as financial econometrics and dynamic general equilibrium models in economics. Students in the M.S. Business Analytics, Master of Finance and Master of Professional Accountancy programs have been using large data sets in their capstone projects and their training would clearly benefit from access to state-of-the-art computing resources fostered through tight connections between SCIDS and Rady.

A number of faculty at Rady use very large data sets in their research and depend on the ability to conduct state-of-the-art analytics. They will benefit considerably from the advent of SCIDS. Current projects span a range of topics, including the development of a database to examine issues of equity in small business ownership examining the near-universe of small businesses in the U.S. (approximately 65.5 million businesses and 127.5 million owners), including individual owners’ gender and race/ethnicity. A current use of this data set examines inequality in government lending programs during COVID-19 with a focus on the Paycheck Protection Program (PPP). Neuroeconomics and consumer neuroscience is another promising area, using data on neural activity to predict market success and customer needs. This combines non-invasive big data methods such as functional magnetic resonance imaging (fMRI) to correlate neural responses with how individuals make decisions with economic consequences. The application of machine learning methods to understand mutual fund portfolio decisions generates vast temporal data sets that require new methods to analyze and interpret. These are only a few examples of some of the rich opportunities for engagement with the new school that will also have impact beyond the University. The ability to retrieve, analyze, and store vast amounts of data is fast becoming a key driver of the business models of many new and established firms, and the interaction between the Rady School of Management and
SCIDS has the potential to be a pivotal asset in coordinating and furthering many of the associated efforts in the San Diego region and beyond.

2.4.6. School of Global Policy and Strategy

The increasing role data flows and data reduction play in geopolitical events, climate change and development of the global economy provides a strong driver for future interactions with SCIDS. The School of Global Policy and Strategy (GPS) already has joint appointments with SIO in the area of societal impacts of climate change and is currently engaged in a joint faculty search with HDSI on Data Science and Public Policy, focusing on the interconnected fields of economics, political Science, and public policy. It is anticipated that the existing excellence in quantitative policy analysis, development economics and measures of the disruptive socioeconomic impacts of innovation in both GPS as well as the Rady School of Management and the Departments of Economics and Political Science in the Division of Social Sciences will provide an excellent foundation and synergistic development of both SCIDS and these academic units.

2.4.7. Jacobs School of Engineering

UCSD JSOE ranks 9th in the US World and News Report for best Engineering Schools across the U.S. with several top 10 departments/programs. This pre-eminent standing owes to leadership in multiple engineering disciplines including data, computation and information science and engineering. As described previously, HDSI has strong ties to the CSE and ECE departments and the intersections between data, computation, and all engineering departments cannot be understated. While CSE and ECE have established leaders in AI, ML and Information Theory, the department of Bioengineering launched the top ranked bioinformatics program in the U.S. two decades ago, being one of the first institutions in creating a national thrust in this field. The Biological Information Science and Technology Initiative of the National Institutes of Health and establishment of the Computer and Information Science and Engineering directorate at the National Science Foundation had substantial input from JSOE faculty and this has led to pioneering research in data science applications.

Creation of SCIDS has enormous synergies with JSOE and the large number of joint appointments between HDSI, SDSC and JSOE are a testament. We anticipate development of several opportunities for undergraduate engineering majors to train through joint curricular offerings between JSOE and SCIDS. Further, our industry advisors have enthusiastically endorsed the creation of new interactions between SCIDS and JSOE and they anticipate the growth of industry consequently in the larger San Diego area.

2.4.8. Division of Arts and Humanities

An important aspect of the foundation for SCIDS is that UC San Diego is a comprehensive research university with an outstanding Division of Arts and Humanities, with highly ranked departments including Theatre and Dance, Music, Philosophy and Visual Arts. Today these programs have increasing overlap with data science and computation. The division has been a pioneer in the establishment of a premier digital arts program and a data-intensive ethics program. In recognizing that our society lives in a digital age with
competency in data and analytics guiding our day-to-day lives and enriching our engagement with arts and humanities, it is imperative that we lead the development of educational programs for students in the arts and humanities laced with digital and data knowledge. The need for a humanistic, philosophical understanding of the critical issues of ethics in data science, machine learning and artificial intelligence is already leading to collaboration. HDSI has built a connection with the Department of Philosophy and the Institute for Practical Ethics through a joint faculty appointment, and it is anticipated that this will inevitably be an important component in the future development of SCIDS at UC San Diego, and the fields of computing, information and data science in the decades to come.

2.4.9. Division of Biological Sciences

Data Science is fundamentally an interdisciplinary science whose strengths shine at its interfaces with domain sciences, especially modern life sciences. This opportunity places SCIDS in a uniquely interdisciplinary domain rather than a traditional, independent and self-sufficient school. Areas like Quantitative Biology and Biostatistics will naturally develop strong interactions with SCIDS that builds on existing interactions with both HDSI and SDSC to facilitate research advances in these fields. The rate of data generation by biologists has exploded in the past few decades—neuroscience, genomics, transcriptomics, to name a few. It would be powerful if SCIDS had an entire department/section dedicated to the interface between Biology and Data Science (Section of Data Science of Biology) where a collection of faculty can share knowledge and approaches applied to multiple aspects of biological systems. Each faculty in SCIDS in these sections would have a joint appointment with the partner department. Such an arrangement would benefit from a critical mass to jump start the interactive domains and train next generation students. Several institutions like MIT have already embraced this paradigm, and HDSI already has at least one joint appointment with the Division of Biological Sciences, so the foundation is already laid here as well.

2.4.10. Division of Physical Sciences

Interactions between the Department of Mathematics and SCIDS have already been discussed, but there are also strong interactions with both the Department of Chemistry and Biochemistry and the Department of Physics within the Division of Physical Sciences, and SDSC as well as HDSI. It is expected that with the advent of SCIDS, these existing ties will strengthen, and new collaborations will form. Chemistry and Physics are both fields that seek to quantitatively understand natural phenomena over incredible scales of time and space through measurement and rigorous theory. Both these departments already have very strong interactions with SDSC, and faculty from both have also engaged with HDSI as founding members. Both departments also span large swathes of their respective disciplines, from astrophysics to particle physics, biophysics to structural biology and molecular synthesis to manipulation of quantum information from the perspective of both physics and chemistry. Increasingly, machine learning and data science techniques are becoming essential tools for the physical sciences, ranging from large heterogeneous multi-scale simulations to reconstruction of data from complex instruments. Several joint grants with SDSC already exist, and in addition DPS researchers have equipment hosted in the SDSC data center and access large national
computational resources through SDSC. The most recent major instrumentation grants at SDSC, Voyager and NRP (see Appendix 1), already are collaborative ventures across the physical sciences, HDSI and SDSC. The opportunity for joint appointments between these units and SCIDS in the future will be an important part of the continued advancement of these disciplines, and their presence on campus contributes to the underlying foundation for SCIDS in a material way.

2.4.11. Division of Social Sciences

Modern social sciences, including Communication, Psychology, Linguistics, Sociology, Economics, and Political Science, rely on large scale analyses of naturalistic trace data – data that emerges from the internet-mediated interaction of millions of people. With the aid of computational tools, such massive datasets are leveraged by political scientists to identify how conspiracy theories spread in social networks, by linguists to trace the cultural evolution of language, or by economists to estimate the consumer impacts of sector-specific inflation. These overlapping interests, methods, and approaches forms the basis of an interdisciplinary area called Computational Social Science – currently a suite of interdisciplinary programs in the division of social science. A formal relationship between Computational Social Science and SCIDS would be a powerful source of interdisciplinary research between social, data, and computational scientists, where jointly appointed faculty could translate between the social science domain knowledge and data sources and computational tools from SCIDS. Ultimately, once joint-affiliation of departments across schools becomes feasible, Computational Social Science forms a natural bridge between SCIDS, and an interdisciplinary team of computational researchers throughout the social sciences. The connection with the interdisciplinary Computational Social Science program is in addition to the existing strong interactions between the Department of Cognitive Science and HDSI that will constitute an additional connection to SCIDS.

2.4.12. Division of Extended Studies

As a bridge between campus and community, the Division of Extended Studies plays a key role in both training students and employees for the demands of local industry and informing academic endeavors across the campus. For example, Extended Studies offered courses in the 1990s and early 2000s in bioinformatics, a nascent field at the time, with large enrollments meeting the needs of local industries while campus academic programs were being implemented. Fields such as data science, communications, healthcare, and defense may offer similar potential going forward. Extended Studies is broadly viewed as a literal extension of UC San Diego: its expertise, its resources, and its name. As part of the Chancellor's strategic plan to connect the institution to the greater San Diego area, Extended Studies has partnered with the San Diego Public Library to provide events, lectures, and courses at over 26 library locations, at no cost to community members or the campus. Library NExT was created in collaboration with the Sally Ride Science program based in Extended Studies, which runs offerings to inspire young people in STEM, in coordination with the Scripps Institution of Oceanography (SIO) and the SDSC. Jacobs School of Engineering and Rady School of Management also support Library NExT. Workshop topics include Messy Science, Introduction to Virtual Reality,
and Introduction to Python, and the program also provides test preparation and college counseling for students and their families, with a focus on underserved communities.

Given the imminent need for data and computational literacy among the public, SCIDS will also seek to offer courses in collaboration with Extended Studies to the larger San Diego Community. These will include, short “learn-by-practice” courses and workshops for the public, summer courses for K-12 and community college students to prepare them for higher education, academic courses to complement SCIDS courses for our undergraduate students, and intensive courses for the local industry participants. The development of program offering hands on training exercises in data usage and computing will be a rich area for collaboration between SCIDS and Extended Studies.

3. RELATIONSHIP of SCIDS to UC SYSTEM and PEER EDUCATIONAL PROGRAMS, and the COMMUNITY

In creating a new school/division/college, it is important to consider the national context and national trends. We begin with a view that looks nationally, and then narrow down to universities in the UC system, and finally consider other segments of higher education in California.

3.1. National Context. There are many examples of schools/colleges/divisions whose name includes the word Computing, and that focus on Computing and Data. All these schools contain a department of Computer Science; sometimes they contain an Electrical Engineering and Computer Science department; and they always contain a few other departments, most commonly a department of Information Sciences and a department of Statistics (but other examples include departments of Interactive Computing, Artificial Intelligence, Machine Learning, Computational Biology, etc.).

In some of these schools, the membership of the departments is exclusive to the school. This includes:

- UC Irvine: Donald Bren School of Information and Computer Sciences with 3 departments (Computer Science, Informatics and Statistics).
- Carnegie Mellon University: School of Computer Science with 7 departments (Computational Biology, Computer Science, Human-Computer Interaction, Software Research, Language Technologies, Machine Learning, Robotics)
- Georgia Tech: College of Computing with 5 departments (Computing Instruction, Computational Science and Engineering, Computer Science, Cybersecurity and Privacy, Interactive Computing)
- University of Wisconsin-Madison: School of Computer, Data & Information Sciences, with 3 departments (Computer Science, Information School, and Statistics)

However, the more common situation in recent years is that departments have joint membership. In these cases, a department (for example Computer Science or Electrical Engineering and Computer Science) would be affiliated with both the new school and in another academic unit like a school/division/college of Engineering. Examples of such joint affiliations include:
UC Berkeley: Division of Computing, Data Science and Society, which includes a department Electrical Engineering and Computer Science (which is also part of the College of Engineering).

MIT: Schwarzman College of Computing, which contains a department of Electrical Engineering and Computer Science (which is also part of the College of Engineering)

Cornell: School of Computing and Information Sciences, which includes a department of Computer Science (which is also part of the School of Engineering)

The University of Washington: School of Computer Science & Engineering, which is also part of the College of Engineering.

3.2. UC System Initiatives. We now focus more specifically on the two examples in the University of California system that have schools focused on Computing and Data: UC Irvine and UC Berkeley.

**UC Irvine.** UC Irvine has the Donald Bren School of Information and Computer Sciences\(^8\), consisting of three departments: Computer Science, Informatics and Statistics. The school was created in 2002, when the 35-year-old department of Information and Computer Science was elevated to a school status, and faculty were split into two departments, the Department of Computer Science and the Department of Informatics. The Department of Statistics, also founded in 2002, was included as a third department in the newly created school. Today, both the Computer Science major\(^9\) and the Data Science major\(^10\) are offered through the UC Irvine School of Information and Computer Sciences: data science through the department of Statistics, and computer science through the department of Computer Science.

UC Irvine also has a school of engineering\(^11\), the Samueli School of Engineering, with a department of Electrical Engineering and Computer Science (all in one department and separate from the Computer Science department in the school of Information and Computer Science). The department of Electrical Engineering and Computer Science offers majors in Electrical Engineering and a separate major in Electrical Engineering and Computer Science\(^12\), which combines elements of electrical engineering and computer science.

**UC Berkeley.** UC Berkeley has a newly created Division of Computing, Data Science, and Society\(^13\). The history of the creation process for this division is documented online\(^14\). The latest incarnation of this unit was announced in 2020, encompassing three units that hold faculty positions:

- The Electrical Engineering and Computer Science (EECS) department, which is jointly affiliated with the new division of Computing, Data Science, and Society and the College of Engineering

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\(^8\) [https://www.ics.uci.edu/](https://www.ics.uci.edu/)

\(^9\) [https://catalogue.uci.edu/donaldbrenschooofinformationandcomputersciences/departmentofcomputerscience/computerscience_bs/](https://catalogue.uci.edu/donaldbrenschooofinformationandcomputersciences/departmentofcomputerscience/computerscience_bs/)

\(^10\) [https://catalogue.uci.edu/donaldbrenschooofinformationandcomputersciences/departmentofstatistics/datascience_bs/](https://catalogue.uci.edu/donaldbrenschooofinformationandcomputersciences/departmentofstatistics/datascience_bs/)

\(^11\) [https://engineering.uci.edu/](https://engineering.uci.edu/)

\(^12\) [https://engineering.uci.edu/dept/eecs/academics/undergraduate](https://engineering.uci.edu/dept/eecs/academics/undergraduate)

\(^13\) [https://data.berkeley.edu/](https://data.berkeley.edu/)

\(^14\) [https://data.berkeley.edu/about/progress](https://data.berkeley.edu/about/progress)
The Information School
- The Department of Statistics

The new division also encompasses two centers that bring faculty together from across campus, but do not hold their own faculty positions: the Berkeley Institute for Data Science, and the Center for Computational Biology.

Berkeley has several majors related to data and computation: a Data Science major\(^\text{15}\) offered by faculty in EECS and Statistics; two Computer Science majors\(^\text{16}\) offered by EECS faculty; and an Electrical Engineering and Computer Science major offered by EECS faculty.

The Berkeley model is relevant to SCIDS:

1. The Berkeley division is the most recent example in the UC system of the creation of a school/division/college around Computing and Data (and certainly much more recent than at UC Irvine – 2020 vs 2002)
2. The Berkeley model addresses the issue of how a computing department that already exists in Engineering should be housed on campus: the solution at Berkeley involves joint affiliation, so that the EECS department (which at Berkeley is a single department) belongs to essentially two divisions/colleges: both the college of Engineering, and the new division of Computing, Data Science and Society. This joint affiliation model is also used at other institutions nationally, most recently at MIT (in the recent creation in 2020 of their Schwarzman College of Computing), but also at Cornell and at the University of Washington.

UC San Diego stands in a unique position to build SCIDS as a structure that brings to bear the capabilities of the Halıcıoğlu Data Science Institute and the San Diego Supercomputer Center, while also using the Berkeley model to bring in additional formal connections with SCIDS, as will be described in further detail in section 7.1.

### 3.3 Relationship to the California State University and Community Colleges

There are two primary mechanisms through which HDSI's current engagements will be leveraged into an expanded and institutional interactions by SCIDS that conform to the spirit and requirements of the California Master Plan for Higher Education. One, creation of new pathways via on-ramp courses, bootcamps that expand the flow and preparation of Community College (CC) students for success in SCIDS degree programs. This will build upon ongoing efforts by HDSI in helping CC in the San Diego area through the process of articulation agreements for courses where credits can be earned by the students joining the Data Science program. This activity is currently being conducted by a temporary contractor enabled by the HDSI endowment resources. The contractor also prepares and offers Python training bootcamps that helps our incoming students to be better prepared for success and on-time graduation when entering into the program. With the establishment of the school, we plan to institutionalize this process through permanent leadership and staff support. HDSI also engages with the CSU San Diego (SDSU) computer science department in joint proposals and recruitment of students in the joint

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\(^{15}\) [https://data.berkeley.edu/academics/data-science-undergraduate-studies/data-science-major](https://data.berkeley.edu/academics/data-science-undergraduate-studies/data-science-major)

\(^{16}\) [http://guide.berkeley.edu/undergraduate/degree-programs/computer-science/](http://guide.berkeley.edu/undergraduate/degree-programs/computer-science/)
PhD program currently hosted by the Jacobs School of Engineering. SCIDS will explore building on this tradition through expansion of this joint doctoral degree program.

3.4. Relationship to the San Diego Community and Global Partners

We stand on the cusp of a new era in research and education as we scale up the progress in science and technology of the past many decades to population-wide impacts. To be successful, we must address essential issues of equity, diversity, and inclusion. The imperative and need for societal impact is shrinking innovation cycles. While advances in basic research will continue, there is a need for translational research and transition to practice of foundational research. High performance computing (HPC) and big data—essential to discovery science—are now also necessary for AI and societal impact. The phenomenon of HPC emerged from “big science”, while big data and data science emerged from industry. We are now seeing the need for convergence across computing, information, and data in order to support discovery science as well as translational research.

UCSD is on track to becoming a STEM Hispanic-serving Institution (HSI). As Chancellor Khosla has said, the university is “taking meaningful action so that UC San Diego can better reflect and serve the diverse population of California”. Indeed, attracting and retaining students is essential for a successful HSI—or, for that matter, for any institution interested in serving underrepresented minorities. However, becoming a STEM HSI is more than just about student retention and success. It is, in fact, about a fundamentally new world view—about the types of problems researchers choose to address; the types of solutions they seek out; and the types of collaborators and students they engage in addressing these problems and developing solutions. As a new institution designed for a new era, SCIDS will employ computing, information, and data to develop solutions for a wide range of complex global issues—from climate change and pandemics to misinformation—and focus on their regional and local impacts by leveraging UCSD’s emerging status as a STEM HSI and the unique geo-political location and context of the San Diego region.

Efforts like the Border Solutions Alliance, the Innovative Cultural and Education Hub in downtown San Diego, SDSC’s WiFIRE project on California wildfires, and the COVID-19 K-12 e-Decision Tree for managing COVID outbreaks in San Diego schools are all examples of projects tackling complex problems with a regional flavor. The WiFIRE project has been picked up as a project under NSF’s new Convergence Accelerator program, which focuses on translational research and transition to practice. Experiential learning is essential to translational research. The SCIDS educational agenda will embrace translational research and transition to practice, providing students hands-on learning with real-world data in real-world situations. The NSF Data Science Corps program encourages bringing real-world data sets into the classroom setting and

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17 [https://ucsdnews.ucsd.edu/feature/becoming-a-hispanic-serving-institution](https://ucsdnews.ucsd.edu/feature/becoming-a-hispanic-serving-institution)
18 [https://mexico.ucsd.edu/initiatives/border-solutions/index.html](https://mexico.ucsd.edu/initiatives/border-solutions/index.html)
providing student internships for learning in real-world environments and provides a good model.

With its emphasis on foundational as well as translational research at the nexus of computing, information, and data, and the 35-year reputation of SDSC as an organization that provides world-class research, development, and production services, SCIDS is well-positioned to make important contributions and play a key role in national initiatives including the National Strategic Computing Initiative (NSCI), the National AI Research Resource (NAIRR), and the call for a National Research Cloud—which could be an extension of the NSF-funded CloudBank project based at SDSC. SCIDS can serve as a natural home for such initiatives.

4. ACADEMIC CURRICULUM, DEGREE PROGRAMS, and ACADEMIC RIGOR

The convergence of disciplines and interdisciplinary engagements brought about by the SCIDS provides an excellent opportunity to create degree programs that serve the current and growing need for talent in an information-enabled society. Fulfilling these needs will be accomplished in diverse ways beyond traditional in-residence undergraduate and graduate degree programs. For instance, SCIDS will develop programs that teach skills that enables individuals to access the benefits of information society in their personal or professional lives, help some others make career transition through new training programs, and help senior executives understand the growing role of AI in businesses. Accordingly, the educational mission of SCIDS will span traditional degree programs to outreach and training for diverse talent. This diversity reflects difference in background and training of the talent drawn to its various degree programs. SCIDS will build upon HDSI’s mechanisms consisting of counseling personnel and on-ramp training boot-camps and courses to build expanded pathways. In the following, we outline degree programs currently offered or in the planning stages as representative of overall offerings by the new School. The outreach will include on-ramp training for incoming and potential future students of our degree programs who are able to explore preparatory topics for later success, as well as professional development opportunities for working professionals in the industry and civic organizations, an area in which the school with coordinate with UC San Diego’s Division of Extended Studies. The school is particularly positioned to support this mission because of the core capabilities it brings from its academic appointees as faculty and affiliates, as well as practicing computing and data science professionals at SDSC. In the following we briefly describe the goals and status of degree programs that will be offered by the SCIDS at its launch. This initial academic structure is provided by the incredible growth of academic programs at HDSI since the launch of the institute in 2018.

4.1. Bachelor of Science in Data Science (BS-DSC):

The BS in Data Science is currently offered by the HDSI both as a major and minor option. The degree program is designed to essentially replace the current BS (engineering or computer science) + MS (data science or artificial intelligence) options available to students. The program is designed to be accessible to a broader group of students than current specializations of Data Science offered by alternative MS programs. The program
consists of 116 units of course work (56 units for a minor). Required courses include courses in mathematics (especially linear algebra and probability), computer science (programming, data structures and abstractions, data mining), and statistics (estimation, testing, and exploratory data analysis). A 12-unit lower division course sequence in physics, chemistry or biology reinforces a strong background in natural sciences. The program includes 20 units of elective courses that enable students to embark upon an in-depth exploration of one or more areas in which Data Science can profitably be applied. Alternatively, students can choose to explore the mathematical, statistical, and computational foundations of Data Science in even greater depth. All majors are required to undertake a two-quarter senior project, giving them an opportunity to creatively synthesize much of what they have learned in their courses.

