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May 10, 2016

CHAIR ANDRÉ KNOESEN
Academic Senate

RE: Request for Comments on the Institute for Transportation Studies (ITS) 5-Year Review

Dear Chair Knoesen:

An *ad hoc* review committee has completed an in-depth five-year review of the Organized Research Unit (ORU) Institute for Transportation Studies (ITS), following UC Administrative Policies and Procedures concerning ORUs. Enclosed is a copy of the *ad hoc* review committee's report for your review and comments.

Also provided for your consideration are comments on the committee's report by the Deans Curtis, Dillard, and Stevens and from the Director.

I request formal Academic Review of these documents. Furthermore, I respectfully request that, if possible, the Academic Senate review be completed as soon as possible.

Thank you in advance for your cooperation.

Sincerely,

A handwritten signature in black ink, appearing to read "Harris A. Lewin".

Harris A. Lewin, Ph.D.

Vice Chancellor for Research

Attachments:

- ITS 5-Year *ad hoc* Review Committee Report
- Dean Curtis's Comments
- Dean Dillard's Comments
- Dean Steven's Comments
- Director Sperling's Comments
- Director Sperling's Supplemental Responses

/cep

Chair Knoesen

May 10, 2016

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c: Associate Vice Chancellor Paul Dodd
Executive Director Nancy Bulger
Research Program Coordinator Christine Parks

INSTITUTE FOR TRANSPORTATION STUDIES 5-Year Organized Research Unit Review

The quality of Organized Research Units (ORUs) of the University of California is assessed at five-year intervals through objective and thorough appraisal of the program and directorship of the unit. The *ad-hoc* review committee nominated by the Davis Division of the Academic Senate and appointed by the Vice Chancellor for Research is pleased to submit this report.

Our goal is to ascertain the extent to which the Institute for Transportation Studies (ITS) has succeeded in achieving its goals, and the general goals of the University, with regard to its original purpose, present functioning, future plans, and continuing development to meet the needs of the field.

ITS was established in 1991 and has become a nationally and internationally-recognized authority on sustainable transportation. Under the continuing guidance of founding director Dan Sperling, ITS has become a leading center of transportation and energy research, and serves as the hub of several highly-focused programs which have been “spun off” by ITS.

The committee visited UC Davis and ITS on February 24 & 25, 2015, meeting with senior university representatives and ITS leadership, faculty, staff and students. Prior to the visit, the committee was provided with documentation including an internal review prepared by the Office of Research and ITS. The committee also created a survey that was completed by ITS and collaborating parties prior to the campus visit. In addition, specific information was requested during the visit, such as ITS faculty publications, and this was received subsequent to the visit.

The committee wishes to acknowledge the valuable assistance received by the leadership and staff of the Office of Research, and of ITS itself. The review process was a stimulating and rewarding experience from the perspective of the committee members.

1. ITS PERFORMANCE REVIEW

Our review consists of examination of ITS’s record of performance in (a) research, (b) teaching, (c) impact on campus, and (d) public service.

A. Performance in Research

The Institute of Transportation Studies at UC Davis has an international reputation for research on sustainable transportation, transportation and energy, transportation and air quality, alternative fuels and vehicles, human behavior and choice-making, land use and transportation, and policy relating to these topics. The Director, Dan Sperling, has an exceptionally high research profile, as do several other Academic Senate and research-track faculty. The Institute is a model for how research can be leveraged to make an impact on policy and industry. The Institute has been steadily

increasing its research funding, along with the number of researchers, publications, and support staff. Most notably, it recently submitted a successful proposal to the U.S. Department of Transportation (USDOT) for a prestigious National University Transportation Center (UTC), on Sustainable Transportation.

ITS has been extremely successful in certain areas and has established sub-centers to attract researchers, students, and projects around these research themes of high impact. These include:

- The National Center for Sustainable Transportation, one of only five national UTCs awarded by the USDOT in the 2013. USDOT awards one multi-year UTC in each of its five focus areas, and we consider this award a major success for ITS-Davis. ITS-Davis is the lead institution in a consortium that includes USC, UC-Riverside, Georgia Tech, and the University of Vermont. The Center is led by Professor Susan Handy, a major asset of ITS. Dr Handy is full professor in Environmental Science and Policy, with an international reputation for work on land use, accessibility, and public transportation, including transit-oriented development (an important concept in public transportation). The Center is focused on reducing greenhouse gas emissions—a broad scope that encompasses many of ITS’s core strengths. We note that this group recently lost Professor Patricia Mokhtarian, who moved to Georgia Tech in 2013. She was associate director of ITS and Director of the Transportation Technology and Policy (TTP) PhD program.
- Sustainable Transportation Energy Pathways (STEPS) is the latest incarnation of ITS’s focus on energy transitions to more sustainable systems. This center’s raison d’etre is a recognition that it’s not enough to develop new and better transportation and energy technologies - that research is needed to understand “how do we get there from here.” Many transportation centers led by engineering programs (the vast majority) tend not to focus on such aspects of transportation. Pathway or transition analysis looks at the interaction of fuel, vehicles, infrastructure, economics, institutions, and policy. Infrastructure analysis covers fuel stations, production facilities, and supply chains. Much of the research revolves around complex engineering-economic models of costs and the incentives needed to make new technologies competitive with existing platforms while the industry learns and grows to a reasonable scale. The strong value proposition of this center is highlighted by the fact that it is supported by 23 partners at \$60K each per year, in the form of unrestricted gifts. These partners are mostly industrial companies in the fuel and vehicle industries but also include some non-profits and government agencies. STEPS is headed by Professor Joan Ogden, a physicist recruited from Princeton who has specialized initially in the transition to hydrogen fuel. While STEPS began as a program focused on hydrogen, we are impressed with the way it has broadened over the years to other energy transitions, such as biofuels and more recently natural gas.

- The Plug-in Hybrid and Electric Vehicle (PH&EV) Research Center has a rapidly ascending profile mirroring (and studying) the significant innovation and market penetration of these vehicles. Because EVs and PHEVs were the first alternative energy vehicles to be commercialized in the recent era, a focus on them can be justified. While this center's mission overlaps potentially with STEPS, it has successfully carved out its own niche focusing on technological, behavioral, environmental, and institutional issues specific to EVs and PHEVs. The interface of these vehicles with the public has been a key area of strength, in terms of purchasing decisions, charging behavior, and trip planning. It is perhaps worth noting that establishment of PH&EV as a center separate from STEPS is a strong move by ITS to maintain its international leadership in alternative fuel transportation across the spectrum of energy types, and electricity is sufficiently different from liquid and gaseous fuels to create its own unique set of issues and merit its own center. It is led ably by Tom Turrentine, with strong contributions also from Ken Kurani; both serve as senior research faculty.
- The China Center for Energy and Transportation has some thematic resemblance to STEPS and the PH&EV Center, but focuses on automotive energy and environmental issues in China. We heard that, despite initial difficulties in gaining traction for this Center, diligent and creative effort to build relationships by Director Yunshi Wang has led to rapid growth in recent years. We see the China Center as a visionary initiative to leverage ITS's research into the world's largest automotive market, largest energy user, and largest emitter of Greenhouse Gas (GHG). The investment in time, money, and leadership effort in getting this center off the ground is paying off. This Center also reflects strongly on ITS Director Dan Sperling's vision of projecting transportation energy and environmental impact onto the biggest possible global stage.

Other areas in which ITS has made important contributions include zero-emission and low-carbon fuel standards and policies, sustainable development in other regions besides the U.S. and China, traffic engineering and intelligent transportation systems, biking, walking, parking, pavement, life-cycle assessment, and oil production. The above four centers, however, clearly comprise the institute's core competencies and are the areas in which ITS-Davis has made the biggest mark.