<table>
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<tr>
<th>Bachelor of Science in Data Science</th>
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<tr>
<td><strong>Lower Division (52 units)</strong></td>
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<tr>
<td>Data Science (28 units):</td>
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<tr>
<td>COGS 9 (Introduction to Data Science)</td>
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<td>DSC 10 (Principles of Data Science)</td>
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<tr>
<td>DSC 20 (Programming &amp; Basic Data Structures for Data Science)</td>
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<tr>
<td>DSC 30 (Data Structure &amp; Algorithms for Data Science)</td>
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<tr>
<td>DSC 40A (Theoretical Foundations of Data Science I)</td>
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<tr>
<td>DSC 40B (Theoretical Foundations of Data Science II)</td>
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<tr>
<td>DSC 80 (Practice &amp; Application of Data Science)</td>
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<tr>
<td><strong>Mathematics (16 units):</strong></td>
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<tr>
<td>MATH 18 (Linear Algebra) or MATH 31AH (Honors Linear Algebra)</td>
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<tr>
<td>MATH 20A (Calculus for Science &amp; Engineering)</td>
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<tr>
<td>MATH 20B (Calculus for Science &amp; Engineering)</td>
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<tr>
<td>MATH 20C (Calculus &amp; Analytic Geometry for Science &amp; Engineering) or MATH 31BH (Honors Multivariable Calculus)</td>
</tr>
<tr>
<td><strong>Subject Domain (8 units) - Students choose 1 of the following tracks:</strong></td>
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<tr>
<td><strong>Business Analytics &amp; Econometrics</strong></td>
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<tr>
<td>ECON 1 (Principles of Microeconomics)</td>
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<tr>
<td>ECON 3 (Principles of Macroeconomics)</td>
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<tr>
<td><strong>Machine Learning &amp; Artificial Intelligence</strong></td>
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<tr>
<td>COGS 14A (Introduction to Research Methods)</td>
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<tr>
<td>COGS 14B (Introduction to Statistical Analysis)</td>
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<td><strong>Science</strong></td>
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<tr>
<td>BILD 1 (The Cell)</td>
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<tr>
<td>BILD 3 (Organismic &amp; Evolutionary Biology)</td>
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<tr>
<td><strong>Social Sciences I</strong></td>
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<tr>
<td>POLI 5 or ECON 5 (Data Analytics for the Social Sciences)</td>
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<tr>
<td><strong>Social Sciences II</strong></td>
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<tr>
<td>SOCI 60 (The Practice of Social Research)</td>
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<tr>
<td>USP 4 (Introduction to Geographic Information Systems)</td>
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<td><strong>Upper Division (60 units)</strong></td>
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<td><strong>Core Courses (32 units):</strong></td>
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<tr>
<td>ECON 129A (Econometrics I) or MATH 183 (Statistical Methods) or MATH 181A (Introduction to Mathematical Statistics I)</td>
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<tr>
<td>MATH 189 (Exploratory Data Analysis &amp; Inference)</td>
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<td>DSC 100 (Introduction to Data Management)</td>
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<td>DSC 102 (Systems for Scalable Analytics)</td>
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<td>DSC 106 (Introduction to Data Visualization)</td>
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<tr>
<td>DSC 140A (Probabilistic Modeling &amp; Machine Learning) or CSE 150A (Introduction to Artificial Intelligence: Probabilistic Reasoning &amp; Decision-Making)</td>
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<tr>
<td>CSE 151A (Introduction to Machine Learning)</td>
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<tr>
<td>CSE 156 (Recommended Systems &amp; Web Mining)</td>
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<tr>
<td><strong>Electives (cont.):</strong></td>
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<tr>
<td><strong>Business Analytics, Econometrics, &amp; Statistics</strong></td>
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<tr>
<td>ECON 120B (Econometrics B)</td>
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<tr>
<td>ECON 120C (Econometrics C)</td>
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<tr>
<td>MATH 152 (Applicable Mathematics &amp; Computing)</td>
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<tr>
<td>MATH 173A (Optimization Methods for Data Science I)</td>
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<tr>
<td>MATH 173B (Optimization Methods for Data Science II)</td>
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<tr>
<td><strong>Senior Project (8 units):</strong></td>
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<tr>
<td>MATH 180A (Introduction to Probability)</td>
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<tr>
<td>MATH 180B (Introduction to Stochastic Processes I)</td>
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<tr>
<td>MATH 180C (Introduction to Stochastic Processes II)</td>
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There are two notable features of the Data Science program: (a) All required courses are typically completed by the end of third year into the program leaving the senior year for student-directed exploration of topics among many elective courses; (b) every student is required to complete a minimum 2-quarter long capstone project sequence generally in a team of 2 or 3 students. Each team is mentored by a faculty member, sometimes in collaboration with an industry mentor. Besides capstone there are multiple opportunities for students to carry out projects the entire four years of the program starting with HDSI UG research scholarships from the first year of the program. The goal of experiential learning in Data Science major is to ensure that each graduating student completes the
program with a portfolio of various projects that expose them to ways methods and tools taught in the required courses can be applied to one or more application domains.

The BS-DSC program was launched in AY 2016. The class of 2025 (admitted in the Fall of 2021) consisted of students with average GPA of 4.25 (25% percentile at 4.20 and 75% percentile at 4.33), making Data Science among the most sought after majors. The program was heavily subscribed and beginning AY 2018, the program has been among the capped majors offered by UC San Diego. Despite the cap, there are over 800 majors making it the sixth largest major at UC San Diego. The undergraduate courses offered by HDSI are also attended by over 200 students in Data Science minor as well as non-majors. There are over 5000 students enrolled in Data Science undergraduate classes annually. This number is currently growing rapidly.

4.2. Graduate Programs
Data Science is a popular graduate level subject: in 2019, nearly half (1571) of over 3000 applicants to various graduate degree programs in Electrical Engineering, Computer Science and Cognitive Sciences indicated interest in a Data Science program. To serve this growing need, HDSI currently offers three graduate degree programs while two other degree programs are currently in planning. In the following we describe the current and pending graduate programs, for details and updates please check the website at https://datascience.ucsd.edu/academics/graduate/graduate-program-requirements/:

1. Master of Science in Data Science
2. Online Master of Data Science
3. Doctor of Philosophy in Data Science
4. 4+1 BS/MS program in Data Science and Business Analytics
5. MD-MS Degree Program

4.2.1. Master of Science in Data Science (MS-DS):
The MS-DS program was designed together with PhD-DS program (described below) with the goal of attracting top students from around the world to the emerging field of Data Science to pursue the proposed M.S. degree that provides them with the necessary knowledge and skills to pursue a career in Data Science for industry, civil services or academia. To achieve this goal, the program is designed to be broadly accessible to students drawn from a variety of undergraduate backgrounds via well-articulated pathways through courses in the program as well as on-ramp courses with financial support necessary to ensure a diverse talent pool.

The educational objectives of this program are to teach students knowledge and skills that enable them to (a) collect raw data from various sources and convert this raw data into a curated form suitable for computational modeling and analysis (e.g., its use in designing experiments); (b) understand learning algorithms and how to appropriately use them in targeted domains such as in business, health etc. (e.g., in developing effective optimization methods); (c) interpret the results of these algorithms and iteratively drill down into the data, perform analysis, visualize results and carry out scientific enquiry appropriate for the targeted domains.
The curriculum is structured into three groups of courses: foundational courses that cover five critical foundational knowledge and skills that each graduating student from the MS-DS program is expected to receive at a graduate level. These are: programming skills, data organization methods, numerical linear algebra, multivariate calculus, and probability & statistics. We do not expect entering students to have all these skills. Instead, entering students typically fall into three streams: (a) those with background in computing and computer science; (b) those with background in mathematics and statistics; and (c) those with background in an application area of data science with skills in quantitative analysis. HDSI offers five courses in this category; a student can take credit towards an MS degree in a maximum of four foundational courses.

The second group of courses are core courses, areas that are generally expected to be understood and practiced by our graduating students. Students are required to take at leave five core courses, three of which are required for all students: Machine Learning, Statistical Methods and Data Ethics & Fairness.

Finally, the third group of courses are elective courses that explore advanced topics in Data Science or its applications into specific domains. The MS program provides two options: a conventional thesis option that focuses on a technical project implemented and documented into a MS Thesis under the guidance of a 3-person committee; and a course-based comprehensive examination options that enables students to choose from among core courses three courses where the students are examined in that specific subject within a much larger context of application or data science foundations.

The MS-DS program also provides a pathway for students to apply for and transition into a PhD in Data Science degree. The MS-DS program was launched in Fall 2021 with the inaugural class joining the program in Fall 2022. In its inaugural year, over 300 applications were received for the MS program, with an expectation of offering admission to about 60 MS students and matriculating some 20 MS students to start in Fall 2022.

4.2.2. Doctor of Philosophy in Data Science (PhD-DS):
A doctoral program is key to the success of a discipline in defining its intellectual core. Given the transdisciplinary nature of Data Science, such a core must also cultivate talent drawn from diverse intellectual traditions from sciences, engineering to social sciences and humanities. Such a program cannot simply be a collection of diverse existing topics or multiple courses and degrees in sciences and humanities stacked on an individual, or specialization of an existing program. Instead, a streamlined and integrated approach to curriculum is needed that is accessible to students drawn from different undergraduate degree backgrounds.

Over the last two years, the HDSI faculty have successfully addressed the challenge of program accessibility in its Master of Science (MS) program. Building upon the MS-DS program, the doctoral program is structured to cultivate both a generalist’s penchant for persistence in results validated by proofs, and robust experimentation as well as a specialist’s view of practical impact validated by real-world demonstrations, user studies
and trials. HDSI faculty started working on designing a PhD program in Data Science in Fall of 2019 after preliminary discussions in the first Faculty retreat in October 2019. Over the next two years, the program evolved into a comprehensive proposal that was formally approved for implementation in Summer 2021. The PhD-DS program was launched in Fall 2021 with the inaugural class joining the program in Fall 2022. In its inaugural year, over 150 applications were received for admission into the PhD program. The plan is to review and make offers to about 20 students with the expectation of 7-10 new entering PhD students starting in Fall 2022. The program will also be opened to transfer from other degree programs in Spring 2022.

The goal of the PhD in Data Science is to serve the need for advanced graduate students in the area, create a talent pipeline that advances the frontiers of knowledge and practice in Data Science. The program is designed to teach students the knowledge, skills and awareness required to perform data-driven tasks in practice and to expand the boundaries of knowledge in Data Science. To achieve these goals, the graduate program is structured as a set of three key requirements related to coursework, examinations and dissertation compliance. The course preparation consists of breadth and depth requirements of 48 units taken for letter grade and 4 units of satisfactory completion of professional preparation courses. After a required preliminary advisory assessment at the end of first year, the examination requirements consist of research qualifying examination and a dissertation defense examination.

There are three key distinguishing features of the PhD program in Data Science: one, the program features a required one-year rotation program that exposes all students to research culture and methodology in diverse disciplines where data analysis plays an important role. Two, all students are required to take courses on Data Ethics and Fairness (DSC 260) as well as professional development courses that include TA/Tutor training, Faculty Research Seminars and Academia Survival Skills (DSC 295).

Three, the dissertation compliance requirement involves approval of a thesis that specifically meets generalizability, reproducibility, and responsibility (GRR) requirements. The primary reason for these additional requirements is the transdisciplinary nature of the nascent discipline that places an additional emphasis on identifying core elements of a research dissertation that forms a basis for it to be considered primarily in data science. Doctoral degree candidates in Data Science are expected to demonstrate evidence of generalization skills, and reproducibility in research results, as well as the ability to responsibly conduct and use data science considering potential ethical and societal implications of the research results. Evidence of these skills may be in the form of -- but not limited to -- generalization of results arrived at across domains, or across applications within a domain, generalization of applicability of method(s) proposed, or generalization of thesis conclusions rooted in formal or mathematical proof or quantitative reasoning supported by robust statistical measures. Reproducibility requirements may be satisfied by supplying additional supplementary material consisting of code, data repository along with evidence of independent external use or adoption. Evidence of responsible use of data science include ability to collaboratively identify and respond to ethical and societal opportunities and risks and adhering to “best practices” in terms of ethical consequences.
(for example, obtaining appropriate consent for data collection about humans, documenting design and modeling choices etc.).

The GRR requirements will necessarily require a PhD student to be exposed to one or more application domains since understanding data upon which method advances are tried must be understood by the researchers so that the objects of generalization, reproducibility and responsible use are indeed supported by the experimental data. Normally this would be through an advisor or co-advisor who works in an application domain area, or through the rotation program. In addition, HDSI is developing tools to also assist students broadly in discovering potential users and applications of their work, to enable discovery and dialogue among the domain and method experts as one would have with a real-life consultant.

4.2.3. Online Master of Data Science (OMDS)

The online Master of Data Science program (OMDS, https://omds.ucsd.edu/) has been developed and offered jointly with CSE and HDSI starting Fall 2022. The program was designed to serve the needs of working professionals as well as provide an easy access to advanced training in data science to talent that would not be normally served by our residential MS programs. The learning goal of the program is to teach students the skills required to be successful at performing data-driven tasks. This includes the ability to: (1) collect raw data from various sources and convert this raw data into a curated form amenable to algorithmic analysis (2) understand machine learning algorithms and how to run them on large data sets; (3) interpret the results of these algorithms and iteratively drill down into the data, and perform more analysis, to answer questions about the data.

The program is designed to be online using “R” courses approved by the Graduate Council of the Academic Senate. These courses are designed with curricular requirements and review that is identical to regular courses for in-person instruction as shown in the Figure below. In addition, the courses are also subject to feedback and statistical data collection analysis for their performance on the standards related to learning goals and outcome using a process (shown below) devised and orchestrated by the Digital Learning Initiative from Teaching and Learning Commons at UC San Diego. (https://digitallearning.ucsd.edu/instructors/resources/guidelines-for-online.html)

The courses are designed and offered in a manner to enable reaching a broad geographic population and provide educational experience to a community that until now has been underserved. The rising cost of higher education, along with the economic challenges faced in residential education leave behind a large population of students; many of them
are our graduates from years or decades ago, who need to keep up with changing technological realities. Many of these students cannot attend residential education at any price due to career constraints or family obligations. Further, emerging areas, such as Data Science, represent a leading edge of technological advances that simply cannot be taught by community colleges or our own extension programs.

The Figure below shows the overall program outline for OMDS degree. The program follows a similar structure of courses as the residential MS-DS and PhD-DS programs consisting of foundation, core and elective groups of courses

4.4. Proposed Specializations and Partnerships

4.4.1. 4+1 BS/MS program in Data Science and Business Analytics

The BS/MS 4+1 (or 3+2) programs seek to combine a BS degree with a MS specialization, usually in another discipline, to effectively channel our graduating seniors into interesting graduate programs. The coordination of BS and MS degree program plans not only results in time savings for the graduating seniors who are interested in higher education
but also savings in both time and money for the students by coordinated offering and selection of elective courses in the two programs. Thus, by choosing appropriate domain electives in their senior year, the BS-DSC students can get a head-start in the MS program. Combined with seamless transition from senior year to first year graduate student including use of summer courses,

We describe one such program that channels graduating BS-DSC students into two different MS programs offered by the Rady School of Management. In the future, we anticipate SCIDS will utilize these programs to build stronger ties to other schools and divisions on campus.

Our current proposal creates two pathways for HDSI’s Data Science students into the Rady graduate programs: a Master of Finance (MFin) or a Master of Science in Business Analytics (MSBA). Combining HDSI’s robust undergraduate training in data science with domain-specific application and business acumen in either of these two master’s degree programs will create value for firms and lead to successful student outcomes in the job market. HDSI undergraduate students who are considering masters-level study will benefit by saving time and money under this proposed structure.

4+1 Program Basics
Undergraduate Data Science majors in good academic standing will have the opportunity to pursue either the MFin or MSBA graduate programs by taking Rady graduate-level courses, totaling 12-16 units, during their senior year of undergraduate study. These courses will count as major elective units in the DSC program and be waived from the respective graduate program. Students would enroll in these Rady graduate-level courses at their standard undergraduate tuition rate—a savings of just under $20,000 at current tuition levels (varies slightly by program). The students would be able to complete the remainder of the graduate program with just three additional quarters of study, enabling them to get a jumpstart on their employment search sooner than if pursuing masters-level study after their standard DSC education plan. The pathways to two programs (MFin and MSBA) allow students to complete 50-52 units of graduate courses through a combination of capstone and DSC electives chosen from MS programs.

4.4.2. MD-MS program
The HDSI faculty are currently engaged in discussions regarding a MD-MS degree in Biomedical Data Science. The proposed degree is tailored to medical students enrolled in the School of Medicine in the MD degree program. This degree provides a pathway for the physicians who have already completed their terminal medical degree (M.D., D.O. or M.B.B.S.) to receive substantial and practical training in Data Science areas. The proposed program is a joint initiative with the School of Medicine to train the next generation of physicians, particularly those who wish to pursue a career in data analytics in medicine.

Like a residential degree program, the MD-MS program has two tracks: a thesis-based or a course-based comprehensive examination. The proposed program consists of following elements:
4.5. Experiential Education Programs

The best education happens when research and teaching missions align. Experiential programs provide opportunities for such alignment through integration of students in cutting-edge research and practical settings to apply their learnings from classroom education. A direct impact of such programs will be to increase innovation in both research and education with pathways to direct applications across science, engineering, and societal domains.

4.5.1. Translating Data Science from Classroom to Research Scale

The focus of education is to teach concepts. In data and computational sciences, this is typically done at the smallest possible non-trivial scale, for students to be able to focus on the concepts rather than getting lost in technicalities of applying these concepts at the scales required for cutting edge research. In practice this often means GB datasets for the classroom, and TB datasets for capstone projects, whereas cutting edge research at SDSC often involves PB scale datasets, and beyond. SCIDS provides an opportunity to holistically think through the process of scaling out the application of concepts from the classroom to the research scale, and thus bridging the many orders of magnitudes in between.

In practice, this can be done by connecting the concepts taught in the classroom and capstone projects to doing research at SDSC during summer internships or work study during the school year. SCIDS will facilitate strong linkages between CI professionals at SDSC that are responsible for large cyberinfrastructure projects, and a student workforce at HDSI that is well trained in practical skills of relevance, and thus attractive to hire.

CI professionals at SDSC excel at attracting research grants and contracts for sponsored research, which in turn create specific commitments to funders. It is thus a core mission of SCIDS to develop the processes that scale out the skill sets of our students to meet the needs of large research projects at SDSC. As we accomplish this mission, we are creating a pipeline of students that successfully has translated classroom concepts to research scale. That pipeline will prove extremely valuable to researchers all over campus, and industry beyond, benefiting all stakeholders. The graduates from this pipeline enter their careers with research scale skillsets, and the CI professionals, faculty
across campus, and industry beyond campus benefit from a dynamic highly skilled workforce to support their research enterprise.

4.5.2. Convergence Research Experience

In our age of complex societal-scale problems, there exists a growing need for university students and researchers to participate in multi-sector and cross-disciplinary partnerships focused on impact. Advanced computing and data science skills can help, but these skills need to be combined with effective cross-disciplinary collaboration capabilities and a problem-solving culture. Convergence research in data science and computing requires training in use-inspired research and team science.

Experiential education programs at SCIDS will provide an opportunity for interested students to participate in convergence research projects across campus, applying their data science and computing skills to actionable projects, and, in the process, developing important convergence research skills. These programs will improve the competitiveness and influence of SCIDS graduates as they enter the workforce, positioning our students to contribute to solving the most important problems of our time throughout their careers.

In practice, this would be achieved through programs supporting participation of students at SDSC, HDSI and across UC San Diego. Convergence research programs are growing across the funding agencies exemplified by the various programs under the NSF Office of Integrated Applications. These programs explore the research foundations required by applications with potential societal impact and practical translation of integrated applications at the societal scale. SDSC has several active convergence research and accelerator projects, and this number is projected to grow under the SDSC’s Division for Cyberinfrastructure and Convergence Research and Education (CICoRE), with a vision to “translate cyberinfrastructure research for impact at scale”. As such, a mission of CICoRE is to provide experiential education and training programs for use-inspired research and team science. CICoRE also works with funders and government organizations to increase capacity in this area, e.g., an NSF Convergence Research Winter Institute is planned for February 2023.

4.5.3. Professional Education and Training Programs

One of the biggest challenges facing the workforce today is keeping up with the rapid advances induced by data science and computing, e.g., artificial intelligence, cybersecurity, internet of things, and cloud computing. Without programs to actively boost modern data science skills, a gap between the existing workforce capabilities and the talent needs of companies accelerates. Programs to upskill existing talent through ongoing professional training and education is a growing need.

SDSC has been an active provider of workforce development and professional programs over the last decade through data science bootcamps, weeklong training programs, online professional certificate programs and partnerships with the UC San Diego Division of Extended Studies. In addition, SCIDS will build upon these programs to create functional programs for professional training that can scale via remote instruction and be self-sustained through industrial partnerships.
4.5.4. Rotational Programs at the Digital Continuum

Rotational programs benefit graduate studies and professional development through exploration of skills and knowledge. Although such programs exist in other areas of research, a rotation program for computing and data does not currently exist in UC San Diego, leaving development in this area to the initiative of the students. SCIDS will include a rotation program for graduate students to explore data science, information and computing as a foundational skill in research.

In practice, this is achievable via 4-6 week rotation programs at SDSC for graduate students in areas including high-performance computing and big data systems, internet of things, research data management, actionable knowledge networks and networking. Such rotation programs provide the students with the background of related skills before they choose a specialized research direction in a multidisciplinary data science area and prepare the students with the hands-on skills applicable in their graduate studies and beyond.

5. JUSTICE, EQUITY, DIVERSITY and INCLUSION

The formation of SCIDS comes at a time when the academy and society are facing profound challenges and opportunities in building a more just, equitable, diverse, and inclusive (JEDI) society. Computing, information, and data science have the potential to be both a tool to addressing these challenges, and a vehicle through which the university leads by the example of its actions and the programs it undertakes. Thus, the formation of SCIDS is a once-in-a-generation opportunity to build a program where JEDI is part of the fabric of the school, with the principles and central components of its core functions embedded in the institutional infrastructure and throughout its academic programs. A multipronged and multilevel approach will engage all populations of the school to ensure that the hard work of JEDI is acknowledged, celebrated, and rewarded. This will be achieved by integrating a JEDI framework in the school’s mission and all activities from inception.

Helping to build an equitable future where all of society benefits from computing, information and data science is a strategic goal for the University of California, and in achieving this goal it will be essential to uncover and reward the contributions the faculty, staff, and students of SCIDS will do to promote JEDI. Achieving these goals requires a steadfast commitment by all stakeholders to be inclusive, hold one another accountable, use data to drive decision-making, and ensure that adequate resources are available to carry out the work. Accordingly, it is essential that sufficient funding for programming and staffing be allocated to ensure that the financial commitment is commensurate with the goals and expectations for JEDI.

The core principles of JEDI are instantiated concretely into the activities and programs of SCIDS.

**Justice:** To achieve justice, a recognition of harm and work towards restoration and repair are essential. SCIDS will acknowledge that data and information are controlled and shaped by power and privilege and can be used in harmful ways. The research, teaching, and community engagement in the school will include using a critical lens towards data
and information science, examining historical practices that have created disparities within our social systems.

**Equity**: Decision-making processes that lead to equitable outcomes will be prioritized in the development of the policies, practices and procedures of the school. This will require continual tracking, monitoring, evaluating, and iterating to achieve equitable outcomes. The school will establish a structure to carry out independent equity evaluations, and direct resources towards implementing resources. This may include regular analyses of equity in teaching load (e.g., new courses prepared, class sizes, number of leaves, salary, advising/mentoring load, and service).

**Diversity**: The school will take a holistic approach to diversity. Diversity can be found in an individual’s or group’s background, experiences, and perspectives. The school will seek diversity across all groups and over the career life-course, not just at the beginning of the career. This includes a focus on diversity in: Leadership hiring, recruitment, and retention; Faculty hiring, recruitment, and retention; Staff hiring, recruitment, and retention; and Student admissions, recruitment, and retention

**Inclusion**: To create a welcoming and inclusive environment for all, the school will develop programming that builds tolerance, awareness, and compassion, ensuring that discrimination and harassment are not tolerated. SCIDS will adopt standards that are developed by the community and revisit them annually. Focusing on inclusion can be facilitated through training for faculty, staff and students. Relevant areas for attention include Inclusive Teaching, Employment Equity, Racial Equity Training, Mental Health First Aid, LGBTQ+ Cultural Competency Training, Safe Zone Training, Racial and Cultural Competence, Ally Training, and American Disabilities Act Training.

SCIDS will look forward to participating in the biannual inclusive excellence accountability meetings established by the Vice Chancellor for Equity, Diversity and Inclusion at UC San Diego. These meetings ask unit leaders to address the effectiveness and impact of EDI strategies across all dimensions of students, faculty and staff, as measured by quantitative data, and are an important part of the Strategic Plan for Inclusive Excellence at UC San Diego. The new school will face the same challenge and opportunity that HDSI has faced with building a unit that has JEDI built into the foundation. The nascent state of the school will naturally make interpreting necessary data a challenge, so baseline data from closely related fields will be used, as well as proactive efforts to engage the faculty, staff and students, as HDSI has done. In this regard, it is worth documenting the baseline from which the new school will be starting by highlighting some of the current JEDI efforts at SDSC and HDSI.

**5.1. Current efforts at JEDI at SDSC and HDSI**

**Faculty, leadership, and workforce development**

HDSI has established a strategy for leadership through active and assertive stewardship of JEDI and broadening participation in computing (BPC) activities. This has included the appointment of a full-time diversity and outreach coordinator as a core position within the HDSI organization, fully empowered to reach out and represent HDSI to various stakeholders internally and externally to UC San Diego. The incumbent has pulled
together a broad committee of participants from HDSI faculty and staff. These efforts are resourced by the novel EDI-share pool funds that HDSI has established that currently amount to $480K and are derived directly from investments in faculty startup packages. This novel approach has the added benefit of ensuring strong faculty engagement in EDI efforts from the very beginning of their career. Deployment of these funds are specifically approved by the diversity and outreach coordinator for designated activities. Furthermore, with the support of the diversity and outreach coordinator, HDSI has been able to formalize and launch several diversity initiatives. An active DEI committee has been formed that has already developed a broadening participation plan that is currently under review at the National Science Foundation.

An important aspect of the HDSI strategy is the development of an open participation model that has proactively sought engagement of diverse faculty among the broad group of founding faculty of the institute, consisting of 68 women and URM out of a total of 186 involved faculty. As the institute has grown, the role played by the large number of founding faculty has evolved, and faculty governance of HDSI is now driven by the Faculty Council. The Faculty Council is the main governing body of HDSI and today consists of 26 faculty with 8 women and LGBTQ members and oversee broad EDI efforts. Inclusion has been a central goal in the governance of HDSI, with gender equity among the Associate Directors and HDSI Faculty Fellows appointed to date. This ensures that a climate and expectation is created where even representation is considered normal.

Over the past year, SDSC’s EDI working group, chaired by the Center Director, has been engaging with campus to identify ways to build a more diverse workforce, including new approaches to ensuring a diverse applicant pool for job opportunities, participation in UCSD’s Anti-Racism challenge and inclusion in new SDSC policies, as well as the active support and development of female PI’s at the Center. SDSC recently launched a summer development internship program for diversifying the IT pipeline and giving students work experience in developing applications in an intense, real-world, agile development model. This approach is exemplified through the Research Data Services internship program where participants are eligible for Co-Curricular Records (CCRs) at UC San Diego; this program has served dozens of students with 90% non-Caucasian and 41% female. These programs also serve to drive inclusion of early career researchers and incorporate EDI into every activity.

**Developing a diverse undergraduate population**

One of the most important aspects of the JEDI strategy is creation of a climate that supports broad participation in the undergraduate data science (DSC) major. The DSC bachelor’s degree program was inherited from a joint CSE+Math leadership in Fall 2018. Among our continuing students, 28.3% (128) students are first generation college attendees. Including our incoming freshmen there are 27% (182) females, 1 non-binary student. While these numbers do not yet reflect the even gender split, we have maintained in our faculty hires, these numbers are significantly better than the underlying dominant engineering background of students, despite being drawn from 23 different majors.

These efforts are already bearing fruit. HDSI is attracting diverse students who are excited about contributing to EDI efforts. This is evident by the newly formed Diversity in Data Science (DDS) student organization, with 40 student members, supporting 2 student-led
EDI-related Data Science projects, each with a faculty mentor. The leadership of DDS is very diverse – with 6 of the 7 board members identifying as Hispanic/LatinX. As UC San Diego moves towards recognition as a Hispanic Serving Institution (HSI) it will be essential to further support student-led initiatives like this.

**Academic programming**

HDSI is working to create broader awareness among the student cohort through the DSC 167 course, approved for the DEI course requirement, engaging some 50 students per quarter. HDSI is also working to create awareness among the broader campus community by supporting, planning and organizing the UC San Diego Health Science Community Fair. The 10-member DEI committee created an extensively researched Diversity Website that identifies resources for both campus-wide and HDSI faculty, staff and students. Finally, HDSI hosts weekly Diversity Chats that have several regular attendees including a number of URM participants. These chats create a dynamic environment for proliferation of new ideas and serve different purposes thus attracting different audiences: from book reading, discussion of current events to a sounding board for sharing experiences.

HDSI is also actively engaged in outreach, and has established HDSI Lab 3.0, an outreach program for K-12 students, to support broadening participation in data science and promote data science literacy for everyone. HDSI faculty and staff partner with local K-12 schools to show students how data science intersects with their everyday lives and different fields of study, including the arts, humanities, medicine, engineering and law. HDSI has established an MOU with Sweetwater Union High School District which has over 40,000 students enrolled with a 94% minority enrollment and have piloted 2 activities serving a total of 85 students in that district. In addition, faculty also speak at regional high schools as outreach to the community, engaging many prospective URM students. These are among the 10 different programs HDSI faculty are directly engaged in as enumerated here: 1. PATHS; 2. MARC; 3. MAP; 4. STARS; 5. UCSD-Spelman Program by Political Science; 6. TRELS; 7. Fatima Fellowship; 8. UCSD LEADS; 9. USS (Undocumented Student Services); and 10. Pathways 2 AI.

**Community Engagement and Experiential Learning**

HDSI is also meaningfully engaging our industry and government partners into EDI activities. Specifically, Intel and Deloitte are each sponsoring multiple student projects (that pay students, as well as their faculty mentors from industry contributions) that have a majority of URM participants. There is no question that diversity and building a climate of inclusion is a work in progress in HDSI and at the broader university. The efforts to date show that a firm foundation has been built to support future efforts both in the institute as well as contributions to the JEDI mission of the new school.

At SDSC, technological innovations have been accompanied by the development of education, outreach, training, and community programs that seek to engage the UCSD, local, state, and national community in a wide range of events, internships, mentoring,

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and other programs that amplify these efforts and bring the benefits of advanced computing to much broader and more diverse community of stakeholders. There are numerous examples of these active programs including: the UC Women in Technology\textsuperscript{20}; the West Big Data Hub’s programs, including partnership with Data 4 Good\textsuperscript{21}; SDSC’s HUBzero’s support of the Intercultural Learning Hub\textsuperscript{22}, which provides tools for interacting with multicultural students; UCSD’s Supercomputing Club\textsuperscript{23}; the Science Gateway Community Institute\textsuperscript{24} partnership with Elizabeth City State University, which in the first 4 ½ years had 681 students and faculty participate, 469 of which were from underrepresented groups; collaboration with the HSI Stem Hub\textsuperscript{25} initiative out of New Mexico State; and programs for high school students, including the Mentorship Apprentice Program\textsuperscript{26}, REHS\textsuperscript{27} (which pairs students with UCSD researchers in intensive summer and academic year programs), and PlantingScience.org\textsuperscript{28} (a HUBzero\textsuperscript{®} supported hub) that facilitates professional development.

**Democratizing access to advanced computing**

SDSC’s vision of democratizing computing for all people and all fields of study provides a strong platform for the JEDI goals of SCIDS. The opportunities provided through SDSC’s programs, and the framework and expertise in place for the development of new ones, will offer a welcoming environment to faculty, students, and staff at all levels and from all backgrounds to engage with world class research, community service, and educational opportunities. Since its founding 35 years ago SDSC has been at the forefront of lowering the barriers to access to these resources and broadening impact through the design of systems, and development of software that support a broad community of users. As a leader in the development of science gateways, (e.g., the Science Gateway Community Institute, West Big Data Hub, WiFire, HUBzero\textsuperscript{®}, and many others), SDSC has provided access to advanced computing to over hundreds of thousands of researchers, students, and users from hundreds of institutions across the country. As a leader in the development of data resources and services based on FAIR principles for data management (Findable, Accessible, Interoperable, and Reusable), SDSC is working to ensure broad access to valuable data and models.

\textsuperscript{20} https://www.ucop.edu/uc-women-in-technology/index.html
\textsuperscript{21} https://escience.washington.edu/dssg/
\textsuperscript{22} https://hubicl.org/
\textsuperscript{23} https://studentorg.ucsd.edu/Home/Details/8249
\textsuperscript{24} https://sciencegateways.org/
\textsuperscript{25} https://hsistemhub.org/
\textsuperscript{26} https://innovation.ucsd.edu/events/applications-open-ucsd-mentor-assistance-program-map-2020-2021/
\textsuperscript{27} https://summer.ucsd.edu/program-finder/research-experience-for-high-school-students.html
\textsuperscript{28} https://plantingscience.org/
6. RESEARCH in SCIDS

We propose the formation of SCIDS as we find ourselves in “the age of complexity”. Changes in knowledge, technology and the environment are having increasingly rapid impacts on society, requiring the development of new integrated systems on a grand scale. From the natural sciences to industry to big tech, challenges exist in not only benefiting from the advances in data science, information and computing, but also in driving developments through the lens of society in order to solve the challenges of our time. Universities need to acknowledge these challenges and embrace new approaches to research that are focused on problem-solving to transform systems in societal settings as exemplified by the NSF’s focus on Growing Convergence Research. SCIDS will be ideally situated to push progress forward on some of the urgent and complex societal problems of our time through integration of data science and computing.

![Diagram of Data Science and Machine Learning Concepts]

Already our researchers are doing work at the forefront of the most important scientific and societal issues of the day – from climate change to COVID-19. These challenges require progress towards solutions at an unprecedented pace. As a leader in data-

29 [https://beta.nsf.gov/funding/opportunities/growing-convergence-research-gcr](https://beta.nsf.gov/funding/opportunities/growing-convergence-research-gcr)
intensive computing and cyberinfrastructure, SCIDS will have an important role to play in moving from data, to discovery, to impact at the societal scale. To this end, SCIDS will focus on development of a convergence research agenda and new programs for advancement of responsible and ethical influence of data science, information and computing within society. In this effort we note that our location at the U.S.-Mexico border means that in our region we experience global challenges locally in a way that most places do not. This results in a living laboratory for discovery in areas critical to our nation and society today. The unique attributes of the border region – a frontier in its own right – provide an unparalleled opportunity for data-driven research, as well as data science-focused education and workforce development. In the following sections we review elements of current research in HDSI, SDSC and the broader community at UC San Diego that combine to provide an excellent foundation for the success of SCIDS as a research innovator, as well as one of the primary goals of convergence research – translating innovation in computing, information and data sciences into impactful practice.

6.1. HDSI Engagement in SCIDS

UC San Diego has a tradition for interdisciplinary research. The advent of big data across all domains of human knowledge has been long recognized by researchers at UC San Diego and HDSI fostered this environment further. HDSI brings together a large number of faculty and researchers across many departments and divisions at UC San Diego with overlapping interests in the discipline of Data Science. HDSI research is organized into clusters of shared interests and domain knowledge ranging from foundational theory to challenging downstream applications in domains such as life sciences and environment. With the establishment of SCIDS, the opportunity to synergize interactions increases manifold. We summarize potential future research directions in SCIDS, several in collaboration with other units on campus, in the schematic below, which will undergo revisions dynamically with the growth of the school.

Focusing on fundamentals, research in SCIDS will build on the work of HDSI on the theoretical foundations of Data Science, design machine learning algorithms with provable guarantees, develop methods and tools for the practitioners that are broadly useful in combating the “deluge” of data caused by ever growing sources of data. In this endeavor, researchers with core expertise in algorithms, mathematics, and statistics work with domain experts in areas where there is a perceived benefit to collecting large amounts of data. The areas of expertise include, computer-intensive and non-parametric statistical methods, methods for time series data analyses, causality and inference, natural language processing, data security, and databases. The application domains that encompass the current research areas of HDSI faculty include life and health sciences, oceanography, material sciences, geosciences and sensors. Other research areas include cognitive sciences and business analytics. The constant interplay between the particulars of a domain and generality of methods is essential to the advances sought in algorithmic data sciences and SCIDS can play a key role in this endeavor.

6.2. SDSC Engagement in SCIDS

UC San Diego is a pioneer in computational infrastructure and sciences. Over the past four decades SDSC has maintained national leadership as a paradigm for Moore’s law in computing and scientific leadership in helping the computing applications community. At
this point of the technological evolution of software and computing, we find ourselves in a major transition, driven by two fundamentals. Exponential growth of computational power per dollar has slowed down substantially because of a slowdown in Moore’s law of growth in transistors per unit area. At the same time, instrumentation is still on an exponential growth curve in numbers of electronic channels per instrument, and the rate at which those channels are sampled and digitized. Similarly, growth in network bandwidth, and the number of devices on the network is still exponential. As a result, exponential growth continues in the generation of data, its movement, and the need for its processing. This is leading to an unprecedented hardware innovation landscape. Programmable computational capabilities are being integrated into devices of all kinds, including network interface cards, switch ports, and storage devices with corresponding innovative programming concepts like programmable networks, data flow processing, and computational storage. All these concepts are ready to be integrated into future HPC systems at all scales, from workgroup clusters to exascale supercomputers. SDSC has expertise at all layers of this ‘vertical stack’, from an Advanced Technology Laboratory where new hardware and systems concepts are explored, to applications where domain scientists work on how to integrate those new concepts into their applications at scale. In the future, we may see increased application also of neuromorphic and quantum computing. Moreover, the deployment of devices with data collection and/or computing capabilities, and the way they are networked with each other continues to grow in both volume and diversity and has led to concepts like “edge computing”, “internet of things”, “wearable computing”, “networked living environments”, and “sensor networks” to mention some examples. The future of wireless communications provides additional opportunities for new types of distributed systems, networks, and radically different applications to exploit their capabilities. SDSC is well positioned to play a major role in driving advances in cyberinfrastructure, and their exploitation in new types of applications.

In parallel, the growth in data science in general, and artificial intelligence and machine learning, are providing additional innovation drivers, leading to hardware innovations on “conventional” CPUs and GPUs, as well as a plethora of hardware architectures dedicated to machine learning. Independently, Blockchain technology, and its use across novel types of applications beyond digital currency provides additional disruptive opportunities. All this heterogeneity in hardware, software, and deployments of both into novel types of systems provides us with exceptional opportunities for SDSC to do what we do best: translate innovations into practical use. SCIDS will provide the right scale and opportunity to execute the new paradigms.

6.3. Translating Innovation into Practice

In addition to advances in basic research, there is a need for translational research and transition to practice of foundational research. As societal challenges grow, there is a need for acceleration of innovation for societal impact. High performance computing (HPC) and big data—essential to data-integrated discovery science—are now also necessary for AI and societal impact. The phenomenon of HPC emerged from “big science”, while big data and data science emerged from industry. We are now seeing a convergence across computing, information, and data to support discovery science as well as translational research.
This kind of research has been a core competency of SDSC for the last 35 years. One might even argue that SDSC was founded to support translational research in computational science and the transition to practice of innovations in software, hardware, and systems that depend on both, and the processes and procedures to effectively operate and support such.

By choosing HDSI and SDSC as foundational units of SCIDS, we have the opportunity to place a special focus on the translational aspects of research in computing, information, and data sciences. We propose to deliberately recruit faculty that primarily engage in such translational research. We propose to start this as part of HDSI, with a teaching commitment to the HDSI curriculum, but with an expectation that their research will depend on people and systems at SDSC, and their research groups will be housed at SDSC. In fact, we expect tenure for such faculty to be judged additionally on the impact of their research outcomes in form of products and services and their widespread adoption, rather than traditional metrics like publications, citation counts, and alike. There is an expectation that a full professor focused on translational research will have created a well-funded sustainable research group in SDSC that routinely engages with customers of their products and services outside of academia. Example for such groups may come primarily from integrative multidisciplinary endeavors, e.g., hazard management (Wildfire, floods, hurricanes, drought, …), agriculture, manufacturing operations, city and power grid management, but also computational genomics, computational pharmacology, practical cybersecurity, automated financial fraud detection, self-driving cars, and many more.

6.4. Synergies with UC San Diego Academic Units

The necessary and futuristic synergies between departments with joint affiliations portends the future and this strongly motivates the establishment of the School of Information and Data Science at UC San Diego. Initial discussions with Deans and Directors of all UC San Diego academic units demonstrated the exceptional synergy that
exists between Data Sciences and other disciplines. This is schematically represented below.

Several grand challenges in science and engineering are dependent on data analytics. The COVID-19 pandemic affected over 400 million humans across the globe with nearly 6 million deaths to date. The epidemiological data alone contributed to petabytes of data and the data analytics helped save significant lives. UC San Diego launched the wastewater detection initiative and the collaboration between the Schools of Medicine, Public Health and HDSI led to our institution becoming one of the forerunners in detecting and preventing more infection. The Cancer Moonshot project that is being revitalized will generate vast amounts of omics data which will yield valuable insights and treatments through detection of germline and somatic mutations and their downstream consequences. We have an unprecedented opportunity to decipher the underlying cancer mechanisms leading to novel treatments. The advent of wearable sensors is causing a revolution in personalized self-monitoring of humans. The challenge lies in transforming this enormous longitudinal data into actionable outcomes.

The dramatic change in global climate is leading to fundamental changes in all walks of human life. Hurricanes (Cyclones), wildfires, earthquakes, global warming, and a plethora of other changes whose change gradients are reaching unprecedented levels are a testimony to global climate changes. Measuring, documenting and analyzing the myriad data associated with climate is a daunting task that will involve the marriage of multiple disciplines and very deep analyses of the measurements. This will range from measurements of oceans to land mass to earth’s atmosphere and the immeasurable analyses of the emerging data. Such analyses have the potential to impact policies that will change the nature of life on earth.

The financial and consequentially the fundamental health of human race will depend on management of earth resources and development of innovative technologies that will transform the utilization of earth resources. While the utilization of resources is depleting the global reserves, the management is leading to reduction in the quality of life and standard of living for a sizable global population and such inequality will lead to global instabilities. The data associated with resource management, utilization and conservation is a harbinger of our future and will warrant entire new analytic strategies combined with new policies.

One of the biggest revolutions that has impacted human race at the turn of the last century is the web and social media developments. Information both true and erroneous are available instantaneously with the only major filter being the human, who is communicating, and this has led to enormous challenges in information and computational sciences. While contextual learning methods in data sciences are beginning to aid veracity and comprehension, we are far from establishing standards of communication as well as content management. This is a major challenge for next generation data and information sciences.

Such challenges are at the core of computational, information, and data sciences and SCIDS is well positioned to address these challenges. The major empowerment for SCIDS addressing these global problems comes from the inherent DNA of being able to work across disciplines and pioneering new paradigms in multi-disciplinary innovation at UC San Diego. The new Dean and thought leaders in SCIDS will frame the global grand challenges that will form the core of intellectual and educational explorations for coming decade.
7. SCIDS ADMINISTRATION AND FINANCIAL PLANNING

7.1. Administrative Structure

An important characteristic of SCIDS is its interdisciplinary status having academic, research, and staffing connections with multiple units on campus. While interdisciplinary research is common in many academic units, an integrated academic unit with significant interdisciplinary teaching responsibilities calls for careful planning and meaningful engagement of multiple administrative units with the SCIDS. Fiscally, this task is within the scope of our integrated university financial system. Administratively, SCIDS administration will be organized to directly oversee the operations of the HDSI and SDSC units, while also providing for consultative engagement with academic units that are closely engaged programmatically through joint academic programs and/or joint faculty recruitments. To envision such a framework, we propose the following initial administrative structure.

*Only reflects oversight in relation to SCIDS structure. Total oversight is broader than what is shown here.*
The Dean of SCIDS will report to the Executive Vice Chancellor and will be responsible for the administration of the school. They will be assisted by an Associate Dean, a faculty member who will report to the Dean and share the overall administrative responsibility. They will also be supported by two Assistant Deans, one in charge of strategic planning and administrative operations and another in charge of development, industry outreach, and DEI. Each Assistant Dean will have appropriate staff who will help with the administrative operations. At the initiation of SCIDS, two units, namely HDSI and SDSC, will have a direct reporting line to the Dean of SCIDS. The faculty and staff academic lines and resources and the operational and fiscal components will be orchestrated through the Dean of SCIDS.

In addition, campus units like CSE, ECE, CogSci, Mathematics and QI that have significant intellectual overlap with SCIDS will have the opportunity for forming a joint affiliation with SCIDS to support a variety of collaborative activities. Primary oversight of these units will remain the responsibility of their parent Schools. All negotiations and coordination of joint activities will be carried out by the respective Deans, Chairs and Directors of the respective units, to ensure that the joint activities are aligned with the units’ strategic visions and missions. This joint affiliation framework will also offer an opportunity for other existing academic programs (e.g., Bioinformatics or Health Informatics) or potential future programs (such as Information Science) to be a part of SCIDS.

7.1.1. Initial Affiliation of CSE and ECE with SCIDS

Given the strong connections between HDSI, CSE, ECE, and the data science and applied data science that will be the focus of SCIDS, a more formal connection between the CSE and ECE departments and SCIDS is proposed during the formation of the school. The context for this connection is based on the central role CSE and ECE have played over the last 30 years leading San Diego’s ascension as a world-class hub for research, education, and practice of computing and information sciences. The UC San Diego CSE department appears near the top of all major rankings. CS Rankings an open, metrics-based ranking, ranks UC San Diego 4th in Computer Science research. CSE plays a key role in preparing large numbers of UCSD students for their careers: each year, nearly a quarter of all students at UC San Diego (undergrad and grad) take a CSE class, and over a third of all graduating students at UC San Diego have taken at least one lower division CSE course. This level of campus-wide impact is unparalleled by any other computing-related research or educational unit on campus. ECE is also a highly ranked department that has spawned a large part of the communication industry in the San Diego area and offers significant academic programs in artificial intelligence and robotics at all levels.

At all universities that have a school/division/college with the word "computing" in it, Computer Science and Engineering is an integral part of this structure with a well-defined formal connection. In many cases, Electrical and Computer Engineering is also a part of this structure with a well-defined formal connection. At some universities, CSE is housed

30 https://csrankings.org/
solely in the School of Computing, for example at Carnegie Mellon and Georgia Tech. At other universities, CSE, ECE and/or EECS are part of both the school/division/college of computing and other structures like a school/division/college of Engineering. This is the case at Berkeley, MIT, and Cornell. Creation of a School of Computing, Information and Data Sciences without establishing a formal connection to CSE/ECE could prevent UC San Diego from being competitive with the top universities for talent at all levels, students, faculty and staff.