Many successful university research centers have a clear specialization and niche, rather than simply providing an umbrella under which faculty can follow their own research interests, and ITS-Davis has certainly achieved this. Stepping back and looking at the whole enterprise, the committee is struck by how ITS has leveraged its core strengths in certain areas of transportation and energy, and its location near the state capital of California, to make a disproportionate impact on both transportation research and transportation systems around the world. California is such a large and important economy, and has had such dire air quality problems, that it has led the world in moving towards cleaner cars and stronger air quality controls and dealing

directly with a sprawling, car-oriented land-use and transportation system. ITS's research, with funding from state agencies, has been able to both study and influence this "laboratory," a laboratory that is simply ahead of the game (in "good" and "bad" ways) compared with other regions of the U.S. and the world. By examining California's problems and possible solutions, and subsequently the effects of the implemented innovative solutions, ITS has a unique stance nationally. ITS has turned this into a major advantage over other university transportation centers, and has acted to increase this advantage. Each new initiative—including the China Center and the Policy Institute, seems designed to take advantage of this ability to study, mold, and disseminate the unique California transportation/energy/land-use/air quality laboratory. And because of the size of California's economy, car makers cannot afford to abandon the California automobile market, thus multiplying ITS's impact on technology and policy into a worldwide phenomenon.

At the same time, ITS very much fulfills an important *raison d'être* of independent research centers by being strongly interdisciplinary. Engineers, economists, planners, and geographers work together to do applied, policy-relevant work. Academic Senate faculty collaborate with research faculty and post-docs with specific transportation expertise in a way that combines their collective strengths. Research faculty bring specific research skills, domain knowledge and relationships with key national and international stakeholders; these characteristics of research faculty strongly complement the scholarly interests of Academic Senate faculty.

A primary goal of a university in establishing research centers is to attract research funding in interdisciplinary research areas, including industry funding. ITS-Davis has succeeded in this regard. Funding has grown steadily from less than \$4 million in 2006-07 to \$7.5 million in 2013-2014, reaching \$8 million in 2012-13 and surpassing \$7 million in each of the last four years. Like many other transportation research institutes, growth occurs in spurts and funding opportunities can be cyclical rather than a steady upward trend.

However, "soft money" institutes are highly dependent on overheads (often called "indirect costs" (IDC)) charged by the university on research expenditures (and accepted by sponsors), and on the portion returned to the institute for "core" managerial, administrative and developmental functions. A substantial amount of ITS's research funding, however, is of the low-overhead variety, coming from State of California funding sources for application- or policy-oriented studies. ITS-Davis could do better in seeking out higher-IDC federal funding from NSF, USDOT, and similar sources. The committee feels that ITS should increase its efforts to compete for national Request for Proposals (RFPs) for major projects such as the UTC grant they received for the National Center for Sustainable Transportation. We feel that this change in emphasis is essential in order to increase the "core funding" of the Institute: the ability of ITS-Davis to seed-fund new initiatives at the unit level is currently too weak and fragile.

Despite ITS-Davis's indirect cost weakness, we note exemplary success in attracting corporate, government, and non-profit gift funding. Such partners represent an impressive cross-section of energy and transport companies and institutions. As these gifts are not project-specific and thus unrestricted in their use, this has been an effective way to maintain an application-oriented and policy-oriented research direction. ITS-Davis is much less oriented toward NSF-type high-IDC basic-science projects.

To its credit, ITS-Davis has recently added core functions seen as necessary for leveraging its research into real-world change. These have included an in-house communications department to produce press releases, white papers, and other types of communications designed for different audiences outside of traditional refereed journal articles. It also includes an in-house development office to obtain more gifts. While we see this as a somewhat unconventional way to fund one of the top transportation centers in the U.S., it is very much in keeping with ITS's mission to promote research *and* real-world change in sustainable transportation. However, a better balance is needed. It is highly advantageous for an institute to work with *both* discretionary funding from industry consortia and high-IDC funds from major national sponsors. Discretionary funds provide the cost share often required on large national programs. In other words, industry funds provide important leverage in winning even larger quanta of government funds.