The task force, hence, proposes that a formal connection be established between CSE, ECE, and SCIDS at inception to ensure that externally the new school starts off aligned with national trends. While details will be memorialized in MOU’s, the task force anticipates that the connection will involve the following kinds of collaboration that will benefit CSE, ECE, SCIDS and the university as a whole:

● **Faculty Hiring:** There is significant intellectual overlap in the academic and research programs of SCIDS and CSE/ECE. We expect that SCIDS and CSE/ECE will make coordinated plans to each hire some faculty in these areas of overlap; having more faculty on campus who work in these areas will benefit SCIDS and the campus. We also anticipate the units may decide to undertake some joint appointment hires together to strengthen their academic portfolios.

● **Teaching:** CSE and ECE have committed to the undergraduate educational mission of SCIDS by continuing to offer introductory computing classes to increase computer literacy amongst all students on campus. CSE also currently runs the campus Computing Pathways Program\(^{31}\) which provides pathways to computing for all UCSD students. CSE will continue this program in collaboration with units in SCIDS. Furthermore, a formal structure will be established to coordinate the educational missions of SCIDS, CSE, ECE, with appropriate leadership roles.

● **Philanthropy:** CSE, ECE and JSOE will continue to engage with philanthropists around computing education and research and will coordinate where appropriate with SCIDS in these efforts to improve the campus footprint of computing research and education. In turn, new philanthropic outreach by SCIDS around computing should coordinate with CSE/ECE and JSOE where appropriate. To facilitate this, a set of shared development coordinators will be arranged between the new school and the Jacobs School.

● **Governance:** The governance structure of SCIDS should be developed to include pathways for CSE/ECE to be incorporated into decision making roles, for example by including chairs of departments with formal connections to SCIDS chairs/dean meetings. In turn, CSE and ECE will ensure that faculty who have appointments in SCIDS continue to hold key governance positions within CSE and ECE respectively.

Given the transdisciplinary nature of the research and educational programs in SCIDS it is likely that similar close collaborations with other existing academic departments may develop as the School grows. The task force envisions a structure where the leadership

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\(^{31}\) [https://computingpaths.ucsd.edu](https://computingpaths.ucsd.edu)
of units including the academic departments of Mathematics and Cognitive Science, as well as the Library and the Qualcomm Institute engage with the SCIDS Dean on a routine basis to coordinate new research and teaching initiatives, as shown schematically in the organizational chart with respect to Computer Science and Electrical and Computer Engineering. This flexibility is a central part of our expansive vision for the role that SCIDS will play as a transdisciplinary academic unit.

7.2. Financial Structure and Viability of SCIDS

As a new school, SCIDS financial viability is rooted in three key elements each of which strictly adds to the financial resources generated by the academic units at UC San Diego: instructional activities, research activities, and operational infrastructure activities. The SCIDS divisional activities will supplement these three legs with a well-designed outreach and philanthropic development initiatives to supplement and expand (particularly, capital investments) the size and scope of the envisioned school. HDSI via its undergraduate major and minor and five graduate degree programs conducts the core instructional activities. The educational section of this proposal outlines the status and planned growth in these programs over the next five years. The research activities of the SCIDS are amongst its biggest highlight and a distinguishing feature of the proposed school compared to its peers across the nation. This is because in addition to the faculty and researchers in the academic department of HDSI, SDSC brings to SCIDS a tremendous capability for operationalizing and conducting at-scale research activities that explore scientific, societal, environmental, and health challenges that typically require significant investments and multi-disciplinary research teams.

SDSC with its 35-year history of carrying out large-scale scientific computational projects tied to national, state and UC research priorities presents a compelling organization of nearly 200 research staff that is highly capable of making expeditions to our future in the world of computation and data. Such research and its underlying infrastructure are necessarily, and have been, supported by extra-mural funding that SDSC has become adept at successfully competing nationally. This capability will complement HDSI's academic core to catalyze and expand the overall research portfolio of SCIDS that would be far above what each of these two units can achieve individually. HDSI’s launch and growth were supported by its founding donor as well as campus investments into building the new academic unit. Going forward, the catalysis of new research through SDSC, and new educational and outreach programs through participation of HDSI personnel, we envision a multiplicative effect that contributes to the growth of SCIDS and its partners. With HDSI and SDSC at its core, the new school will also feature a diversity of income streams, which notably includes service agreements with the private sector and other external organizations. These service agreements are often rooted in the computational and data analysis infrastructure built and maintained by SDSC.

In this proposal, we present a 5-year growth plan for SCIDS as an initial point in the larger planning process, primarily based on current trajectories over the three-year faculty growth plan currently in effect. We present here an outline of the plan in fiscal terms. While this fiscal outlay restricts itself to standard expenses, it is not meant to capture the investments in potentially paradigm changing research investments. Plans for such investments and strategic planning will be within the purview of the Dean of the new
School in consultation with the EVC and Chancellor. We present a brief outline of the projected fiscal plan for HDSI, SDSC and the SCIDS Dean’s Office. The hardware and computing infrastructure, present and future, are listed in Appendix 2.

**HDSI Financial Status and Plan:**

HDSI has been supported by institutional resources in concert with philanthropic Foundation resources during the formative years since 2018. Past and projected finances for HDSI from FY20 through FY25 are given in the table below. HDSI’s current budget consists of $5.8M in core operations and $3M in activities in form of fellowships, postdoctoral support, infrastructure, outreach, and industry liaison programs. The core budget is directly tied to the growth of enrollments, programs, faculty and staff appointments and is currently on a growth path as we continue to recruit faculty, and add courses and programs. Included in $5.8M is $3M in faculty and $1.2M in staff salary and benefits. Based on the recruiting plan and programs already in progress, we anticipate the core budget to increase to $8M in FY23. The graduate programs will see enrollments starting Fall 2022 and will also add to the graduate support as well as income from our two MS programs being launched starting Fall 2022. The planned growth in various parameters that determine the core budget are listed in the table below. The sponsored research is currently ahead of the projected growth due to a number of large-scale projects and proposals in the pipeline. Over the long term, we anticipate HDSI to reach an average of $200K/faculty/year of extramural research funding. However, unlike many traditional disciplinary academic units, we are likely to see a much larger variation in extramural research support across faculty given a very wide range of disciplines and training of its faculty. A closer engagement with SDSC researchers will enable higher levels of extramural research funding by improving the average size and competitiveness of the research project proposals fielded by the SCIDS researchers working together.

### HDSI Financials

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<th>Operating/Core Funds</th>
<th>FY20</th>
<th>FY21</th>
<th>FY22</th>
<th>FY23</th>
<th>FY24</th>
<th>FY25</th>
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<tr>
<td>Resources</td>
<td>2,447,179</td>
<td>4,421,231</td>
<td>5,807,643</td>
<td>8,154,475</td>
<td>9,631,212</td>
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<td>Core Resource Allocations</td>
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<td>8,154,475</td>
<td>9,631,212</td>
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<td>Total Resources (less faculty controlled)</td>
<td>2,447,179</td>
<td>4,421,231</td>
<td>5,807,643</td>
<td>8,154,475</td>
<td>9,631,212</td>
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<td>Expenses</td>
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<td>Academic Salaries and Wages - faculty</td>
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<td>Equipment</td>
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### Supporting - Contracts and Grants

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<tr>
<td>FY23</td>
<td>1,225,591</td>
</tr>
<tr>
<td>FY24</td>
<td>1,482,966</td>
</tr>
<tr>
<td>FY25</td>
<td>2,209,619</td>
</tr>
</tbody>
</table>
SDSC Financial Status and Plan:

Past and projected finances for HDSI from FY20 through FY25 are given in the table below. In the most recent fiscal year, SDSC reported $35M in contract and grant revenue, and $14M in service agreement and recharge revenue. This can fluctuate significantly due to high performance computing acquisition awards, for example the recent Expanse system, which represents a $10M procurement. Conservative estimates for growth are 4% per year without SCIDS, and 8% per year with a well-resourced, well executed SCIDS. The difference comes to a non-negligible part from the “translation of innovation into practice” focus discussed in Section 5. To achieve growth near 8% per year, we must recruit faculty focused on translational computer, information, and data sciences as part of a focus area in SCIDS. Those faculty are revenue drivers that will expand the scope of research, lead to partnerships with industry, and develop new experiential learning programs. A growing portion of SDSC’s revenue comprise service agreements with the private sector and other external entities. Service agreements provide a mechanism to increase discretionary revenue through differential income (DI). DI is an important mechanism for creating additional resources to invest in new strategic initiatives and can help offset year-to-year budget fluctuations. In a normal year, the DI is roughly what SDSC can invest. The budget model here assumes 4% growth throughout. To support an 8% growth in revenue, we expect to require a 5% growth in SDSC research staff, in particular a growth in the number of PIs. This assumes that a 3% revenue growth is
needed to maintain existing staff levels of 200-250 people. In short, SDSC comes to SCIDS in exceptional financial condition and will thus be a net contributor to the overall financial viability of SCIDS, further reducing risk.

**SCIDS Dean’s Office Financial Plan:**

Given the excellent fiscal health of both HDSI and SDSC, the proposed initial budget for the SCIDS Dean’s Office, shown in the Table below, is focused on essential operations and a small number of programmatic investments essential for the successful operation of the school. The initial budget below includes key administrative positions, including the Assistant Dean, Dean’s assistant, academic personnel, and financial analyst. This is a natural path forward in the development of the administrative structure of the school as two established units are brought together under this new umbrella. As the synergism in research, education and development activity grows there will be an opportunity for the new Dean to develop an efficient administrative structure. As noted in section 7.1, as the school grows and increases development and other activities, we expect that an expansion of the office with an additional Assistant Dean would be ideal.

In addition to these core functions, the budget includes a communications specialist, and a development support staff member. These positions will initially work closely with their campus counterparts and those in HDSI and SDSC on a wide range of start-up activities, including branding, website, newsletter, community relations and outreach, and others. The communications specialist will be especially important to coordinate strategies and investments across HDSI and SDSC to engage the rest of the UCSD campus as well as the UC system. It is anticipated as the school grows that communications and development will become increasingly centered in the Dean’s office supporting the diverse needs of SDSC, HDSI and the broader mission of SCIDS.

### 8. CAPITAL REQUIREMENTS – INFRASTRUCTURE

The establishment of a new school will provide an important opportunity for UC San Diego to identify a new state-of-the-art home for SCIDS. Initially SDSC will remain housed in the purpose-built building it has resided in for nearly 40 years. Currently HDSI is collocated with SDSC in the building, but soon HDSI will relocate to the renovated Data Science Building in the Warren College area. This will provide relevant space for HDSI, and then, SCIDS to grow the academic program in the near term. In the longer term, the new dean
for SCIDS should work with the EVC and the Chancellor to identify philanthropic support for a new home for the academic center of the new school. This should be an important priority in the early years of SCIDS.

This priority also needs to be considered in the context of a more urgent need for both the new school and the campus at large, and that is an expansion of the SDSC data center. SDSC presently operates a 19k square feet data center for UC San Diego, housing 515 computer racks. After a multi-year campaign to consolidate inefficient and often dangerous closet server racks spread across campus, the data center at SDSC is presently saving campus roughly $4.4M per year in energy savings compared to operations prior to the consolidation. At this point, the data center is full, and SDSC is preparing to submit a proposal for an expansion of at least 10,000 square feet. Past growth indicates that such an expansion would be filled within 10 years. To be prepared for additional growth inherent in the creation of SCIDS, we envision a 15-20k square feet expansion, including cooling infrastructure to host the kind of high power density equipment necessary for today’s top of the line AI/ML computing hardware. Additional data center space dedicated for SCIDS, and its future computing and data needs would allow for an expansion in systems that facilitate collaborations with industry, foundations, other UC campuses, and federally funded research. As an example, the existing data center includes investments by the Simons Foundation, the NSF, the State of California, and several million dollars of industry supported hardware. The industry investments are particularly noteworthy as they provide physical infrastructure that facilitates faculty -

<table>
<thead>
<tr>
<th>Classroom Laboratory Size Cat</th>
<th>Description of Instructional Activity</th>
<th>ASF/Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Includes simple computer station laboratories, case study and group project laboratories.</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>Includes mix of computer laboratories, behavior science laboratories, simple wet laboratories.</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>Includes wet laboratories, significant material storage requirements.</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>Includes complex wet laboratories with extensive service space, complex design laboratories, CAD/CAM, project studios.</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td>Includes complex wet and dry laboratories, equipment intensive areas, extensive storage and shop requirements, increasing code requirements for life-safety.</td>
<td>90</td>
</tr>
</tbody>
</table>
industry collaborations, most notably between health sciences and the pharma industry. Having the data center space to grow such initiatives will be aided by the creation of SCIDS.

SCIDS space growth plans will follow the General Campus mandate on office, laboratory and research space. In the master plan for space allocation related to instruction and research for campus in the tables shown above, SCIDS will follow the current HDSI plan of opting for 5D, similar to the Computer Science and Engineering model. Based on this formula, the proposed plan anticipates the need for additional 20-30,000 sq. ft. of space by 2030 when SCIDS is expected to achieve a steady state in terms of faculty, staff and student strengths.

9. METRICS FOR REVIEW AND ASSESSMENT OF SCIDS

The Task Force discussed the metrics for review and assessment of SCIDS over short, intermediate, and extended time periods. In terms of prior assessment of HDSI, SDSC, and the affiliated departments, i.e., CSE, ECE, Cog Sci and Math academic achievements highlight the immense success of the units. Within a very short period of existence HDSI and the data science components of closely affiliated departments have achieved the US World and News Report academic ranking of 10th in Data Analytics and Science programs, and SDSC has been a nationally funded and highly recognized supercomputer center.

The success of Schools in institutions of higher education are assessed by multiple metrics, the principal ones being the US World and News Report Annual Rankings at the national level, and the Times Higher Education Rankings internationally. These rankings are based on peer assessments, extramural funding and publications that highlight the
research accomplishments and education and training assessed through student placements and alumni reviews. SCIDS administration will gather pertinent data from inception and will review annually progress and propose improvements as needed. We detail specific metrics of assessment and the concomitant timelines below.

In Research, the most significant metrics as associated with extramural research funding, publications, recruitments of quality faculty and students, and peer standing. It is a tradition cutting across academic divisions at UC San Diego to obtain exceptional extramural funding from federal agencies, Foundations, and industrial partnerships. SCIDS administration will ensure the extension of this success to departments and units in SCIDS. The Dean will collaborate actively with campus advancement office and the faculty in SCIDS to enhance endowment funding. The scientific leadership in SCIDS will assess annually the most important areas of growth in computing, information, and data sciences for solving imminent societal problems and advancing data analytics. The Dean in collaboration with department chairs will carry out annual assessments of faculty research progress and advice on mechanisms to enhance research and funding. Success in research is traditionally echoed by the training of Master’s and Ph.D. students, postdoctoral associates, and publication of high quality research papers while advancing new methods and technologies. The latter is often reflected by disclosures and patents that are licensable for private sector developments. The Dean’s office and administration will monitor and assess the units in SCIDS for these measures. Concrete steps for improvements will be advocated and supported.

A key metric of success of a School lies in training Undergraduate Students who will form the next generation workforce for the nation. The emergence of computing and data sciences and important public-private sector employment needs mandates that SCIDS should play an effective role in educating students. SCIDS will assess the employment statistics of our graduates annually in addition to actively collaborating with local industry in assessing their needs and tuning our training to address the needs. Most importantly, SCIDS will build an internship corridor with industry in the San Diego region and California more broadly to provide a continuous movement of students for training in industry in preparation for successful employment. The Dean’s office and administration will assess this success on an annual basis and provide necessary adjustments. The latter will include periodic assessments of curricula, engagements of students in research training, and ability of students translate learning to practice. SCIDS will form an external advisory committee consisting of academic and industry leaders who will review the success of the program on a 5-year review basis.

SCIDS will also assess in collaboration with other campus units the extent of involvement and affiliation of other campus units with SCIDS. We anticipate in the future departments in other Schools on campus to have stronger affiliations in terms of joint faculty appointments, new educational programs, and creation of joint organized research units (ORUs). These plans and programs will be assessed periodically, as per the campus norm.
10. SUMMARY

The Task Force is pleased to provide this proposal for the establishment of a new School of Computing, Information, and Data Sciences. This proposal has been developed from a five-month discussion between the members and campus stakeholders. The proposal outlines the compelling need for UC San Diego to launch a School of Computing, Information, and Data Sciences and provides a detailed administrative, intellectual and academic framework. Given that data and computer literacy is the *sine qua non* of any modern and future society, SCIDS will play an important role in training the next generation workforce and providing solutions to challenging societal problems involving data and information. We look forward to engaging the Divisional Academic Senate in submitting the proposal for Systemwide Senate and UC Office of the President endorsement for launching SCIDS.
APPENDIX 1 TASK FORCE MEMBERSHIP and CHARGE LETTER

Task Force Members:

Faculty Representatives

Shankar Subramaniam, Distinguished Professor, Bioengineering, Co-Chair
Virginia de Sa, Professor, Cognitive Science, Associate Director, HDSI
Kelly Frazer, Professor, Pediatrics
Javier Garay, Professor, Mechanical and Aerospace Engineering
Takaki Komiyama, Professor, Neurosciences
Lucila Ohno-Machado, Distinguished Professor, Medicine
Dimitris Politis, Distinguished Professor, Mathematics, Associate Director, HDSI
Alex Snoeren, Professor, Computer Science and Engineering
George Sugihara, Distinguished Professor, Scripps Institution of Oceanography
Allan Timmermann, Distinguished Professor, Rady School of Management
Edward Vul, Associate Professor, Psychology
Yusu Wang, Professor, HDSI

Administration

Robert Continetti, SAVC-AA and Dean Designee for HDSI, SDSC, Co-Chair
Ilkay Altintas, Chief Data Science Officer, SDSC
Cheryl Anderson, Dean, School of Public Health
Chaitan Baru, Distinguished Scientist, SDSC
Rajesh K. Gupta, Director, HDSI
Jessica Kuhrt, Business Officer, Dean Designee’s Office
Sorin Lerner, Professor and Chair, Computer Science and Engineering
Bill Lin, Professor and Chair, Electrical and Computer Engineering
Amit Majumdar, Division Director, Data Enabled Scientific Computing, SDSC
James McKernan, Distinguished Professor and Chair, Mathematics
Douglas Nitz, Professor and Chair, Cognitive Science
Mai Nguyen, Director, Design Lab
Lisa Ordóñez, Dean, Rady School of Management
Shawn Strande, Deputy Director, SDSC
Frank Wuerthwein, Professor, Physics, Interim Director, SDSC

UC San Diego Foundation Board of Trustees

Steve Hart, Co-founder, Executive Vice-President and Chief Technical Officer, Viasat
Matt Newsome, Senior Vice President, Cubic Transportation Systems
Pelin Thorogood, Executive Chairman and Co-founder, Radicle Science
Subject: School of Computing, Information and Data Science Proposal Task Force Charge

Dear Colleagues,

Thank you for agreeing to serve as members of the School of Computing, Information and Data Science (SCIDS) Proposal Task Force. This task force is being formed as a senate-administration task force following adoption of the report of a Workgroup on the feasibility of SCIDS submitted earlier in the summer of 2021. I am pleased that
Senior Associate Vice Chancellor for Academic Affairs (SAVCAA) Robert Continetti and Distinguished Professor Shankar Subramaniam from the Department of Bioengineering have agreed to serve as co-chairs for the task force, and the office of the Senior Associate Vice Chancellor will provide administrative staff support.

**SCIDS Vision:** As outlined in the report by the Workgroup, the School of Computing, Information and Data Science (SCIDS) will be an enduring academic unit that leverages the intellectual and operational resources of the Halicioğlu Data Science Institute (HDSI) and the San Diego Supercomputer Center (SDSC). SCIDS is envisioned to be a transdisciplinary school that serves as a hub of research, teaching, and translational practice in broad areas of data science and its impact on society. At the core of SCIDS will be HDSI and SDSC that together will serve to attract and engage a broad community of researchers on campus and externally. Organizationally, the two units will not only retain their existing external identities but also build upon the SCIDS personnel, academic and operational resources to expand their reach and impact.

**The SCIDS Proposal Task Force:** In view of the broad and transdisciplinary nature of the scope of the proposed school, based on the recommendations of the Senate Committee on Committees, we have assembled a broad representative task force with members drawn from across the General Campus, SIO and Health Sciences to ensure rich and informed discussions on developing the proposal for creation of the new School.

**Proposal Background:**

The Task Force is coming together at a key moment in the evolution of the role computing, information and data science play in society and on our campus. The increasing focus on data-driven approaches across the breadth of human inquiry was one of the motivations for the establishment of the interdisciplinary Halicioğlu Data Science Institute (HDSI) proposed in 2017 and launched in 2018. The San Diego Supercomputer Center (SDSC) has been on campus now for more than 35 years, with notable external roles and recognition as well as an essential role in supporting interdisciplinary computational science on campus. The two organizations, HDSI and SDSC, have significant interactions, with SDSC researchers serving on HDSI faculty council and in key leadership positions in HDSI. SDSC has appointed 8 HDSI faculty members as SDSC fellows, while SDSC’s chief data scientist is appointed as an HDSI Fellow. The synergy between HDSI research and SDSC’s operational excellence in cyberinfrastructure and large-scale data science projects have raised the possibility of creating a compelling integrated institution at the intersection of computing, information and data sciences. Together, the presence of these two vital organizations on campus provides an outstanding opportunity to leverage complementary strengths of academic and operational success in building a School that takes the lead in not only establishing new academic programs and talent pools but also carrying out exploration to meet the needs of an information society in the decades ahead. As the new School builds new academic programs, supports and expands campus-wide activities, it will catalyze new research communities and efforts while enabling UC San Diego’s unified presence in the emerging area among peer schools.

To assess the prospects for developing a new school, a preliminary Workgroup consisting of faculty and researchers drawn from SDSC, HDSI and other divisions was convened to examine the question in January of this year. That workgroup met with a wide range of academic leaders, including all academic deans, and produced a report that strongly supported the establishment of a new School. The report noted that to be successful, the School will have to be dynamic and promote collaborations with established programs across the campus, particularly with established departments such as Computer Science and Engineering, Electrical and Computer Engineering and the applied mathematicians in Mathematics. Similarly, the School will need to establish an
environment to enhance the breadth of interactions HDSI has and is developing through joint appointments across the general campus, including with the arts and humanities, social sciences, the professional schools, SIO and the health sciences. The educational programs of the School will benefit from the strong momentum HDSI has already generated, and will contribute to broadening the opportunities for students at all levels to benefit from interdisciplinary studies in computational and data science.

**Scope and Charter of the SCIDS Proposal Task Force:**

As you examine the opportunities presented by the new School, it will be essential to proceed in a way that preserves the existing strengths and roles of HDSI and SDSC, while laying the foundation for a larger and permanent presence for computing, information and data sciences in the research and educational mission of UC San Diego. These include partnerships with the full range of existing schools/divisions.

The next step in this envisioning process is to develop a formal proposal for the School for review, refinement and approval through the established shared governance process with the San Diego Division of the Academic Senate and the Administration, leading to approval by the Divisional Academic Senate and submission to the Office of the President for further review.

The process for approving new schools is described in the Compendium of the University of California. This is typically a two-step process consisting of a preproposal and a full proposal. We will be in consultation with the Academic Senate to consider the possibility of this SCIDS Proposal to be the preliminary or full proposal. Regardless, this task force’s proposal will form the basis of the final proposal submitted for the systemwide review.

The compendium notes that **the proposal will need to address four primary elements: (1) academic rigor, (2) financial viability, (3) the need for the program, and (4) the fit of the school within the UC system and within the segments of higher education in the State of California.** Furthermore, the compendium specifies that the consideration of financial viability will need to address FTE requirements to support the school, capital requirements and sources of revenue. **Writing a proposal responsive to these four required elements is thus the central charge for this workgroup.** The report from the preliminary workgroup provides a starting point for embarking on this process, and it will also be valuable for this workgroup to consider the following specific points as you respond to the requirements of the compendium:

I. **What organizational structure** of the School will contribute most effectively to the success of transdisciplinary research and education across the campus? What are the synergistic programs and activities enabled by the new academic unit, and how will they interact with the full spectrum of existing schools/divisions?

II. **Develop a plan for the growth of the academic programs, research thrusts,** and the faculty. This should specifically address how the extramurally supported research mission of SDSC can benefit through involvement with the broader educational mission of the School and campus.

III. **Consider the potential contributions the programs of the School could make towards understanding the ethics and societal impacts** of computation and data across all disciplines.

IV. **Identify infrastructure needs for a successful implementation of the School.**
V. Assess societal needs and the placement of graduates (at all degree levels) from the programs offered by the School.

VI. Develop metrics to assess the success and future evolution of the School, as well as a process for review and assessment of those metrics.

VII. Consider how the School could support UC San Diego’s goals for diversity, equity and inclusion, and the effort to be recognized as a Hispanic-Serving Institution.

VIII. Consider a transition plan for HDSI and SDSC to the School, as well as potential avenues for expansion of the School in the future.

IX. Assess the potential place and uniqueness of the school in the context of similar endeavors in peer institutions.

The success of HDSI and the engagement of SDSC offer UC San Diego a unique and synergistic opportunity to establish a premier School that embraces computing, information and data science for establishing a leadership position in academic education, research and operational infrastructure.

I ask that the Task Force work to prepare a proposal for presentation to the senior leadership sometime before the end of Fall Quarter 2021 and target submission of a draft report by mid-January 2022.

I appreciate your willingness to participate in this endeavor and look forward to receiving the full proposal for the School of Computing, Information and Data Science. Please direct any questions or comments to Lisa Riolo (iriolo@ucsd.edu).

With best regards,

Elizabeth H. Simmons
Executive Vice Chancellor
APPENDIX 2

SDSC COMPUTATIONAL INFRASTRUCTURE

SDSC is a well-established production facility with many computational and storage resources. Of the current production compute systems, Expanse and the upcoming Voyager and National Research Platform (NRP) are funded by the National Science Foundation (NSF) and are available to the national academic and nonprofit user community of the US. 90% of the cycles of Expanse are allocated via the Extreme Science and Engineering Discovery (XSEDE) organization which coordinates the NSF-funded large scale HPC machines; Voyager and NRP will have three years of “testbed” phase and then two years of allocated phase for the national user community. The Comet machine, originally funded by NSF for about 5 years for the national user community, is now operated by SDSC on behalf of the Center for Western Weather and Water Extreme (CW3E), Scripps Institute of Oceanography, UCSD. The Popeye machine is operated on behalf of the Flatiron Institute of Simons foundation by SDSC. The Triton Shared Computing Cluster (TSCC) is funded by UCSD, SDSC and UC San Diego faculties. TSCC is operated as a condo cluster where researchers purchase a certain number of nodes, based on their needs and available funding, and SDSC manages the machine as a single cluster. In addition, SDSC staff play leadership roles in the “Pacific Research Platform” and the OSG, two distributed platforms that together have built federated cyberinfrastructure across hundreds of institutions globally.

Expanse

SDSC Expanse is a Dell cluster organized into 13 SDSC Scalable Compute Units (SSCU), comprising 56 standard nodes and four GPU nodes, connected with 100 GB/s HDR InfiniBand. 13 of Expanse racks are funded by NSF and are allocated to the academic research community through NSF’s XSEDE project. Another rack is funded by UCSD and is available to industrial users. Every Expanse node has access to a 12 PB Lustre parallel file system (provided by Aeon Computing) and a 7 PB Ceph Object Store system. Expanse’s standard compute nodes are each powered by two 64-core AMD EPYC 7742 processors and contain 256 GB of DDR4 memory, while each GPU node contains four NVIDIA V100s (32 GB SMX2), connected via NVLINK, and dual 20-core Intel Xeon 6248 CPUs. Expanse also has four 2 TB large memory nodes. The Expanse cluster is managed using the Bright Computing HPC Cluster management system and uses the SLURM workload manager for job scheduling. While the system is suited for modest-scale jobs as few as tens of cores to several hundred cores, Expanse also handles high-throughput computing jobs via integration with the Open Science Grid, which can have tens of thousands of single-core jobs and provides connectivity to commercial clouds via the job queuing system. A low-latency interconnect based on Mellanox High Data Rate (HDR) InfiniBand supports a fabric topology optimized for jobs...
of one to a few thousand cores that require medium-scale parallelism. One of the key innovations of Expanse is its ability to support composable systems, allowing researchers to create a virtual 'tool set' of resources, such as Kubernetes, for a specific project and then re-compose it as needed. Expanse will also feature direct scheduler-integration with the major cloud providers, leveraging high-speed networks to ease data movement to/from the cloud.

**Comet**

SDSC Comet is the predecessor to Expanse, a Peta scale resource that consists of 1,944 compute nodes, each equipped with Intel Haswell dual socket processors, 12 cores/socket, 2.5 GHz clock, AVX2. Each node has 128 GB of DDR4 memory and 320 GB of flash memory; large memory nodes contain 1.5 TB of DRAM. Each rack of 72 nodes has full bisection InfiniBand FDR interconnects, with a 4:1 bisection interconnect across the racks. In addition, 72 nodes with GPU accelerators, 36 nodes with 2 Nvidia K80 cards and 36 nodes with 4 Nvidia P100 cards. Comet users have access to 7 PB of Lustre-based high-performance storage and 6 PB of durable storage for data reliability, both of which are part of SDSC’s evolving Data Oasis storage system.

**Voyager**

SDSC Voyager is an NSF funded AI resource scheduled to begin operation in late 2021. Based on AI processors of Habana/Intel optimized for deep learning (DL) operations for training (using Habana Gaudi processors) and inference (using Habana Goya processors), Voyager will be one of the first-of-its-kind systems available in the NSF resource portfolio. This will give researchers the opportunity to explore Voyager’s unique hardware and software using well-established deep learning frameworks like TensorFlow and PyTorch to implement deep learning techniques such as convolutional neural networks (CNNs) and generative adversarial networks (GANs). Researchers will also be able to develop their own AI techniques using software tools and libraries built specifically for Voyager's innovative AI architecture.

**NRP and related projects**

SDSC lead National Research Platform (NRP) is a distributed infrastructure with computer hardware on the west coast, Midwest, and east coast, and a content delivery system with caches in the national network backbone of Internet2 in five additional locations. The 8 locations were chosen to achieve coverage of the continental USA. Any location in the continental USA can reach a cache within roughly 500 miles. The project includes a “Bring Your Own Resources” program that builds on concepts developed by the Pacific Research Platform (PRP), as well as OSG. The larger vision is to work towards federating cyberinfrastructure across all 3,900 accredited degree granting institutions of higher education. We see this as the next logical step beyond the expansion of high-speed internet in California (funded by CA State government at the tune of $6.25B) and nationwide (part of the Biden infrastructure package to the tune of $76B). We are focused on education and research being an application driver of these networking investments,
in addition to YouTube, Netflix, and social media. Our collection of funded projects comprises close to 1,000 GPUs, ranging from gaming GPUs to top of the line NVIDIA data center systems with low latency high bandwidth networking, close to 40 FPGAs, and a mix of low latency parallel as well as distributed high throughput computing infrastructure. In addition, these projects include regional storage pools, with special focus on expanding data infrastructure in EPSCOR states, and at minority serving institutions.

Popeye

The Popeye supercomputer is hosted by SDSC for researchers at the Flatiron Institute of the Simons Foundation. Popeye is a heterogeneous cluster that has been upgraded several times. The CPU and GPU racks are from Lenovo, the InfiniBand switches are from Mellanox, and most of the disk storage is from Aeon. Currently there are 11 CPU racks with a total of 41,472 Intel cores that have a peak speed of 3.67 Pflop/s plus two GPU racks with a total of 1,280 Intel cores and 128 NVIDIA V100s that have a combined peak speed of 1.0 Pflop/s. Six CPU racks are liquid-cooled; all the other racks are air-cooled. The operating system is CentOS, the cluster management system is Bright, and the scheduler is Slurm. The compute nodes and the file systems are all connected via an EDR InfiniBand network. The primary file system is managed by Ceph and consists of 25 PB raw disk of which about 15 PB should be usable. However, not all the storage is online yet, since it has not been needed.

Triton Shared Computing Cluster (TSCC)

TSCC is a medium-scale, high performance computing cluster primarily for campus researchers. The system is housed in a secure, energy-efficient data center on the UC San Diego campus. Designed to facilitate rapid access to computing resources, TSCC features flexible usage and business models and professional system administration and user support. The primary business model for TSCC is the “condo computing model,” in which research groups use grant, startup, gift, or other funds to purchase computer servers (“nodes”) which are installed in the cluster and are available to all users on a fair-share basis. Condo participants and the campus administration cost-share the annual operating costs for the cluster. In addition to the condo computing partition, TSCC has a “hotel node” partition which is available to condo owners and to other researchers on an ad hoc (“pay as you go”) recharge basis. The condo and hotel configurations contain both standard two-socket, x86 compute nodes and Graphics Processing Unit (GPU) nodes. The hotel configuration also features one or more large-memory nodes. The cluster contains several generations of x86 compute nodes (16-36 cores, 64-384GB memory), several generations of NVIDIA GPU nodes, and a mixed interconnect including EDR InfiniBand for closely coupled simulations and 10/25GbE Ethernet for high performance communications and I/O. The system has a 2 petabyte, high performance Lustre parallel file system for staging of input data and temporary storage of results data.
SDSC Cloud (Compute)

The SDSC Cloud also offers Compute and block storage utilizing the same Openstack underpinnings with Swift Cloud Storage, such as common identity management. The Compute functionality provides an elastic resource for small or non-parallel compute jobs not requiring or well suited to high performance computing (HPC).

Storage Infrastructure

SDSC Universal Scale Storage (High Performance, Large-Scale Storage)

SDSC’s Universal Scale Storage (USS) provides researchers and research partners with a flexible, scalable, and affordable storage cluster for any storage purpose, including high performance computational workloads, departmental user data storage, and long-term archival.

Housed within the SDSC data center with multiple high-speed 80Gb links to the internal SDSC network and internet at large, USS can be mounted directly on SDSC high performance computing (HPC) systems (Comet, Expanse and TSCC), in addition to most UC San Diego campus systems. Erasure encoding striped across clustered storage devices ensures effective data durability. A daily snapshot option creates the opportunity to restore recently accidentally deleted data or recover after disasters. An SSD cache on top of spinning disk storage within each device in the cluster achieves maximum system I/O performance. Users may request a copy of data to be pushed to a separate archival object storage system for additional redundancy.

While the typical use case is a 200+ TB share mounted on collocated systems or SDSC HPC systems, users can request shares greater than 1 PB and can access the data from anywhere when pairing USS with local file servers, such as an SDSC VMware VM, or 3rd party interfaces. Experienced SDSC storage engineers are available to architect solutions tailored to research needs and provide ongoing support.

SDSC Cloud (Storage)

SDSC’s Cloud Storage provides academic and research partners with a convenient and affordable way to store, share, and archive data, including extremely large data sets. The object-based storage system and multiple interface methods make the SDSC Cloud easy to use for the average user, but also provide a flexible, configurable, and expandable solution to meet the needs of more demanding applications.

Utilizing the OpenStack Swift Object Storage software across 3 PB of hardware, objects are written to multiple physical storage arrays simultaneously, ensuring at least three verified copies always exist on different servers. Continuous, automatic data verification provides unparalleled durability, which equates to peace-of-mind for you and your data. Optional off-site replication to our partner facility provides additional durability and protection against data loss.
Files of any size can be stored in the cloud, from small personal document collections to multi-terabyte backup sets routed directly to the cloud by Rackspace or S3 API compliant applications. Cloud Backup package solutions are also available, using SDSC's CommVault Backup service. With on-demand storage, researchers never have to worry about running out of space – storage scales as needed.

**SDSC Project Storage (High Performance NFS and CIFS Storage)**

SDSC's Project Storage provides academic and research partners a network-based storage service that offers CIFS/Samba and NFS to UCSD. Leveraging Oasis with a dual 10 Gbps network connection and boasting a raw capacity of 4.4 PB (1,900+ disks), Project Storage is an excellent option for interactive access and use as a traditional mounted file system. Project Storage is a popular option with HPC users as it allows for the fastest transfer of large data to and from the supercomputers at SDSC, as well as easy access through mount points. Nightly ZFS snapshot replications ensure dual-copy data durability. By choosing to add historical backups utilizing SDSC CommVault services, users can perform point-in-time file recovery. Additionally, users can invest in project storage hardware housed in a condo function, allowing the users to trade steeper up-front fees for lower long-term costs. The user is responsible for investing in hardware while SDSC typically handles the hardware procurement, setup, and maintenance.

**Global scale data federation**

SDSC is collaborating across multiple projects (OSG, PRP, NRP, NSDF, OSN) towards a vision of a global scale data federation. Different projects pursue this vision with different technology foci. All have in common the vision of federating data into a global namespace that allows for fine grained access controls, distributed across many storage systems owned by many different organizations, and data accessed from anywhere at any time via a content delivery network (CDN). Several of these projects have a strong focus on democratization of access to data, thus deploying hardware in minority serving institutions nationwide. Some are focused mostly on "Bring Your Own Resource", i.e., integrating existing data on existing storage systems at institutions other than UCSD. The largest of these systems today includes 18 caches across 4 continents, most of them located in the USA, plus 9 data origins that feed the CDN for a wide range of communities. One of the projects (NSDF) includes funding to integrate the USS mentioned above into this global scale data federation as an origin.

**Additional Resources**

**SDSC Datacenter**

All equipment is housed in the SDSC colocation facility. SDSC’s 19,000-square foot climate-controlled and secure datacenter is fully equipped with 13 Megawatts of power, 100 gigabit and multi- 10-gigabit network connectivity, and a 24/7 operations staff. Staff constantly monitor the room environment and are available as ‘remote hands. Options for highest uptime use cases include emergency power, UPS and generator-backed racks.
Equipment is dual-powered by two PDUs per rack. All racks are installed on isobase, floating foundations for earthquake protection.

**EarthCube Office (ECO)**

The EarthCube Office serves as the backbone organization for the community driven, NSF-funded EarthCube Initiative. ECO is a collaboration between SDSC, the National Center for Supercomputing Applications at University of Illinois Urbana Champaign, the Scripps Institution of Oceanography at UC San Diego, the University of Hawaii at Manoa, the Earth Science Information Partners (ESIP), and the US Geoscience Information Network (USGIN). ECO’s science engagement and technical activities include data FAIRs and data help desks at geoscience community meetings, and consultation on best practices for interoperability between geosciences/EarthCube projects.

**National Data Service**

Resources offered through the National Data Service (NDS) are available for pilots via NDS Labs and for larger or production scale data needs via NDS Share. SDSC makes available portions of its storage and compute platforms on SDSC Cloud to the NDS. Projects needing multiple sites utilize tools such as Globus to move between federated resources at the nation’s major academic supercomputing centers.

**West Big Data Innovation Hub**

With a focus on thematic ‘verticals’ such as metro/urban data science, and natural resource management, especially water, as well as cross-cutting ‘horizontal’ such as open science, workforce development, and data ethics, the West Hub enables creative cross-pollination and resource-sharing. Our initiatives convene a diverse and inclusive community, bringing together scientists and technologists, policy enthusiasts and decision makers, local innovators and the broader public to identify common goals and opportunities. Fueled by outcomes-focused partnerships, the West Hub facilitates the development of collaborative pilot projects addressing regional needs, while connecting and scaling efforts as part of a larger global network. The WBDIH connect, convene, curate, and communicate across our network with an emphasis on enabling interoperable, scalable, and sustainable solutions.

The West Big Data Innovation Hub (WBDIH) is one of four regional hubs funded by NSF to build and strengthen partnerships across industry, academia, nonprofits, and government to address scientific and societal challenges, spur economic development, and foster a big data innovation ecosystem. Launched in November 2015, the West Hub has recruited a diverse community of contributors across disciplines, backgrounds, and geographies to enable translational research projects that have the potential for wide-reaching societal impact.

By spanning 13 states and sparking national as well as global engagement, the West Hub can leverage a broad collection of physical facilities as well as online infrastructure. The West Hub has hosted in-person and virtual community convenings at many campuses
including: (University of California - Berkeley, Los Angeles, Davis, San Diego, University of Washington, University of Colorado - Boulder, Boise State University, Portland State University, University of Wyoming, University of Utah, New Mexico State University, and others), Federally Funded Research and Development Centers, industry sites (from small startups to large corporations), co-working innovation spaces, local government venues, large technical conferences, and community facilities, often open to the public and captured online to broaden access and participation.

Go FAIR (US)

Research Data Services division of the San Diego Supercomputer Center (SDSC) at the University of California San Diego, hosts the U.S. GO FAIR Coordination Office. GO (Global Open) FAIR is a ‘bottom up’ initiative aimed at implementing the FAIR principles to ensure that data is findable, accessible, interoperable, and reusable. GO FAIR’s main goal is to kick-start the development of a global data commons for research and innovation. The GO FAIR US office serves as a coordination entity to develop and facilitate community engagement, capacity building and training, decision-making and other activities related to the adoption the FAIR principles within the U.S. and its territories. GO FAIR US works to support all knowledge domains, and lead efforts toward the general goal of increasing FAIR data stewardship.

Cyberinfrastructure and SCIDS

Infrastructure for computing and data has become an essential component of every institution of higher learning. UC San Diego has a larger mandate in this domain given the presence of a national supercomputing center. The establishment of SCIDS would enhance the presence of this advanced infrastructure and can help launch UC San Diego as the paradigm for the next generation cyberinfrastructure (we define cyberinfrastructure (CI) as hardware, software, research networking, and a team of technical and domain experts.) Here we present the exceptional scope of cyberinfrastructure available at SDSC and how it provides a central role in the success of SCIDS.

Cyberinfrastructure must be a foundational element of SCIDS, providing the computing, data resources, and expertise to advance its research, teaching, and service missions. To be successful, SCIDS will require a scale and complexity of CI that goes well beyond the department or campus research computing function. Today, SDSC provides a wide range of these services and resources to campus, with well-developed cost recovery and funding models. While some additional growth is possible, what SDSC can provide to campus is bounded by available funding, people, and the limitations inherent in current organization structure. The advent of SCIDS will provide new opportunities for the growth of SDSC and through careful stewardship of existing resources, using well-established service and business models, SDSC can build out its existing services and resources, and develop the new ones that will be needed.

The table below describes SDSC’s current portfolio of CI solutions, current support model, how they are relevant to SCIDS, and suggests what will be needed for SCIDS and how
they can be capitalized. In addition, there are two proposed services suggested that would be of value to SCIDS. Capital investment will be targeted and wherever possible, leverage existing cost-recovery models, or direct grant funding. There are two notable exceptions to this as noted in the table. First, and regardless of SCIDS, there is an urgent need for a data center expansion to meet existing needs. Planning work is underway now to assess the required funding and potential impacts to campus. SCIDS may provide new opportunities for funding such an effort, for example, if it were done in conjunction with a new SCIDS building, one can envision a showcase building with a state-of-the-art data center, technology innovation lab, teaching space, lab space, and collaboration spaces. Second, SDSC has for many years operated the campus research computing cluster (TSCC). With some investment from campus and some from SDSC, TSCC has reached a point of stability and success that is marked by widespread support from PIs. However, investment is needed for growth.