Despite the institute's track record of growing research funding, the committee has some concerns about the reliability of the funding stream and the potential multiplier effect that can work in both directions. To elaborate, a substantial amount of funding has been obtained by post-docs and soft-money research scientists. This is a good thing in many ways, in that young scientists are encouraged and enabled to grow and move from working on more senior scientists' projects to their own. ITS has done a good job of enabling this pathway, and several young researchers expressed their appreciation of this opportunity. However, a downside is that multiplier effects can work in both directions, and if projects dry up for some reason, non-tenure-track scientists could lose their positions, fewer proposals will be generated, support staff could be let go, and the enterprise could spiral in reverse. While we do not view this as likely to happen, there is a risk of supporting such a large center and so many researchers and staff on a project-to-project basis. One important method of amelioration is more core funding based on high-IDC projects and effective leverage of industry consortium funds, as discussed above. Also, centers that rely more on tenure-track faculty are better equipped to ride out such dips. Greater faculty involvement in ITS research and in submitting their research proposals through ITS, as well as more base funding from the university, would provide a further important buffer or insurance for these kinds of ups and downs.

The research sponsors pursued by ITS, along with ITS's vision for global impact, have a direct effect on the types of publications produced. Certainly, ITS stands out from many university transportation centers in its efforts to package research in ways more likely to impact decision-makers in government and industry, in addition to scholarly

books and articles in refereed academic journals. The core faculty have strong records in publishing in prestigious academic journals, and many grad students, post-docs, and research scientists also publish in refereed journals. We were told by some researchers during our site visit that sometimes it is difficult to find the time to convert all of their research reports and white papers into refereed papers. This would be less of an issue if more grants were obtained for doing basic scientific research. We received a few written comments to our surveys to the effect that there is “not enough credit and attention to peer-reviewed publication” and “the support for fundamental and theoretical research is weak.” However, this is an issue endemic to transportation research institutes. We do not see evidence that ITS is under-performing on scholarly research, relative to other transportation institutes. However, it does appear that ITS research faculty publish less than tenured faculty in UC Davis academic units who interact with ITS.

We received mostly positive feedback about research and publishing support. Most ITS members were enthusiastic about the support they get for writing proposals, administering grants, human resources support, and publishing reports and websites. Some faculty based in other units noted the good support and collaboration they got for doing a grant through ITS. However, one comment mentioned “limited staff support for preparing final reports (e.g. editing, formatting, etc.), and limited research infrastructure (e.g. staff to program and administer surveys, etc.).” The committee generally felt that this criticism was in the minority and certain support provided by ITS was evident, but on the lean side. Of course, the ability of ITS to provide such support is a function of the available core funds in the institute. Potential structural solutions to increase such funds are discussed above.

Research scientists (faculty and post-docs) at ITS seem to be hired on a project by project basis, if the required type of researcher is not currently at ITS. This may occur either because they lack an expert in that area or the expert has moved on to a faculty or permanent position elsewhere. Given that researchers hired in this way often stay on at ITS after the project ends, it represents a somewhat *ad-hoc* process of filling out the team. In some ways, the process works well. If the researcher proves themselves and fits well, they may be kept on, but otherwise they are not rehired. In other ways, however, it lacks a strategic long-term plan. The comment in the previous paragraph about a need for a survey research expert is an example of what a more strategic hire to fit a need might look like (we’re not saying this *is* a currently pressing need – but is given as an example). ITS has made a few such strategic hires, such as Amy Jaffe for communication skills and oil industry expertise. The committee feels there may be more opportunities for strategic hiring of researchers who could obtain grants in specific areas.

For future directions, the committee received mixed messages about whether ITS was targeting autonomous vehicles (AVs), which increasingly look like the “next big thing” in transportation. Several researchers said ITS was not getting into AVs, others said they were “thinking” about it, and others implied they were “starting” to investigate AVs. While the technology at the core of the AV movement is not currently one of ITS’s strengths, the committee noted that there is some potential overlap between

AVs and some of ITS's core strengths, such as sustainability and electric vehicles. That is, the wide ramifications of AVs for society and the economy could represent fertile research fields for ITS, even if technological research continues to be off the table. This may be facilitated by the natural connection between automated vehicles, vehicle light-weighting and tailored design, and electrified vehicles.

One written comment noted the need for faculty interested in "qualitative research, urban planning and design, etc." The committee certainly does see that ITS possesses relevant expertise in these areas in the National Center for Sustainable Transportation and the PH&EV Center. Given that UC Davis does not have Planning program, this could be considered as an area for future reinforcement.

A further relevant consideration is the "disruptive" role that Californian companies are playing in the future direction of the automotive industry. With vehicles becoming smarter, more connected, more situation-aware and ultimately more automated, there is likely to be an increasing role for Californian universities in the assessment and deployment of new vehicle capabilities. UC Davis's role in assisting California's industrial competitiveness could well be strengthened by a move by ITS into the automated vehicle space.

B. Performance in Teaching

ITS offers its own interdisciplinary PhD program in Transportation Technology and Policy (TTP), which is very unusual among transportation institutes and distinguishes ITS-Davis from its peer institutes. Because the Environmental Science and Policy (ESP) program does not have its own transportation courses, TTP also fulfills an important need for students in ESP. ITS also fulfills its interdisciplinary education mission through its affiliation with the Mechanical and Aerospace Engineering (MAE) and Civil and Environmental Engineering (CEE) degree programs. With 43 ITS faculty, 30 of whom are members of the TTP graduate group, students have the opportunity to work with many world-leading experts in their fields.

A truly interdisciplinary program, TTP brings together experts in ecology, energy, policy, design, and economics as well as all fields of engineering. Students in those fields work on interdisciplinary research projects with ITS faculty; through ITS, they forge valuable ties with researchers and policy leaders in government and industry. The TTP program is a nexus of industry, government, and academia, and engages students with real-world projects and policy initiatives on the cutting edge of the field.

Support

Importantly, the TTP program offers substantial administrative and financial support for its pre- and post-doctoral graduate students. Students are supported either through paid fellowships or research assistantships. Students who responded to our anonymous survey reported a high degree of satisfaction with the level of assistantship and fellowship funding.

Students are brought onto interdisciplinary research projects very early on in their careers. They quickly develop skills and knowledge of great value to industry and policymakers, allowing ITS to help satisfy demand for well-rounded graduates with practical expertise and

research experience that crosses disciplinary boundaries. However, one researcher noted that insufficient credit is given to ITS researchers who engage students in interdisciplinary projects.

Graduate students also receive financial support for travel to research conferences, with \$700 for domestic and \$900 for international conferences. While unlikely to cover all conference costs, this level of support is substantially larger than that at many departments on campus.

Training

The highly interdisciplinary nature of ITS, coupled with the fact that many ITS faculty have primary appointments in other units on campus, means that graduate education can be somewhat disjointed at times. Disconnects were both perceptual and physical, as the location of ITS in West Village, at some distance from the main campus, was viewed as an obstacle for both students and affiliated faculty. One student reported, *"Can feel a bit disjointed because faculty sit in different departments across campus,"* a comment echoed by that of another student: *"Somewhat disjointed curriculum, especially in the changes after the departure of Pat Mokhtarian. Some classes seem unnecessary or don't fit well."* ITS students remarked that they would like to see more tools courses in traffic engineering, travel demand modeling, spatial analysis, and operations research.

While every graduate program has occasional mismatches between mentors and students, these are magnified at ITS by the inability of research scientists to officially mentor students. This was a common refrain in both students' survey responses and in our conversations during the site visit:

"There is not enough faculty engagement in graduate student mentoring and advising. Even though ITS-Davis has a long list of faculty, there are only very few who actually (can) advise students."

"Basically all of the really smart experts that work at ITS are not professors, and are TOO separated from being able to serve on student committees, which is stupid if I'm trying to get a PhD in a field that has a few key experts."