**Table I Campus Cyberinfrastructure Resources Relevant to SCIDS**

<table>
<thead>
<tr>
<th>Cyberinfrastructure</th>
<th>Function/Service</th>
<th>Funding model</th>
<th>Relevance to SCIDS</th>
<th>SCIDS funding model and Capital requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Colocation facility</td>
<td>Space, power, cooling, R&amp;E networking (<a href="https://www.sdsc.edu/services/ci/colocation.html">https://www.sdsc.edu/services/ci/colocation.html</a>)</td>
<td>SDSC Data Center Colo model in place and supporting researchers from UC San Diego and across the UC system in 507 racks, but <strong>essentially out of space for new systems</strong>. Campus covers fees for UCSD researchers. External (including UC) customers pay full rate. Full range of services provided.</td>
<td>Data center expansion or new data center as part of SCIDS facilities is a must to accommodate expected growth in research, scale, students</td>
<td>Mixed model of campus support, donor, fee-for-service recharge including revenue from industry partners. New data center or expansion required in the future. Capital requirement: 10's of millions of $.</td>
</tr>
<tr>
<td>Expanse high-performance computing system</td>
<td>5 petaflop CPU and GPU compute system. SDSC’s largest HPS systems. (<a href="https://www.sdsc.edu/services/hpc/expansion/">https://www.sdsc.edu/services/hpc/expansion/</a>)</td>
<td>13 of the scalable units were funded by NSF and operated on behalf of the national community. An additional Scalable Unit was purchased by SDSC and is operated for UCSD as a recharge</td>
<td>A fraction of Expanse can be allocated to UCSD researchers at no cost via NSF-approved discretionary mechanism. Many active UCSD researchers take advantage of this now.</td>
<td>No additional capital required beyond data center space and power. Anticipated operating for an additional 5 years once it goes out of NSF service via a model like Comet, which is now operated on behalf of SIO.</td>
</tr>
<tr>
<td>System</td>
<td>Description</td>
<td>Maintenance and Support</td>
<td>Notes</td>
<td></td>
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<td>---------------------------------------------</td>
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<tr>
<td>Comet HPC system</td>
<td>2.5 petaflop CPU and GPU system. Previously an NSF system, now operated by SDSC on behalf of the Center for Western Weather and Water Extremes (CW3E) at Scripps Institute of Oceanography. (<a href="https://www.sdsc.edu/support/user_guides/comet.html">https://www.sdsc.edu/support/user_guides/comet.html</a>)</td>
<td>Maintenance and support are covered by SIO.</td>
<td>This is the backbone of CW3E and an exemplar of how the pipeline of HPC systems at SDSC benefit UCSD researchers. No additional capital required beyond data center space and power.</td>
<td></td>
</tr>
<tr>
<td>Popeye HPC System</td>
<td>~5 petaflops CPU and GPU system operated on behalf of the Flatiron Institute at the Simons Foundation</td>
<td>Hardware purchased by the Simons Foundation, which also provides funding for SDSC staff to operate the system, and for data center colocation space and power. Simons had previously assumed operational expenses for SDSC’s Gordon HPC system when it concluded NSF service.</td>
<td>UCSD has multiple research collaborations with the Simons Foundation; there is also differential income provided by the arrangement. More recently Simons has provided computing time on Popeye to UCSD researchers at no-cost. No capital required other than space in the data center.</td>
<td></td>
</tr>
<tr>
<td>Voyager AI supercomputer</td>
<td>Specialized HPC system for machine learning and artificial intelligence research</td>
<td>Funded by NSF, Voyager enters production in 2022 and will operate for 5 years.</td>
<td>UCSD researchers Rommie Amaro and Javier Duarte are co-PIs. Voyager put UCSD at the forefront of innovation in AI/ML architectures and provides a platform for research in this important area. No capital requirements other than continued data center space and power.</td>
<td></td>
</tr>
<tr>
<td>National Research Platform (NRP)</td>
<td>National, distributed resource for data-intensive science and engineering.</td>
<td>Funded by NSF, NRP enters production in 2022 and will operate for 5 years.</td>
<td>UCSD researchers Tajana Rosing and Tom DeFanti are co-PIs. NRP will allow No capital requirements other than continued data center space and power.</td>
<td></td>
</tr>
<tr>
<td>Triton Shared Computing Cluster (TSCC)</td>
<td>Campus computing cluster for research, education, capstone projects. Owned by and operated on behalf of campus researchers</td>
<td>TSCC supports 30+ labs, hundreds of researchers. Mix of condo and hotel nodes purchased by PIs with operational subsidy covered via SDSC and UCSD</td>
<td>Scale-out to support growth of SCIDS education and research portfolio</td>
<td>Campus support for racks and labor sufficient to ensure long-term sustainability and growth. Seek partnerships with industry</td>
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<tr>
<td><strong>Storage and Data:</strong> Spectrum of high-capacity, high-performance storage, including Universal Scale Storage, SDSC Cloud <a href="https://www.sdsc.edu/services/ci/index.html">https://www.sdsc.edu/services/ci/index.html</a></td>
<td>On premise and distributed data storage. TB to multi-PB scale</td>
<td>Primarily a fee-for-service recharge model. Currently supports many researchers across campus. Solutions and support are significantly more cost effective than for researcher owned and operated services.</td>
<td>An essential element in nearly all SCIDS data-driven research and education activities.</td>
<td>Primarily cost recovery. School makes financial commitment to cover # TBs per researcher or min. allocation.</td>
</tr>
<tr>
<td><strong>Data Commons (Proposed)</strong></td>
<td>Small, curated data repositories</td>
<td>Not a current offering.</td>
<td>This would be essential to providing a repository of important data for research and education activities of SCIDS. I would leverage existing storage models at SDSC and be operated in collaboration with the UCSD Library.</td>
<td>Modest initial costs would be required and be based on the volume of data, number of repositories, and user base.</td>
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<td><strong>Capital requirement: TBD, likely less than $100K/year.</strong></td>
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</tbody>
</table>
Research, teaching, computing facilitation (Proposed)

Scale out support for algorithm, computing, and data, assisting in developing CI solutions for researchers, access to CI and people for experiential learning

Currently an ad hoc service. Activities are funded out of recharges, grants, and IDC recovery. Projects are opportunistic based on UCSD researcher queries.

For SCIDS, this could become a formalized service offering for researchers and faculty.

No capital requirement needed. Would be operated as via a spectrum of funding including for-fee; collaboration on grants; in-kind (e.g., REU supplements to existing grants). Cost recovery.

In addition to the CI in Table 1, SDSC operates several other projects which provide resources, expertise, and collaboration opportunities relevant to SCIDS. Table 2 lists several of these with a brief description and links to additional information.

### TABLE 2 Synergistic Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Center for Applied Internet Data Analysis (CAIDA)</td>
<td>Founded in 1997, the Center for Applied Internet Data Analysis (CAIDA) conducts network research and builds research infrastructure to support large-scale data collection, curation, and data distribution to the scientific research community. <a href="https://www.caida.org">https://www.caida.org</a></td>
</tr>
<tr>
<td>CloudBank</td>
<td>A cloud access entity that helps the computer science community access and use public clouds for research and education by delivering a set of managed services designed to simplify access to public clouds. <a href="https://www.cloudbank.org/about">https://www.cloudbank.org/about</a></td>
</tr>
<tr>
<td>EarthCube Coordination Office</td>
<td>The EarthCube Office serves as the backbone organization for the community driven, NSF-funded EarthCube Initiative. <a href="https://www.earthcube.org">https://www.earthcube.org</a></td>
</tr>
<tr>
<td>Open Science Grid</td>
<td>The OSG is a consortium of research collaborations, campuses, national laboratories and software providers dedicated to the advancement of all open science via the practice of distributed High Throughput Computing (dHTC), and the advancement of its state of the art. Established in 2005, the OSG operates a fabric of dHTC services for the National S&amp;E community. <a href="https://opensciencegrid.org">https://opensciencegrid.org</a></td>
</tr>
<tr>
<td>Pacific Research Platform</td>
<td>The Pacific Research Platform (PRP) is a multi-institutional extensible deployment that establishes a science-driven high-capacity data-centric ‘freeway system.’ The PRP spans all 10 campuses of the University of California, as well as the major California private research universities, four supercomputer centers, and several universities outside California. <a href="https://pacificresearchplatform.org">https://pacificresearchplatform.org</a></td>
</tr>
<tr>
<td>US GO FAIR Coordination Office</td>
<td>GO (Global Open) FAIR is a ‘bottom up’ initiative aimed at implementing the FAIR principles to ensure that data is findable, accessible, interoperable, and reusable. <a href="https://www.go-fair.org/go-fair-initiative/go-fair-offices/go-fair-us-office/">https://www.go-fair.org/go-fair-initiative/go-fair-offices/go-fair-us-office/</a></td>
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<tr>
<td>West Big Data Innovation Hub</td>
<td>The West Big Data Innovation Hub (WBDIH) is one of four regional hubs funded by NSF to build and strengthen partnerships across industry, academia, nonprofits, and government to address scientific and societal challenges, spur economic development, and foster a big data innovation ecosystem. <a href="https://www.westbigdatahub.org">https://www.westbigdatahub.org</a></td>
</tr>
<tr>
<td>Workflows for Data Science Center of Excellence (WoRDS)</td>
<td>WoRDS is a hub for the development, promotion, and delivery of workflow services for a wide range of applications. The mission is to support data analysis projects, data scientists and software engineers in their computational practices involving process management. <a href="https://words.sdsc.edu">https://words.sdsc.edu</a></td>
</tr>
</tbody>
</table>
APPENDIX 3

LETTERS OF SUPPORT

School of Global Policy and Strategy
Rady School of Management
Irwin and Joan Jacobs School of Engineering
School of Marine Sciences, Scripps Institution of Oceanography
Skaggs School of Pharmacy and Pharmaceutical Sciences
Herbert Wertheim School of Public Health and Human Longevity Science
UC San Diego School of Medicine
Division of Graduate Education and Postdoctoral Affairs
Division of Undergraduate Education
Division of Extended Studies
Division of Arts and Humanities
Division of Social Sciences
Division of Physical Sciences
Division of Biological Sciences
The Library
Qualcomm Institute
Department of Cognitive Science
Department of Mathematics
Department of Electrical and Computer Engineering
Department of Computer Science and Engineering
UC San Diego Innovation and Entrepreneurship Council
March 10, 2022

To: Divisional Senate

From: Caroline Freund
Dean, School of Global Policy and Strategy

RE: Creation of a School of Computing, Information and Data Sciences (SCIDS)

The School of Global Policy and Strategy (GPS) supports the creation of a School of Computing, Information and Data Sciences (SCIDS). There are many synergies with GPS, given the emphasis in our curriculum on data and analysis and our faculty’s research, which increasingly uses big data, AI, and new methodologies.

Our programs provide training in quantitative and qualitative domains of International Affairs and Public Policy. Our programs are known for providing the strongest training in computational and data work of any policy school, and the new school would help us continue to deliver on that goal. We believe that the proposed school would complement the programs at GPS and there would be great potential for interdisciplinary research. Evidence of the potential is the ongoing search for a Chancellor’s joint faculty position with Halicioğlu Data Science Institute (HDSI). The search process itself has highlighted the many complementarities, as our members have gotten to know each other throughout the interview process. For GPS, this new joint position will bring additional teaching resources on data science and a potential collaborator for our faculty, who is highly skilled technically and interested in policy analysis. We look forward to many more such interactions.

GPS is highly interdisciplinary, with economists, political scientists, and scientists all working on pressing policy issues. The new school will provide GPS with an additional resource on which to draw on as they search for the best method to analyze a policy issue. It will also support our students in providing the most advanced quantitative skills of any policy school. We look forward to working collegially, collaboratively, and cooperatively with the leadership of new school.
March 17, 2022

Dear Prof. Robert Continetti and Prof. Shankar Subramaniam,

I have been honored to serve on the task force that prepared the “School of Computing, Information, and Data Sciences” proposal. This new school, if approved, will be an exciting hub for the campus in terms of research and teaching in these areas. The Rady School faculty and MS in Business Analytics would clearly benefit from the activities and faculty in this new school.

Thus, I am pleased to write this letter in support of the SCIDS proposal dated 3/7/22. We at the Rady School are eager for this new school to be approved.

Sincerely,

Lisa D. Ordóñez, PhD
Dean, Rady School of Management
Stanley and Pauline Foster Endowed Chair
Executive Vice Chancellor Elizabeth H. Simmons
University of California San Diego

Dear EVC Simmons:

After my review of the proposal for the new School of Computation, Information and Data Sciences (SCIDS), I am pleased to provide my strong and enthusiastic support. The Jacobs School of Engineering has played a major role in leading education, research and training in the areas of computation, information and data, all of which have become pervasive not only in Engineering, but in many other disciplines as well. Thus, the creation of SCIDS is timely and will enhance the repute and impact associated with the many programs comprising the campus.

I envision that the Jacobs School of Engineering will partner with SCIDS in four important ways. These will be accomplished via the careful coordination of 1) faculty hiring, 2) research directions and programs, 3) curriculum development and offerings and 4) fundraising and resource generation. Indeed, the two leading departments in the Jacobs School of Engineering, namely Computer Science and Engineering (CSE) and Electrical and Computer Engineering (ECE) will have a “dotted line” affiliation with SCIDS, and I see this “dotted line” is an instantiation of those four important ways of coordinating in order to have maximum mutual benefit and maximum strategic impact. I am pleased to observe that several Engineering faculty already participate in the Halicioglu Data Sciences Institute and will continue to collaborate on curriculum and research in SCIDS. The Jacobs School of Engineering has a strong partnership with the San Diego Supercomputer Center (SDSC) and I anticipate similar collaboration and coordination there as well.

Because interdisciplinary research is such a large part of the DNA of UC San Diego, I anticipate that SCIDS will catalyze extensive collaborations across the campus and I am very excited about the opportunities this offers the Jacobs School. The ranking of the Jacobs School as a top-ten Engineering School is sure to be enhanced through association with SCIDS. I look forward to the successful creation of SCIDS and its collaboration and coordination with the Jacobs School as well as the entire campus.

Sincerely,

Albert ("Al") P. Pisano
Member, US National Academy of Engineering
Member, US National Academy of Inventors
Walter J. Zable Distinguished Professor & Dean
Irwin and Joan Jacobs School of Engineering
University of California San Diego
March 21, 2022

Dr. Robert Continetti
Senior Associate Vice Chancellor
UC San Diego

Dear AVC Continetti,

It is my pleasure to write in support of the creation of the proposed new School of Computing Information and Data Science at UC San Diego. Over the past five or six years the University has discussed how best to educate students and do research in the rapidly developing areas of computing information and data science. From the beginning we envisioned a mechanism to partner the scholarship of the university with the tools and techniques in computing information and data science. The emergence of the new Halicioglu Data Science Institute and its focus on joint faculty with other parts of the university brings that vision to reality. The addition of Computing Information built on the foundation of the San Diego Supercomputer Center, which has transformed our national capabilities in how to generate information from data is most welcome. Our new leadership in these areas is also firmly focused on generating new ways of thinking about data and information. I am enthusiastic about the potential for UC San Diego that the new School offers and I know that faculty and Researchers at Scripps Institution of Oceanography join me in looking forward to working with those in the new School.

Sincerely,

Margaret Leinen
Dean, School of Marine Sciences and
Vice Chancellor for Marine Sciences.
March 22, 2022

Dear Dr. Subramaniam:

The leadership of the Skaggs School of Pharmacy and Pharmaceutical Sciences is pleased to support the launch of the new School of Computing, Information, and Data Sciences. We expect to partner with faculty in the new School in several areas. These include:

**High performance computing** is a big theme for us. Also mapping simulation algorithms to GPUs.

**The interface of chemical informatics, structural biology, molecular simulations with artificial intelligence and machine learning** is extremely hot in industry and academia now. We are very active in the area of structure-based drug design and utilize the San Diego Super Computer Center.

**Pharmaceutical informatics and pharmacogenomics**—Using machine learning to help collect these data, using AI to analyze these data.

**Software architecture**

**Open Source Software**

We are also collaborating with the Department of Medical Informatics to craft a new Masters in Health Informatics program.

While not unanimous in support, our computational and informatics faculty also are excited about the function of this proposed School.

Sincerely,

James H. McKerrow, PhD, MD  
Dean, Skaggs School of Pharmacy & Pharmaceutical Sciences  
Associate Vice Chancellor for Health Sciences
March 21, 2022

Dear Dr. Continetti:

I am pleased to provide this letter of support for the creation of a School of Computing, Information and Data Sciences (SCIDS) at UC San Diego. In the realm of public health, data science is integral to data gathering, analytics, predictive computing, and devising interventions to advance public health outcomes. The establishment of SCIDS will accelerate efforts to bring data science to the Herbert Wertheim School of Public Health and Human Longevity Science (HWSPH), which was recently established and is positioning itself as an outstanding place for education and research into 21st century public health challenges. We are excited about the proposal for a new School of Computing, Information, and Data Sciences as it is highly complementary with the strategic areas of focus for our school. These areas include global and border health, health services and learning healthcare systems, climate and public health, health equity, mental health and addiction, and longevity sciences. In addition, our educational core will be enhanced by strong data science support from SCIDS.

The local, state, and global impact of our school of public health will be heightened by the presence of, and partnership with, the School of Computing, Information, and Data Sciences. Recognizing the many intersections between data science and public health, the HWSPH currently partners with HDSI in data science as well as joint faculty recruitment. We look forward to additional interdisciplinary teaching and research, and to the creation of community programs that employ data science techniques in addressing longstanding public health challenges.

We are excited about the potential transformational impact of this new school and offer our strongest support.

Sincerely,

Cheryl Anderson, PhD, MPH, MS
Professor and Dean
Hood Family Endowed Dean’s Chair in Public Health
Robert Continetti  
Senior Associate Vice Chancellor Academic Affairs  
UC San Diego  

March 15, 2022  

Dear Dr. Continetti:  

Please convey to the Divisional Senate my strongest support for the proposed School of Computing Information and Data Sciences (SCIDS). The School of Medicine sees SCIDS as a bridge between multiple medical and scientific disciplines and computing technology which is a growing necessity for effective and timely cross-disciplinary data science research.  

The School of Medicine has data analytics needs that relate to basic, translational, and clinical research, as well as the quality of patient care and other operational initiatives. Partnership with data scientists from SCIDS will strengthen biomedical data science efforts already underway in various basic science and clinical departments. For basic research, SCIDS partnerships focused on developing algorithms and tools to extract novel biological information from the combined analysis of large and complex omics (genomic, epigenomic, metabolomics) public datasets will be hugely beneficial. For translational and clinical research, SOM faculty will offer SCIDS partnerships creating a gateway for access to real clinical data and/or genomic data from human subjects.  

The research and training needed for the future of the School of Medicine strongly warrants the creation of a School that will provide a unique opportunity to serve as the next-generation data-driven health care incubator. The proposed program can be a leader in training the next generation of physicians, particularly those who wish to pursue a career in data analytics in medicine.  

Please do not hesitate to contact me if I can provide additional support for this transformational proposal.  

Sincerely,  

Steven R. Garfin, MD  
Interim Dean, UC San Diego School of Medicine
March 15, 2022

Bob Continetti  
Senior Associate Vice Chancellor – Academic Affairs

Shankar Subramaniam  
Distinguished Professor

Dear Bob and Shankar,

Thank you for sending me the proposal for the new School of Computing Information and Data Sciences (SCIDS) at UC San Diego. It was a pleasure to read. It is my view that the establishment of a new School of Computing Information and Data Sciences (SCIDS) at UC San Diego will have a positive impact on graduate students and postdocs across the university.

The most immediate positive impact would be the creation of a substantial school-based infrastructure to house the exciting, and compelling, new degree programs in data science. Such a housing gives students and postdoctoral scholars an important intellectual home within which to engage in the exciting work of data science, and from which both can launch cross-campus collaborations. The school structure also dramatically clarifies the ways in which we, as a university, advertise and promote the presence of graduate program offerings to the external world, which is important because it signals to all that UC San Diego is a global leader in the multifaceted research areas addressed by the broad moniker of data science.

The existence of this school will also bring intellectual energy around all data science issues and allow my team to work closely with an easy-to-identify collection of scholars when it comes to brainstorming about broader campus-wide initiatives. An example would be the creation of data science oriented professional development initiatives that would benefit all graduate students, not just those majoring in data science. Our world is increasingly data dependent, and most intellectual work in any discipline benefits from a deeper understanding of how to work with data. I envision a future in which UC San Diego has data science professional development opportunities for all graduate students, regardless of disciplines; I see the same opportunities for our postdoctoral scholars. A new School of Computing Information and Data Sciences (SCIDS) would facilitate these kinds of forward-thinking conversations at UC San Diego.

In short, a new School of Computing Information and Data Sciences (SCIDS) at UC San Diego is a brilliant idea. The synergies possible are many, and—in sum—the existence of this new school will have great potential to benefit all graduate and professional students, as well as all postdoctoral scholars. I look forward to the possibilities.

Sincerely yours,

James Antony, Ph.D.  
Dean, The Graduate Division  
Professor in Education  
Affiliate Professor, Rady School of Management
March 17, 2022

Dear Senior Associate Vice Chancellor Continetti:

It is my pleasure to write in support of the proposed establishment of the School of Computing, Information, and Data Sciences. The proposal would create structures that will enhance the educational and research missions of the university in the areas of data science and related disciplines. It has the potential to make our campus a world leader in this growing area. It would also strengthen a number of inter-disciplinary connections – very much in line with the campus’ innovative academic mission. From the point of view of the Division of Undergraduate Education, the school will strengthen undergraduate programs and research in these areas. I do suggest that connections with the undergraduate colleges be explored; the emphasis on experiential learning, including undergraduate research, represents a shared goal between the colleges and the proposal.

Sincerely,

John C. Moore
Dean, Undergraduate Education
March 17, 2022

Academic Senate
University of California San Diego
Mail Code 0002
9500 Gilman Drive
La Jolla, CA 92093-0002

RE: Support for Creation of School of Computing, Information, and Data Sciences (SCIDS)

Dear Members:

This letter expresses our enthusiastic support for the proposal to create a School of Computing, Information, and Data Sciences at UC San Diego.

The Division of Extended Studies (DES) constantly monitors the community's needs specifically to ensure a vibrant workforce that sustains the economy in our State. For many years, we have witnessed a continued increased interest on the part of employers on topics that relate to information technologies, data capture, and analysis. Employers seek professionals with a sophisticated understanding of issues that surround data streams to inform decisions or create insights. Challenges in data management, visualization, research, machine learning techniques, or other artificial intelligence methods to gain insights have revolutionized the most diverse endeavors from marketing to defense and social services, to urban planning, health, or environmental sciences. Today, data science is an integral and core component of most areas of human endeavor knowledge systems. Thus, they have become crucial for organizations, regardless of the mission.

At the Division of Extended Studies, we have witnessed an increased demand for all data and analytics offerings for over a decade. Our non-matriculated students come from leading organizations in their field. These are not purely in the STEM industries, but also in social benefit organizations, healthcare, government, and particularly individuals in the social sciences who are keen on exploring the social data collected at different levels by a myriad of individual organizations.

Our offerings at DES have provided new or updated skills to thousands of individuals who came seeking some level of credentialing. However, our efforts reach only a certain level of complexity. There is a substantial, unmet need to offer programs beyond skill-building. Curricula that teach learners to develop data-driven solutions by collating data into information they can synthesize into knowledge to create truly impactful programs to address the most varied sets of issues. Indeed, few areas of activity have not been rethought or impacted by new information.
technologies and data analytics. In this way, UC San Diego can provide a complete range of educational opportunities from cutting-edge technologies to the primary workers needed to support a data-driven, information-rich environment.

Furthermore, a truly collaborative, multidisciplinary environment, such as the School of Computing, Information, and Data Sciences is proposing, can open new avenues of research into innovative and broadly applicable methodologies. We believe that establishing this new School will provide a highly valued resource that will have a transformational impact on our global community.

Sincerely,

Hugo O. Villar, PhD, MBA
Dean
UC San Diego Division of Extended Studies
March 20, 2022

Dear Colleagues:

I write in strong support of the proposal to create the UC San Diego School of Computing, Information and Data Sciences (SCIDS). UC San Diego is well-positioned to provide critical leadership and innovation in the rapidly evolving and interconnected fields of data, information, and computing sciences. As detailed in the proposal submitted by the SCIDS taskforce, “the proposed school is envisioned to be UC San Diego’s next leap forward in addressing the most compelling need of modern times – transforming data into knowledge. Every walk of our day-to-day life, from the continuous myriad measurements of wearable sensors to the vast amounts of temporal data collected across the globe documenting climate change, warrant conversion into actionable knowledge and models. Addressing the data deluge is arguably the greatest intellectual challenge of our time and this will motivate the unprecedented integration of diverse disciplines and development of unforeseen technologies.”

SCIDS will provide the intellectual core where these issues will be addressed, and connect meaningfully with other units, thus enhancing synergistic and interdisciplinary strengths and opportunities. In this context, the School of Arts & Humanities will both benefit from and support SCIDS through initiatives such as those pioneered by the Institute for Practical Ethics (IAH). IAH engages with research big data, for example, in order to understand the ethical implications involved in the interpretation and dissemination of these data, fostering deliberation amongst ethicists, scientists, and policy makers.

SCIDS will play an important role in training the next generation of leaders in computing, information and data science. These leaders will have the tools to transform data into knowledge, as well as understand the nature of this knowledge within the framework of ethical reflection. In this framework, the national and international standing of UC San Diego will not only grow, but also benefit the common good.

With best regards,

Cristina Della Coletta
Chancellor's Associates Chair in Italian Literature
Dean of Arts and Humanities
March 15, 2022

TO: Robert Continetti, SVCAA
Academic Affairs

Shankar Subramaniam, Professor
Computer Science and Engineering

RE: Proposal for a new School of Computing, Information and Data Sciences

I write to express support for the proposed new School of Computing, Information and Data Sciences. The School of Social Sciences has had representation throughout the process of assembling this proposal and I am pleased to see that many of our ideas are incorporated in the narrative and the plans for the new School.