We also heard comments about a lack of civil engineering transportation classes, especially in traffic engineering, and tools classes (such as spatial analysis and operations research).

Another structural obstacle faced by ITS faculty and students is the limited undergraduate curriculum and the inability of research scientists to teach courses, which has the effect of both restricting educational opportunities for graduate students and reducing graduate students' opportunities to receive funding through teach assistantships. At least one student suggested that ITS *"provide more opportunities for teaching assistantships to fund graduate students."*

Graduate Placement

ITS has a strong record in placing graduates in academic and industry positions. Since 2010, 103 ITS students graduated with MS degrees, most of whom attained positions in industry and secondarily, research institutions, while about 20% of MS graduates went on to pursue a PhD, most often at ITS. Of the 51 PhD graduates since 2010, ten took up postdoctoral positions, typically at UC Davis but also at renowned institutions such as Stanford and Oxford. Nine PhDs attained tenure-track academic positions, and virtually all of the remaining graduates attained positions as research scientists at independent research institutes, government, or industry. Just three candidates had no known employment at the time of this report.

C. Impact on Campus

There is no doubt that ITS is a flagship research program for UC Davis, and generates strong outreach nationally and internationally. We learned that the high profile of ITS, and its director Dan Sperling, is appreciated by multiple UC Davis units, including the School of Management, Ag&ES and Engineering. We commend Dan Sperling's virtually peerless national profile, as evidenced by his chairmanship of the Transportation Research Board's Executive Committee.

An important factor in the high profile of ITS is the strong commitment of ITS faculty and staff, as well as its leadership. The committee met with a significant fraction of the staff, as well as receiving the responses from the questionnaires. The thrust was that they were excited to be part of something important with such high visibility, on the cutting edge of transportation advances, tackling important technical and societal problems, with supportive colleagues. They were aware that their positions were uncertain, and permanent slots rare, and faculty options almost impossible. But their commitment was evident.

The valuable achievements of ITS on behalf of the university cannot be overstated. ITS is the premier national organization for sustainable transportation research. This could not be achieved within the existing departmental structure of the university. Transportation is highly interdisciplinary and requires the focused collaboration that can be achieved in an institute. Transportation also requires a mature consideration of its essentially public-private nature. This is especially true when the industry is being strongly impacted by government action, as is the case for emissions standards, for example. It is hard to imagine meaningful research in sustainable transportation without expertise that understands the public-private tensions, and without multiple disciplines working at close quarters.

The committee is strongly supportive of the unique stature and capabilities of ITS and its impact on numerous campus schools and departments. Its focus on a very specialized and limited set of goals in sustainable transportation and energy efficiency and graduate student education is ideally matched to its ORU structure. This clear sustainable transportation focus is a major factor in the high profiles of the institute and its director, senior leadership and faculty members.

The significant engagement between Academic Senate faculty and ITS, especially providing faculty members with opportunities for building research groups and for highly professional research administration, suggests that the presence of ITS is an attractor for faculty. Similarly, undergraduate activities in mobility provide energy and excitement that is attractive to prospective students. It also appears to us that ITS is a model for other centers and institutes at UC Davis, and such centers generate further layers of positive impact for the campus.

The committee had several occasions to interact directly with students, including a lunch with 5 graduate students. Their comments were unanimous in that it was the existence of ITS and its research staff that strongly influenced their decision to come to UC Davis. In addition, we had the results of the questionnaires, and many of the responses appeared to come from students. These had the same theme about how fortunate they were to be working on important problems with a world-class staff. We also learned that ITS has sponsored programs that attract undergraduates, especially cross-department programs through the associated energy organizations.

We have already observed that ITS experiences the “soft money” financial restrictions that apply to all transportation institutes. The financial resources available to ITS we find to be used very efficiently, which is typical of such enterprises. The one key area where ITS has decided to place additional investment is in research administration. This investment has clearly been successful, and is appreciated by research faculty and Academic Senate faculty alike.