Data science and big data are a part of the School of Social Sciences in terms of our departments’ and programs’ curricula, our faculty hires and new majors, minors and specializations. Several faculty from the Social Sciences have been involved in the initial conceptualization and formation of the new HDSI. A number of our faculty and their graduate students rely on the services of the Supercomputer Center for their research. Some of our departments offer majors in data analytics and have courses for undergraduates in methods using big data for their particular area of social science.

I want to recognize two units in particular who will be working in close partnership with SCIDS in the future: the Cognitive Science Department and the Computational Social Science Program. Cognitive Science has been involved in computing and data sciences from the earliest years of the department’s establishment. The department was formed by a group of faculty from across the Social Sciences as well as some from Computer Science and Engineering and Philosophy. Its DNA is fundamentally social science as it explores issues of data science, artificial intelligence and machine learning relating to human behavior and cognition. The Computational Social Science Program offers a minor (but not a major), a masters’ program and a PhD specialization. The program has participating faculty from almost all our departments and programs who have agreed to share responsibility for courses at the undergraduate and masters’ level which involve teaching tools and methods of data analysis where questions of social science are at the forefront. I see from your organizational charts and graphics that CSS will be a partner with SCIDS.

In terms of the proposal, the Chair and the faculty of Cognitive Science would like to see a relationship with SCIDS that parallels the one proposed for CSE and ECE where there is a dotted line in the administrative structure. Their goal is to maintain complementarity in course offerings and faculty strengths. The department will continue to hire in areas of strength; coordinating effort and resources across the two units is in the campus’s interests. Cognitive Science is fundamentally a Social Sciences endeavor and is as much about computing as it is cognition and human behavior. I note that MIT’s Data Science Institute includes the word “Society” in its name, recognizing that in the most fundamental sense, big data and data analytics serve our society and its institutions.

Thank you for your campus-wide effort. I look forward to being your partner in the creation and building of SCIDS.
Sincerely,

Carol Padden
Dean, Division of Social Sciences
March 16, 2022

To: UC San Diego Division of the Academic Senate

I am writing to provide my strong and enthusiastic support for the proposal to create the new School of Information and Data Sciences (SCIDS) at UC San Diego. SCIDS represents both the culmination of a natural progression in the evolution of data sciences on campus and the much-needed foundation for expanding our endeavors in computing, information, and data sciences going forward. Physical Sciences has played a driving role in this evolution, both through our historical and ongoing connections and leadership of the San Diego Supercomputer Center (SDSC), and through our foundational role in partnering to create the Halicioğlu Data Sciences Institute (HDSI). All three of the departments in Physical Sciences – Mathematics, Physics, and Chemistry & Biochemistry – maintain close and productive connections with both SDSC and HDSI. The establishment of SCIDS will serve to enhance these connections to Physical Sciences. I anticipate strong collaborations between the schools, and many possibilities to explore exciting new research directions in partnership. The mutual areas of overlap in computing and data science are enormous, and the applications affect nearly every field of physical and mathematical sciences. I am particularly interested in seeing how the establishment of SCIDS could help in expanding the visibility and impact of both statistics applied mathematics at UC San Diego, fields that are largely concentrated in our department of Mathematics. I will be eager to explore more formal engagement between Physical Sciences and SCIDS once the school is established.

Sincerely,

Steven E. Boggs
Dean of Physical Sciences
Chancellor’s Associates Endowed Chair in Physics
University of California, San Diego
He/him
To: Robert E. Continetti  
Sr. Associate Vice Chancellor  
Academic Affairs

RE: Proposal for a new School of Computing, Information and Data Sciences

Dear Sr. Associate Vice Chancellor Continetti,

On behalf of the Division of Biological Sciences, I am pleased to support the proposal for a new School of Computing, Information and Data Sciences. The proposal was reviewed by the chairs and Biological Sciences Executive Committee, and we find the plan to be robust and well-articulated. There is clearly a strong opportunity for growth in Data Sciences research and education, and for collaboration with many disciplines. The proposed new School will be well-positioned to capitalize on these research opportunities, while delivering high value curricula for our students. We have no specific concerns, and look forward to collaborating with the new school.

Sincerely,

Kit Pogliano, PhD
March 8, 2022

Elizabeth Simmons
Executive Vice Chancellor
UC San Diego

Dear Elizabeth,

I am writing in my role as the University Librarian to express the Library’s support for the proposed School of Computing, Information and Data Sciences.

The Library is committed to supporting all educational and research programs at UC San Diego and I have been excited to see the development of data science and trans-disciplinary areas of research connected to the Halıcıoğlu Data Science Institute. I am especially excited about the vision of the new school - to take the “next leap forward in addressing the most compelling need of modern times - transforming data into knowledge.”

As this school takes shape the Library will work to support the school’s emerging programs, research areas and learning support needs. This will require some investment and adjustments in focus as we increase our capacity to support students and faculty engaged in data science but I believe that this shift is well aligned with the overall direction of the Library.

I expect that as we support the work of this new school the Library itself will benefit by being able to draw on the expertise of the students and faculty in exploring pressing Information Science questions. I’m excited to think that we will have new collaborators interested in pursuing the pressing questions around the democratization of information, equitable access to and critical assessment of knowledge and the ethical and societal impact of big data research.

The library already has a number of experts on staff who closely collaborate with the existing partners who will come together to form the proposed school and I am excited to extend these collaborations and bring more expertise to bear from the Library. I believe that we could contribute to and benefit from the schools’ investment in experiential education, in working on data science at classroom and research scales and in developing professional education and training programs.

Sincerely,

Erik Mitchell
The Audrey Geisel University Librarian
UC San Diego
March 21, 2022

RE: SCIDS Letter of Support

Dear Divisional Senate:

The comprehensive proposal for the establishment of the new School of Computing Information and Data Sciences (SCIDS) is very persuasive. Kudos to the team that put it together. The Qualcomm Institute looks forward to developing new collaborations with SCIDS above and beyond the ones already underway. As a trans-disciplinary entity, QI serves as a unique place to explore and develop new ideas. We are confident that SCIDS, like the other schools at UC San Diego, will engage with and enrich the larger campus community. We look forward to its speedy establishment.

Sincerely,

Ramesh Rao, PhD
Professor, Electrical and Computer Engineering
Director, Qualcomm Institute
Interim Director, California Institute for Telecommunications and Information Technology
Qualcomm Endowed Chair in Telecommunications and Information Technology
To: Robert Continetti, SVCAA
   Academic Affairs

Shankar Subramaniam, Professor
Computer Science and Engineering

From: Douglas Nitz, Professor and Chair
Department of Cognitive Science

RE: Proposal for a new School of Computing, Information, and Data Sciences

On behalf of the Cognitive Science Department, I write to express support for the new School of Computing, Information, and Data Sciences. The Department has had representation on the campus-wide committee working to outline the structure of the new School and I am pleased to see that many of the ideas put forth by members of the Cognitive Science Department have been adopted in the first complete draft of the proposal document. Having met and discussed those aspects of the proposal relevant to Cognitive Science, the Department voted, nearly unanimously, to support the new School’s development and to coordinate our efforts with the new School to the mutual benefit of both. Specifically, the Department’s support is contingent upon incorporation into the School plan of a “dotted line” relationship between Cognitive Science and SCIDS that is equivalent to that formulated for the Departments of Computer Science and Engineering and Electrical and Computer Engineering. With this more formal relationship in place, we are excited to support the new School and to coordinate activities related to curricula, research, governance, outreach, and fund-raising. This more formal relationship is seen by the Department as reflecting extensive current and past efforts in helping to develop the Data Science program at UCSD, as reflecting the extensive overlap in research interests and expertise between Cognitive Science and the new School, and as reflecting the need for consistent communication and transparency concerning issues of mutual interest.

The Department of Cognitive Science is home to faculty and students conducting research under a wide range of scientific disciplines including computation, data science, machine learning, artificial intelligence, education, human animal cognition, psychology, ethnography, neuroscience, genetics, design, human-computer interaction, and linguistics. In all of these areas, the application of data science and large-scale computational methodologies is key to the development of modern research programs. Accordingly, many of the faculty currently composing Cognitive Science have been leaders in their fields with respect to the design and execution of large-scale, data and computation intensive research initiatives on an international scale. Not the least of these include work in organization of communities-wide urban planning, computational and statistical approaches to genomic and imaging data, the adaptation of data science practice to neuroscience, the development of widely-distributed instructional practices in data science, the development of media to foster skill-building in programming techniques (e.g., Python Tutor), and machine learning approaches to computer vision and language processing.
Specific, existing contributions to the development of data science at UCSD include the contributions of Jeff Elman as a co-leader of the Halıcıoğlu Data Science Institute’s (HDSI) inception. Equally impactful have been the contributions of several faculty acting in executive positions with HDSI, including Shannon Ellis, Virginia de Sa, and Bradley Voytek, who substantively contributed to the design, development, and execution of HDSI’s diversity equity and inclusion, industry liaison, and internship program initiatives as well as the structuring and delivery of curricula. Finally, Cognitive Science is home to multiple lower and upper division courses in data science and machine learning that are open to students of data science and important components to its curriculum.

Thus, Cognitive Science has had, and will continue to have in the future, a close relationship to the work of SCIDS. Cognitive Science includes much more than its contributions to data science, machine learning, computation, human-computer interaction, and statistical approaches. In turn, information and data science research and SCIDS will span multiple areas beyond those covered by Cognitive Science, and so it is important to recognize the significant overlap between the Department of Cognitive Science and SCIDS. The two units will unequivocally benefit mutually, and this will enhance the stature and standing of UC San Diego as a leading institution in data science research and training and their applications to the highly diverse set of data types examined and processed in the practice of Cognitive Science. Given the overlap and presence of several joint faculty between Cognitive Science and HDSI, it will be beneficial for Cognitive Science to have a formal affiliation with SCIDS, even while retaining its position with the Division of Social Sciences. Given the strong connections between HDSI, CSE, ECE, Cognitive Science and the data science and applied data science that will be the focus of SCIDS, a more formal connection between the Cognitive Science, CSE and ECE departments and SCIDS is proposed at the formation of the school.

Finally, we congratulate the leaders of the new School’s development plan on the building of an exciting new enterprise at UCSD. The Cognitive Science Department is excited to see UCSD build upon a solid foundation in this area of research and instruction and will continue its efforts to help make this initiative take final shape in the months and years to come.

Sincerely,

Douglas A. Nitz, PhD
Professor & Chair, Dept. of Cognitive Science
University of California, San Diego
March 18, 2022

Robert E. Continetti  
Sr. Associate Vice Chancellor–Academic Affairs  
UCSD

Dear Sr. A VC Continetti,

this letter is to confirm the strong support of the mathematics department for the proposal to form a new school of computing information and data sciences at the University of California, San Diego.

The mathematics department has always had strong connections with both the San Diego Supercomputer Centre and the Halicioğlu Data Science Institute. A number of faculty in the mathematics department have joint appointments in HDSI and the department also has a strong presence in computational science, mathematics and engineering. In fact the department has been heavily involved with the HDSI since its formation, in many areas of research, teaching and administration.

The mathematics department eagerly looks forward to the formation of the new school and the new opportunities for collaboration in research and teaching.

Yours sincerely,

James McKernan, FRS  
Department Chair  
Charles Lee Powell Endowed Chair in Mathematics
March 22, 2022

Dear Executive Vice Chancellor Simmons,

I have reviewed the proposal for the creation of a new School of Computing, Information and Data Sciences (SCIDS), and I am pleased to provide my support. My department is delighted to see that the proposal recognizes that ECE (Electrical and Computer Engineering) has played an instrumental role in the creation of HDSI that forms the foundation of SCIDS, that the formation of similar new schools at our peer institutions have involved formal connections with their ECE/EECS departments, and that establishing a formal connection between SCIDS and ECE from inception is important to ensure that externally the new school starts off aligned with national trends. I am also pleased to see that we already have an example of the type of benefits that the formal connection will bring in the establishment of the recent $20M AI Institute TILOS where the ECE faculty represents about one-third of the TILOS faculty and serves in key leadership roles.

While the details of this formal connection are still be memorialized in MOU’s, as noted in the proposal, ECE looks forward to actively engaging in this next phase of discussion to develop a partnership that will be mutually beneficial to all parties involved and maximize the impact that UC San Diego will make on the world stage. I look forward to the successful formation of the new school and our partnership with SCIDS in coordination with the Jacobs School of Engineering.

Sincerely,

Bill Lin
Professor and Chair
Department of Electrical and Computer Engineering
University of California San Diego
DATE: March 23, 2022

TO: Elizabeth Simmons, Executive Vice-Chancellor

FROM: Sorin Lerner, Professor and Chair of Computer Science and Engineering

RE: School of Computing, Information and Data Sciences

I am pleased to provide my support for the establishment of a School of Computing, Information and Data Sciences (SCIDS) with a formal connection to the department of Computer Science and Engineering (CSE), reflecting CSE’s leadership in defining computing at UC San Diego over the last 40 years, its position at the core of computing education and research at the university, and the role it will play going forward in making SCIDS an international leader in research and education.

Computing, information and data have fundamentally transformed our modern society, affecting every aspect of our daily lives, either directly or indirectly. Communication, health, scientific discovery, entertainment, there is not a single part of the modern world that has not been touched by computing and data. Fully unlocking the potential of computers, software and the data they process, in a safe and impactful way, with all its societal implications, is one of the central intellectual endeavors of our time. The CSE department has seen this intellectual endeavor as central to its mission for many years now. We see a new School of Computing, Information and Data Sciences as a next step toward the broader fulfillment of this intellectual endeavor. The interdisciplinary nature of the school will lead to strengthened collaborations across the entire campus. CSE looks forward to engaging, contributing and taking part in the creation of this new school.

CSE has supported the campus efforts toward Data Science and the mission of the Halıcıoğlu Data Science Institute (HDSI) from the very beginning:

- CSE was the administrative home of the Data Science undergraduate program for several years before HDSI was created as an academic unit
- CSE hired two Teaching Professors to teach in the Data Science undergraduate program before HDSI was able to hire its own faculty (these Teaching Professors were then transferred to HDSI when HDSI became an academic unit capable of holding faculty lines)
CSE has given all HDSI faculty affiliate status in CSE so that they can admit PhD students from the CSE PhD pool

CSE faculty have led a variety of faculty searches in HDSI, and are leading several proposals that are put together in HDSI

CSE and HDSI have a joint educational program, an online Master of Data Science

Many top universities are re-imagining a future that brings computing, data and applications into focus with a new school, division, or college. This includes Berkeley, MIT, Carnegie Mellon University, Cornell, University of Washington, and University of Wisconsin. As the proposal states, at all universities that have a school/division/college with the word Computing in the name, Computer Science and Engineering is in the School. In some cases, CSE is housed solely in the School of Computing, for example at Carnegie Mellon and Georgia Tech. In other cases CSE is part of both the school/division/college of computing and other structures like a school/division/college of Engineering. This is the case at Berkeley, MIT, and Cornell.

For SCIDS to be competitive at the national and international level, the SCIDS task force recommends that a formal connection be established between CSE and SCIDS at the time of inception. Indeed, the CSE faculty cannot envision SCIDS without a deep and substantial formal connection with CSE.

Thus, building on the existing strong relationship between CSE, JSOE, HDSI and SDSC, the CSE department is looking forward to engaging in the process of defining this formal connection. There are varying views in the CSE department about what this formal connection should look like, but there is broad agreement that this connection needs to be there. In defining the MOUs for this formal connection, it will be important to look at recent examples of joint department membership of CSE in similarly scoped new schools/divisions/colleges, for example those at Berkeley, MIT and Cornell.

In summary, I am pleased to support the establishment of SCIDS with a formal connection to CSE. The CSE department looks forward to continued engagement to define this formal connection. We are excited to establish a deep and strong partnership with SCIDS in coordination with the Jacobs School of Engineering.

Sincerely,

Sorin Lerner
Professor and Chair
Department of Computer Science and Engineering
Jacobs School of Engineering
University of California, San Diego
January 6, 2022

Chancellor Pradeep K. Khosla
Office of the Chancellor
UC San Diego
9500 Gilman Drive
La Jolla, CA 92037

Dear Chancellor Khosla,

We write to you in our capacity as members of the UC San Diego Innovation and Entrepreneurship Council (IEC) to unequivocally endorse the launch of the UC San Diego School of Computing, Information and Data Sciences (referred to as SCIDS). The IEC, comprised of entrepreneurs, industry partners and alumni, is an advisory group to the Chancellor, and is deeply committed to establishing UC San Diego as a premier institution for scientific and societal impact through innovation.

UC San Diego has a deep history in computing and computational sciences. With the global Big Data explosion of the past decade, we have entered the next frontier for innovation, competition, and productivity. The advent of this new frontier justifies the urgency of the SCIDS initiative. As an enduring academic unit, SCIDS will be uniquely positioned to effectively leverage the existing intellectual and operational resources of the Halıcıoğlu Data Science Institute (HDSI) and the San Diego Supercomputer Center (SDSC) to serve the rapidly increasing need to train the next generation workforce in data sciences and computation. This transdisciplinary school will also serve as a much-needed hub of research, teaching, and translational practice in broad areas of data science and its impact on society.

The view of the IEC, shared by campus academic unit leaders, is that the SCIDS will expand upon UC San Diego’s Vision for Innovation to drive social and economic prosperity in the following ways:

- Attract and engage a broad community of researchers on campus and externally.
- Develop and train highly qualified students for the data workforce and create a unique niche for interdisciplinary training across multiple disciplines and data sciences. SCIDS will help students accomplish experiential learning with data and computing, while realizing the synergies between education, training and ground-breaking research through collaborations with faculty and researchers across campus.
- Advance exciting and novel opportunities for fundamental and applied research in the interdisciplinary areas of data science and computing.
Enable broad practical applications of research topics spearheaded by renowned domain science departments and schools across UC San Diego.

This is a pivotal moment in the evolution of the role computing, information and data science play in society - and our campus. We respectfully encourage you to approve UC San Diego’s proposal for the School of Computing, Information and Data Sciences, which is an unprecedented opportunity to make a meaningful difference for our students, faculty and the diverse communities we serve for generations to come.

Sincerely,

Pelin Thorogood, Co-Chair
Cofounder and Executive Chairwoman,
Radicle Science
Treasurer, UC San Diego Foundation

Leo Spiegel ’83, Co-Chair
Managing Partner, Spiegel Capital Management
Trustee, UC San Diego Foundation

Jeff Belk ’83
CEO, Ocreati Advisors, LLC
Immediate Past President,
UC San Diego Alumni Board of Directors

Deborah Bronston-Culp ’80
Managing Partner, Samothrace Partners
Trustee, UC San Diego Foundation

Taner Halıcıoğlu ’96
Founder, Halıcıoğlu Data Science Institute
Trustee, UC San Diego Foundation

Steve Hart, MA ’80
Executive Vice President and CTO, Viasat
Immediate Past Chair, UC San Diego Foundation

Sabrina Johnson
President and CEO,
Daré Bioscience, Inc

Matthew Newsome ’91
Vice President and General Manager,
Cubic Transportation Systems
Trustee, UC San Diego Foundation

Drew Senyei
Chairman, CEO and Founder, NoniGENex
Trustee, UC San Diego Foundation

Jeff Silberman
President and CEO, Carlton Management
Chair, UC San Diego Foundation
May 30, 2022

Professor Nancy Postero
Vice Chair, San Diego Divisional Academic Senate
UC San Diego

Subject: Summary response to the comments from Senate Council regarding the proposal for a new School of Computing, Information, and Data Sciences (SCIDS)

Dear Vice Chair Postero:

We thank the Academic Senate and its standing Committees for a thoughtful and constructive review of the proposal to establish a School of Computing, Information, and Data Sciences. While we plan to address all the points raised in substantial detail if the proposal is approved to move forward for systemwide review, we provide here a summary response to facilitate our presentation to the Representative Assembly on June 7, 2022.

1. The most significant concern raised by the Senate Council and the Senate Committees revolve around the financial planning and health of the proposed school in the context of UCSD’s overall financial needs and planning. We wish to clarify several points in this summary response.

- A key point underpinning the concerns of Senate Council lies in the financial investments that will be needed to create a successful School. The proposal broadly outlined the expenses for establishing an administrative structure for the School. The essential fiscal foundation for the new school exists owing to endowment of HDSI and the external funding of SDSC which serves as a national resource; however, for the future success of the new school, it is essential that development efforts be aggressively launched and pursued, and the establishment of the new school provides an excellent opportunity. The Chancellor and EVC are committed to development efforts targeted at the new School.

- There appears to be a misunderstanding that HDSI is financially autonomous and self-supporting owing to its initial endowment and the academic income from student tuition and faculty research grants. While such claims may have merit if HDSI was merely a small institute without its own faculty and educational needs, the campus fiscal commitment to HDSI cannot be understated. Faculty recruitment, start-up costs, retentions, building infrastructure, and the administrative structure needed are a part of campus fiscal engagement. Hence, HDSI is not self-supporting. SDSC is largely supported on extramural grants, and now receives support from the campus in the form of indirect cost return under the divisional support model. Contributions to the physical infrastructure to support computing have been an important part of campus investment,
and will need to occur irrespective of the establishment of SCIDS as an element of supporting UC San Diego’s leadership in computational research.

- HDSI has grown at this point to be equivalent of a large department with growing demands and unique administrative requirements. Given the interdisciplinary nature of HDSI and the growing demands of cross-interactions, no single school (such as JSOE or Physical Sciences or Social Sciences) would be an appropriate home for HDSI. This is also counter to the academic needs of computing, data, and information sciences across campus. SDSC increasingly not only supports campus computing and computational sciences, but also provides an intellectual focal point for interdisciplinary applications, making it far more than simply a computational infrastructure resource for the campus. The cross-interactions of SDSC across every school on campus is now well-understood and increasing this component further warrants a new form of administrative infrastructure. Such considerations were the leitmotif for the proposal for a new School.

- The Working Group that developed the proposal recognized the establishment of similar schools in peer institutions and the existing strengths and synergies at UC San Diego which not only harbinger the formation of SCIDS but also portends its rapid establishment as a leading and peerless academic entity. The presence of HDSI and SDSC and other leading academic departments along with a tradition for computational excellence is a prognosticator of success.

- Today, HDSI is a stand-alone academic unit and SDSC is an Organized Research Unit (ORU), however, it is one that functions very distinctly from other ORUs on campus. SDSC has both a state and national mandate deriving from its origin as an NSF supercomputing center in addition to playing a role as a strong computational resource for the campus. In this regard, SDSC is similar in spirit to the Scripps Institution of Oceanography with its fleet of research vessels. Thus, SDSC is distinct from other ORUs, and HDSI is unique as a stand-alone academic unit at UC San Diego that now needs a stronger administrative support structure.

- As pointed out by members of the Senate who favored advancing the proposal, the administrative structure of HDSI is unsustainable under the conditions of its growth (with over 1000 students and increasing enrollment demands, the concomitant rise in number of courses and a growing number of faculty). While SDSC has existed for several decades with successful autonomous administration, its integration with campus over the past decade has introduced increasing demands on its shared administration with campus and the current structure poses significant challenges. Also, as pointed out by the Senate members, “joining these units together under the umbrella of a school will strengthen the University’s research and educational initiatives in these areas and will allow for regular Academic Senate review.”