The committee has concerns about the stability of ITS in the medium to long term due to the imbalance between severely limited continuing campus support and large numbers of short term but remunerative contracts and grants. While ITS has done a remarkable job leveraging its funding, and success begets success, potential funding instability is exacerbated by the anomalous position of ITS non-academic senate research scientists of national and even international reputation who act as PI’s on grants via a number of administrative “work arounds”. Funding stability will require the retention of significant numbers of these research scientists.

These issues present a compelling case for increased investment by the university. Additional university funding commitment to ITS would allow it closer campus interactions with additional stable funding. Clearly, freeing up ITS researchers’ time from a constant preoccupation with funding would also allow greater impact by ITS scientists on the educational mission of UC Davis.

We have the impression that ITS’s stated record of attracting external funding to the university is a significant underestimate of total ITS-generated support. There are numerous examples of ITS-initiated projects that are being administered in individual departments. While the Director struggled to quantify these impacts, the committee is of the opinion that it might increase the total ITS-generated funding to the campus by something like 50%.

The question of enhancing ITS's impact on the campus is also tied to the viability of its West Village location. There are obvious benefits from additional research centers with complementary missions locating in West Village, especially those that are already under the ITS administrative umbrella, (e.g., Air Pollution Research Center) but such clustering incurs high West Village rents.

In the committee's view, the continuation of ITS and its leadership should not be in question. Rarely would we see such impact nationally, for the state and for the university, achieved with so little continuing investment. We are impressed with the way ITS has created new centers such as in Policy Institute for Energy, Environment and the Economy (PIEEE) and the Energy Efficiency Center (EEC), and would expect to see more centers created in the future. The clear focus of these centers is exemplary and will bring higher profile results, faster, across the entire field of sustainable transportation.

ITS has a proven record of spinning off research programs that are tangential to its core effort, leading to a cluster of other institutes in West Village, such as PIEE and EEC. The committee appreciated the opportunity to meet at ITS's West Village location and to see the beneficial clustering of ITS and the new centers. The West Village site represents a much larger opportunity for ITS and the university to deploy and demonstrate beneficial systems and technologies. Such deployments will create rapid learning opportunities for students and open innovation opportunities for faculty. The Honda demonstration house could be the first of many such activities. We also expect a highly practical impact on campus transportation systems and mobility.

ITS is a "crown jewel" for UC Davis, and we suggest that the university treat ITS more as a strategic asset. We suggest that ITS is sufficiently valuable to be factored into high-level university conversations and actions at the state and national levels.

D. Public Service

ITS's Director has created a fine track record of agenda-setting in sustainable transportation. ITS-Davis has promoted programs aimed at positive environmental impact for the State of California, the United States and the planet. The strong service orientation shown by ITS is endemic to the organization, as seen in its mission statement:

"To serve the needs of society by organizing and conducting multidisciplinary research on emerging and important transportation issues, disseminating this research through conferences and scholarly publications, and enhancing the quality and breadth of transportation education."

ITS has a culture of engagement and outreach. This is clearly evidenced by its strong orientation towards research dissemination, industry engagement and policy contributions. ITS leadership and researchers regularly contribute to public discourse

on sustainable transportation through workshops and media statements. It is interesting to note that, in the past few years, ITS has been involved in the launch of the PIIEE and has issued white papers and policy briefs, and has strengthened its outreach capabilities. ITS-Davis has an exceptional record of leadership through the Transportation Research Board (TRB) and other prestigious national organizations, keynote addresses and testimony before elected representatives.

2. PROBLEMS, NEEDS & PROSPECTS

A. Problems & Needs

The problems faced by ITS-Davis are similar to those experienced by many cash-strapped transportation institutes. There is an uneasy fit between a “soft-money” research institute populated by research faculty and the university at large driven by tenured academic faculty funded through tuition. Research funding opportunities tend to be cyclical. Individual projects may not allow sufficient discretion to build up thematic research groups with enough scale and ability to develop young researchers. Academic faculty may not see sufficient incentive to collaborate, and may not be willing to accept joint appointments, given the conflicting imperatives of their academic careers.