Succinctly, we wish to point out that the cost of stasis and not creating a school in the light of the dramatic revolution in computing, information and data sciences will far outweigh any investment costs. Simply stated, the advantages that will emerge from the
The establishment of the new school are immense and it would be a huge missed opportunity if we did not pursue the new school, especially given our pre-eminent status in computing and data sciences.

2. The comments summarized by Senate Council point to the question of SCIDS ties to a larger number of campus units. While the proposal explicitly provides dotted line associations with Computer Science and Engineering (CSE) and Electrical and Computer Engineering (ECE), these are not meant to be exclusive, and the proposal describes potential for future affiliations. Indeed, the support letter from Cognitive Science makes clear their intention to have a similar affiliation at founding of the new School. Already, the joint appointments between HDSI and other campus units go beyond CSE and ECE; current joint appointments include those involving Cognitive Science, Bioengineering, Math, Political Science, Biological Sciences, Marine Sciences, Physical Sciences, and the Schools of Medicine and Public Health. This demonstrates the importance of computing and data sciences and the need to provide an academic umbrella.

The governing faculty council of HDSI consists of faculty drawn from nearly all schools including health and marine sciences. This group has worked together so effectively that over the four-year period since its founding HDSI has successfully recruited 23 new faculty members, out of which 14 faculty members have joint appointments across 9 departments including SIO and Health Sciences. As of this writing, HDSI has an open search or plans to hire in the next two years faculty jointly with Social Sciences, GPS, SIO, Health Sciences, Physical Sciences, Biological Sciences, Arts and Humanities. In addition, the governing faculty council has 24 faculty members drawn from many departments with a 0% appointment in HDSI. As pointed out in the proposal, SCIDS will continue to support joint faculty appointments with many units on campus and develop joint curricula.

3. The Council mentioned the issue of joint governance. We wish to point to the current administrative structure of HDSI and SDSC. While HDSI is an academic unit that reports to SAVCAA Continetti on academic matters, it is a sub-optimal structure especially given the exponential growth over the past two years. Additionally, HDSI has innumerable links with other Schools and Divisions through joint appointments, curricula, and research funding. This growth places enormous burden on the existing administrative infrastructure. SDSC has a Director and an established administrative structure, but with its greater integration into UCSD campus, there is inadequate administrative support for strong collaborations. Further data and computing activities spanning the campus warrant strong academic coordination and governance and only a school with an interdisciplinary focus can accommodate the needs. HDSI will acquire a Department status in the new school with the required staffing and SDSC will continue its staffing. As proposed the Dean and the Dean’s office will provide joint oversight for HDSI (as a department), SDSC, and a host of units that will have affiliations at diverse levels.

4. The Council also noted the entrepreneurial nature of HDSI and SDSC. The SCIDS proposal highlights the synergies that will provide even greater opportunities for philanthropy and
entrepreneurship. Given the “big data” needs of industry and the impact of growing data analytics on areas of human need such as health, energy, and climate offer unique entrepreneurial opportunities. SCIDS administration will offer greater developmental potential emphasizing the strong interdisciplinary DNA of the proposed school.

5. The Council mentions the issue of intellectual diversity in HDSI owing to joint hires. HDSI was founded by faculty who had appointments in units such as CSE, ECE, Math, and CogSci. HDSI subsequently has recruited faculty who are 100% FTEs in HDSI. The practice of both recruiting faculty in HDSI (100% FTE) as well as jointly with other units on campus is described in the SCIDS proposal. Further, the Chancellor’s Joint FTE program provides excellent opportunities for SCIDS to collaborate with other units on campus.

6. The Council points to the increased demands for data science courses across campus. We thank the Council for presenting this overwhelmingly critical component emphasizing the need for SCIDS. The Data Science programs share courses with departments such as CSE, Math, CogSci, and Bioeng. SCIDS will further facilitate joint curricular activities with other units on campus and this is a foundational concept in the SCIDS proposal.

7. The Council raised the question of undergraduate enrollment. The impacted nature of the DSC major was due to its legacy as a part of administration within JSOE where all programs are impacted. In fact, as HDSI has recruited more faculty and created additional capacity, it has substantially increased the capped limits (from 175 to 300) and looks forward to removal of cap limits altogether under the processes established by the new School. We have already received the permission for engineering majors to double major with Data Science, something that was not possible earlier. It was the intent of the SCIDS Working Group that developed the Proposal to include a discussion of Data Science minors in the undergraduate program. This was omitted inadvertently and will be added to the proposal.

A formally established school will be better able to manage resources to create advising and programmatic capacity than a standalone department, especially with the synergies enabled by SDSC.

Formation of a school also makes it easier for UC San Diego to serve a broader group of students than is possible within an academic department. SCIDS will build upon proven mechanisms for DEI courses and EDI-share pool resources to expand outreach, build a talent pipeline as well as create academic subsections (departments/divisions) in the future that will provide directed pathways for STEM and non-STEM talent pools attracted by the emerging discipline.

8. While the SCIDS Proposal does not explicitly highlight the resource investments in JEDI, the Working Group expressed strong intent in investing resources in JEDI. These will be in the form of URM and women faculty, staff and student recruitments, enhanced curricular activities for URM students and career path advising on a continual basis with emphasis on JEDI. Data
Sciences also offer greater opportunities for students with physical disabilities and the Proposal will explicitly discuss plans for recruitments in this category.

We thank the Senate Council and the Committees for engendering detailed discussions and comments and believe that the proposal will benefit from the questions posed as it is prepared for systemwide review process. Given our unique status among peers in the emerging discipline of data sciences and our longstanding excellence in computing sciences, time is of essence in the establishment of SCIDS and the opportunity is now for enabling UCSD to become a top-tier institution in Computing, Information and Data Sciences.

We hope that we have addressed the comments posed by the Academic Senate and its Standing Committees.

Sincerely,

Robert E. Continetti  
SCIDS Proposal Task Force Co-Chair  
Senior Associate Vice Chancellor, Academic Affairs  
Distinguished Professor of Chemistry and Biochemistry

Shankar Subramaniam  
SCIDS Proposal Task Force Co-Chair  
Distinguished Professor of Bioengineering and Computer Science and Engineering
May 23, 2022

ELIZABETH H. SIMMONS
Executive Vice Chancellor

SUBJECT: Review of Proposal for a School of Computing, Information and Data Sciences

Dear EVC Simmons,

The pre-proposal for a School of Computing, Information and Data Sciences (SCIDS) was distributed to Senate standing committees and discussed at the May 16, 2022 Senate Council meeting. A majority of Senate Council had no objections to the pre-proposal and voted to place it on the June 7, 2022 Representative Assembly meeting agenda. The members who favored advancing the proposal supported establishing a school focused on the growing fields of computing, information, and data sciences, recognizing that the current placement of the San Diego Supercomputer Center (SDSC) and the Halicioğlu Data Science Institute (HDSI) within the University’s organizational structure is suboptimal. Joining these units together under the umbrella of a school will strengthen the University’s research and educational initiatives in these areas and will allow for regular Academic Senate review. A minority of Senate Council members shared concerns raised in the Committee on Planning and Budget’s response (attached) that a new school is a substantial expense and the pre-proposal lacked a sufficient justification for its establishment. They felt that these concerns were significant enough to recommend seeking additional information on resource requirements, administrative costs, and the need for a new school before advancing the pre-proposal.

All members agreed that additional details on the School’s structure, resources, and interdisciplinary pursuits will be required as the proposal advances in the review process. The Council offered the following comments and questions:

- Concerns were raised regarding the cost of creating a new School as well as the cost of the many new permanent administrative and staff positions needed to support it, particularly at a time when the campus is facing budgetary pressures due to rapid expansion, growing student population, and inadequate state support. Citing the success of many ORUs on campus, it was not clear to some reviewers why UCSD’s existing administrative framework, programs, and departments could not support this new programming. That is, might these substantial resources not be better used to expand or support the existing entities? Council requests a clearer estimation of the costs and benefits of this plan. Additional information on how the establishment of SCIDS will impact campus growth is specifically requested.

- There were additional concerns that the pre-proposal underestimated the costs of creating a new School, and reviewers strongly suggested including a more detailed justification of the basis of the figures in the proposal to more accurately represent the true estimated costs. It would be helpful to know the administrative costs of other schools as a comparison. Given that SDSC and HDSI will be transitioning from self-supporting entities to constituents of a School, more details should also be provided on the campus’ financial obligations for these transitions. Further, would existing staff in these two entities be reallocated to the new School or will the new positions laid out in the organizational chart be new hires?

- The pre-proposal mentions SCIDS’ ties with a few departments on campus, but Council noted that it left out several areas of campus where ties could be formalized. For the ties that were identified, it was not clear how SCIDS would interact and share resources with areas with related programming.
• It is not clear from the pre-proposal how being folded under SCIDS will impact SDSC and HDSI or how the two units will share governance. Additional information about how whether these units will remain as named under the new structure and how they will operate is recommended.

• Council notes HDSI and SDSC have been marked by their inclusive and entrepreneurial nature, based in part in their ‘grassroots’ structure. What are the trade-offs in the proposed more formal structure?

• Council members noted that much of the planned intellectual diversity within SCIDS is based on joint hires. This approach seems to make SCIDS very reliant on collaborations with other academic units. Council suggests providing evidence of support for this strategy from Administration and other Schools.

• There is an increasing demand for data science courses and it is unclear how the formation of a new school will meet this need, particularly when it is starting with one undergraduate major that is already capped. Council is interested in learning more about how the establishment of SCIDS will alleviate the enrollment and admissions pressures on campus. Questions were also raised on the accessibility of SCIDS courses to non-STEM majors, how transfer students will be accommodated, and how SCIDS courses will contribute to undergraduate general education requirements, including the DEI requirement. Given the broad nature of the School, it was also not clear how double majoring or major changes between SCIDS and other schools will be handled (for example, double majoring with engineering programs). What forms of coordination are envisioned?

• Council appreciated the attention paid to Justice, Equity, Diversity and Inclusion (JEDI) efforts in the pre-proposal and the multi-dimensional approach described. It would be helpful to include more specifics on how the JEDI efforts will be integrated into courses, policies, and practices in order to achieve the stated goals. What resources will be invested into these efforts? It was also noted that there are important issues in need of attention within the data science realm, including neurodiversity, physical disabilities, and inclusion of Black students.

The Committee on Diversity and Equity, the Committee on Planning and Budget, the Educational Policy Committee, Graduate Council, and Undergraduate Council reviewed the proposal. Their responses are attached.

Sincerely,

Nancy Postero
Vice Chair
San Diego Divisional Academic Senate

Attachments

cc: Chancellor Khosla
    Dean Antony
    Senior Associate Vice Chancellor Continetti
    Associate Chancellor Gattas
    Director Gupta
    Director Hullings
    Dean Moore
    Assistant Vice Chancellor Sanders
    Professor Subramanian
    Director Würthwein
April 9, 2022

TARA JAVIDI, CHAIR
Academic Senate, San Diego Division

SUBJECT: SCIDS Pre-Proposal

The Committee on Diversity and Equity (CDE) considered the proposal to create a School of Computing, Information and Data Science (SCIDS) at the committee’s regularly scheduled meeting on April 15, 2022.

The committee began by acknowledging the tremendous efforts that went into launching the Halicioglu Data Science Institute (HDSI), which will sit at the core of the new school. HDSI (along with the SDSC) has been a model of truly working across campus, integrating all units, and supporting shared infrastructure and interdisciplinary pursuits. From a diversity, equity, and inclusion perspective, this effort is commendable and deeply appreciated.

Against that backdrop, the committee’s discussion focused on whether the proposed SCIDS structure might alleviate or hinder known EDI issues on campus. We highlight three points that we would hope to see school leadership address prior to launch:

First, the committee appreciated the intent expressed in the JEDI section of the proposal, and the multi-dimensional approach to these issues. We agree that this is a once-in-a-lifetime opportunity to build JEDI into the fabric of SCIDS, and that being deliberate about this could be a dimension that sets UC San Diego SCIDS apart from peer institutions. The extant HDSI efforts represent a strong starting point, but it would be helpful to see a more detailed articulation of how this JEDI fabric really will be woven. What specific courses will be offered (and how will they be incentivized given that they are not required in the current curriculum)? What policies or practices will be employed to achieve (e.g.) the stated diversity goals? In terms of inclusion, there are some really strong dimensions in need of attention in the data science / information / CS world – including neurodiversity & physical disabilities. We encourage the school to take a bold stance, and to harness the school structure for resources to ensure that anyone who wants to study these fields at UCSD can, and will be wholly supported as their full authentic selves.

Second, in terms of EDI, a key red flag for CDE was the acceptance of capped majors as a fait accompli and launching the school with capped majors at the outset. We refer to our response to the enrollment management workgroup report on why capped majors represent a very troubling JEDI issue. The new school should start from the data on who is presently being excluded from the relevant majors, and develop a specific plan to “crowd in” a more diverse student body, as opposed to effectively locking them out by buying into the current system.

Finally, the committee acknowledged that the new school structure will naturally trade off the benefits of organizational consolidation with some of the broader-spanning more fluid structure that exists presently. To that end, CDE encourages the school to offset some of the consolidation forces with more concrete bridge-building. We don’t intend to be prescriptive, but could there be direct investment in things like cross-listed or co-taught courses/sequences that maintain some of the full-campus spirit of HDSI within the new school structure? Such investments could create strong links to the new school for the full student body at UC San Diego, could embed some of the JEDI aspirations articulated in the proposal, and could truly set SCIDS apart from competitor institutions.

University of California – (Letterhead for interdepartmental use)
CDE looks forward to seeing the new school take shape, and hopes this feedback will be helpful as SCIDS leadership refines its JEDI mission prior to launch.

Sincerely,

Jennifer Burney, Chair
Committee on Diversity & Equity

cc: N. Postero
May 6, 2022

TARA JAVIDI, CHAIR
Academic Senate, San Diego Division

SUBJECT: School of Computing, Information and Data Science Pre-Proposal

The CPB discussed the proposal at our April meeting. The committee recognized the considerable work and thought that has gone into this proposal, the importance to UCSD of the guiding facilities (HDSI and SDSC), and the industrious and thoughtfulness of the steering committee. The committee further recognizes the current importance and future promise of the computing, information, and data sciences for all disciplines, as well as UCSD’s potential to train future scholars, researchers, and professionals in those sciences.

The committee has several concerns about the proposal. Our primary question concerns the argument for a new, significant administrative unit, at a time when campus faces non-trivial budgetary pressures due to rapid expansion and inadequate state support. Certainly the demand for CIDS coursework is acute, and likely to persist in at least the near future. Moreover, supporting the research mission of HDSI and SDSC and enhancing CIDS coursework are important goals. However, the proposal fails to give convincing reasons why these goals could not be attained within the framework of UCSD’s existing administrative structure. Establishing a new school will incur a substantial permanent increase in administrative expenses. It also may create expectations that further resources – faculty positions or infrastructure – will be provided without rigorous review. An alternative, more fiscally efficient and flexible alternative would be to provide more resources as needed to existing programs and departments.

The proposal appears to underestimate the additional administrative cost of the center. We request a more detailed justification of the basis for the figures in the proposal. For example, the estimates do not include the remuneration package for a new Dean. A comparison table providing commensurate administrative costs in other schools would help the committee evaluate the plausibility of estimated costs.

To our knowledge SDSC has no history of course development for regular UG/Grad instruction (although we acknowledge their track record in holding or hosting trainings, workshops, etc.). The proposal is unclear how SDSC would participate in the instructional mission of the new school. Which SDSC personnel are regularly involved in undergraduate and graduate instruction? How that might change with the establishment of SCIDS, and will that change the compensation basis for SCIDS personnel?

How might the formal shift of SDSC from a self-supporting research facility to a major constituent of a school oblige UCSD to fund SDSC? Currently SDSC passes its costs on to campus users. Would this still be the case if they were receiving campus funding as part of a school? It is critical to clarify any new campus financial obligation to SDSC as well as HDSI under the proposed arrangement.

The organizational chart is vague. The figure and supporting text leave unanswered questions about the obligations of, and opportunities to, participating divisions or departments.

The justification for SCIDS rests on three claims: the excellent performance of current relevant units on campus, the increasing importance of data science, and the establishment of similar schools at comparison
institutions. We do not dispute these claims, but we do not yet perceive how these claims justify the need for a new school that will create yet another costly layer of administration. The committee requests a revision of the proposal that clearly describes the benefits of reorganization, and provides an estimate of associated costs that is more complete, and is supported by comparison data.

Sincerely,

Gedeon Deák, Chair
Committee on Planning & Budget

cc: N. Postero
May 3, 2022

PROFESSOR TARA JAVIDI, Chair
Academic Senate, San Diego Division

SUBJECT:  School of Computing, Information, and Data Sciences Pre-Proposal

At its April 18, 2022 meeting, the Educational Policy Committee reviewed the pre-proposal to establish a School of Computing, Information, and Data Sciences (SCIDS) at UC San Diego. The Committee supports the establishment of the School, and had the following comments on the pre-proposal:

- The pre-proposal mentions SCIDS ties with a few departments across campus, but left out several areas of campus where ties could be formalized. To strengthen the proposal, the Committee encourages the proposers to develop formalized ties with other areas of campus where big data is studied.
- If a School of Computing, Information, and Data Sciences is formed, the Committee recommends that the proposal clearly explain how this impacts the Halicioğlu Data Science Institute and the San Diego Supercomputer Center. Will these units remain as named under the new structure?

Sincerely,

Padmini Rangamani, Chair
Educational Policy Committee

cc: D. Dubin
L. Hullings
J. Lucius
N. Postero
May 5, 2022

TARA JAVIDI, Chair  
Academic Senate, San Diego Division

SUBJECT: School of Computing, Information, and Data Sciences Pre-Proposal

At its April 11, 2022 meeting, the Graduate Council reviewed the pre-proposal to establish a School of Computing, Information, and Data Sciences (SCIDS) at UC San Diego. In general, the Council had no objections to establishing the new school. The Council opined that additional details about shared governance and how this new school will interact and share resources with existing schools that have related programming would be helpful.

Sincerely,

Arshad Desai, Chair  
Graduate Council

cc:  P. Ghosh  
     L. Hullings  
     J. Lucius  
     N. Postero
May 6th, 2022

PROFESSOR TARA JAVIDI, Chair
Academic Senate, San Diego Division

SUBJECT: Pre-Proposal for the School of Computing, Information, and Data Sciences

At its April 8, 2022 meeting, the Undergraduate Council reviewed the pre-proposal to establish a School of Computing, Information, and Data Sciences (SCIDs) at UC San Diego.

In general, UGC supports the proposal. The Council acknowledges and appreciates the broad overview of the Schools proposed affiliations and connections across campus. We look forward to learning more about how these partnerships will unfold and provide a richer undergraduate student experience. As the Data Sciences currently favor the STEM fields, it will be valuable for SCIDS to make the field(s) of study more accessible to non-STEM majors. We note that the basic and applied aspects of computing, information and data sciences provide a rich and positive intellectual space for faculty and students alike.

The Council advanced the following questions for consideration:

- While the proposal had a great deal of conceptual information, the Council noted that facets describing the undergraduate student experience are missing. How will the School contribute to the collective general elective (GE) options available to students? Beyond the single DEI course, DSC 167, what are the School’s plans for bringing DEI initiatives to its curricula? How will the School’s curriculum and advising attract and accommodate transfer students?

- Given the broad nature of the School and overlap with other existing programs at UC San Diego, the Council has opined that specific attention will need to be paid to existing policies governing undergraduate degrees. Senate Regulation 600(3)(B) states that “The two majors may not be within the School of Engineering, nor, except with the approval of the Undergraduate Council, within a single department.” Is the content overlap between the SCIDs and Jacobs School of Engineering extensive enough that students should be prevented from double majoring? Will a student be allowed two SCID majors? How will major changes be handled? How might this affect admissions and capped major status?

Sincerely,

Stacey Brydges, Chair
Undergraduate Council

cc: T. Erbe
     L. Hullings
     J. Lucius
     N. Postero
REPORT OF THE GRADUATE COUNCIL

At its May 9, 2022 meeting, the Graduate Council approved a proposal for the establishment of four new Master’s degree specializations in Engineering Sciences, to be offered to students in the Department of Mechanical and Aerospace Engineering. The proposal requests the establishment of the following new degrees:

- MS in Engineering Sciences (Biomechanics and Biomedical Engineering)
- MS in Engineering Sciences (Controls and Mechatronics)
- MS in Engineering Sciences (Power and Energy Systems)
- MS in Engineering Sciences (Computational Engineering and Science)

The Council is supportive of this academic endeavor and recommends that the Representative Assembly approve the proposal.

Arshad Desai, Chair
Graduate Council

The complete proposal is available for review: https://senate.ucsd.edu/media/571523/mae-proposed-specializations-in-engineering-sciences.pdf

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Executive Summary
The Mechanical and Aerospace Engineering Department proposes the establishment of four new major codes for M.S. programs that will provide an opportunity for students to gain a deep technical knowledge within emerging and growing application areas. This action is motivated by the rapid growth in these particular application areas within industry and within our faculty research portfolio and the desire of the MAE Faculty to more closely align our M.S. degree offerings with the Department’s scope of research.

This request represents Phase 2 of the implementation of updated MS degree programs in MAE. The Phase 1 MS degree proposal was submitted at the same time as this proposal and details our request for updates to existing degree programs. Together, these updated and newly proposed specializations complement the MAE Core MS degree program in Mechanical Engineering that was launched several years ago, which has experienced high demand and has an enrollment of about 200 MS students/year. This Core program was designed intentionally to have courses that span the breadth of the Department’s research activities from which students choose, combined with electives drawn from our PhD program course offerings. While this overall MS program growth was one of the goals of the MS Core Program, it has also resulted in a large influx of graduate students, the majority of whom are international students, with interests that are somewhat disconnected from the Department’s research foci.

As a result, the Department would like to complement its Core MS program offering with these new degree programs that meet the interests of today’s MS students and the needs of MAE industry partners, whose advice has helped shape the proposed revisions. The foci of these new MS degree programs are drawn from and aligned with the Department’s research efforts, and the proposed new course requirements would be drawn almost entirely from our existing PhD level graduate course offerings, thereby minimizing the number of required new courses needed to launch these new specializations.
The proposed changes will result in a diverse set of MS degree offerings that allow students to either obtain a broad MS degree that spans across many of the disciplines represented in the Department, or to obtain an MS degree that is narrower in scope but that goes much deeper into a student’s area of chosen technical interests. It is our expectation that this update will attract a deeper pool of qualified candidates and thereby allow the Department to grow its overall MS enrollment with a larger fraction of MS students with interests that align with our PhD level research programs; this may also have the side benefit of providing a new pool to draw from for our PhD program recruitment. We also expect that these new degree offerings will be attractive to domestic students as they provide skills in high demand for our industry partners and are expected to yield a more balanced distribution of domestic and international MS student enrollment. The Department is targeting having these new degree programs available for students beginning in AY23-24.