The committee has identified several areas of concern which may be impeding the growth and influence of ITS. While these issues have not prevented ITS from achieving a high status, attention to these issues could unleash new waves of success, and insure against future “perfect storms”.

Indirect cost return is critical to core institute funding

Among soft-money institutes, ITS receives relatively low return on overheads (often called “indirect costs”, or IDC) charged by the university on research expenditures. A substantial amount of ITS’s research funding is of the low-overhead variety. The portion returned to the institute for “core” managerial, administrative and developmental functions is absolutely critical to the health of the institute. It could be argued that core discretionary funding is the *raison d’être* of an institute. The ability of ITS to seed-fund new initiatives at the unit level is currently too weak and fragile.

This issue also creates a risk multiplier for non-tenure-track scientists and their support staff, where fluctuations in available funding, and inevitable gaps between funded projects, can adversely affect research groups. This creates a risk of ITS losing essential expertise that is difficult to regain.

ITS has experienced a chronic shortage in core funding

Given the importance of a healthy cadre of research faculty to the ITS mission, we were surprised to find that researchers tend to be hired on a project basis, more than conscious expertise-building. The very limited core funding available to ITS throughout its history causes this mind-set. We think it is essential that ITS builds thematic programs that span across multiple generations of projects. The committee feels there may be more opportunities for strategic hiring of researchers who could obtain grants in specific areas.

The committee also wishes to emphasize the destabilizing influence of chronic funding shortages. The committee has concerns about the stability of ITS in the medium to long term due to the imbalance between severely limited continuing campus support and large numbers of short term contracts and grants. This problem is exacerbated by the anomalous

position of renowned ITS research scientists who seem to act as Principal Investigators (PI's) on grants on an exception basis. These issues present a compelling case for increased investment by the university. Additional university funding commitment to ITS would allow it closer campus interactions with additional stable funding.

Institutional and funding issues impede ITS research faculty

The challenges faced by non-tenure-track researchers should not be underestimated. All institutes experience difficulties in hiring and retaining such researchers. The continual need to win and prosecute sponsored projects, while carrying out "unfunded" service and dissemination activities, is not attractive to all qualified candidates. And there are institutional barriers to the very scholarly activities that appeal to many research scientists, such as dissertation advising and teaching. UC Davis could provide greater institutional support to ITS scientists by regularizing teaching and advising appointments and providing a degree of "hard money" support and eventual paths to tenured positions.

This brings us to what we feel is the biggest current challenge to ITS and its mission. ITS rightly places high value on graduate education and took a commendable initiative when it created the interdisciplinary degree program in Transportation Technology and Policy (TTP). This program goes well beyond the efforts of peer institutes. We were therefore disturbed to see disconnects between the rules increasingly enforced by the Academic Senate and the imperatives of an institute like ITS. Such issues are magnified by the inability of research scientists to officially mentor students. We understand that only a few of ITS's highly-qualified faculty are empowered to advise students. This is seen as a significant problem by both students and the research faculty themselves. This problem is exacerbated when Academic Senate faculty involved in ITS and TTP choose not to mentor graduate students.

A related structural obstacle faced by ITS faculty and students is the limited undergraduate curriculum and the inability of research scientists to teach courses, which has the effect of both restricting educational opportunities for graduate students and reducing graduate students' opportunities to receive funding through teaching assistantships. At least one student suggested that ITS "*provide more opportunities for teaching assistantships to fund graduate students.*"

ITS should not under-value scholarly publication

While ITS-Davis does not exhibit an unusually low academic publication rate (relative to other transportation institutes), ITS should be careful of perceptions. ITS's unusually strong efforts with white papers and policy-oriented materials may raise questions about commensurate scholarly efforts. ITS should pay more attention to the underlying logic of more federally-funded basic science projects, higher earned indirects, more scientific findings to report and more time to spend on publications on the world-wide academic record.

ITS may find itself removed from technology that is transforming transportation

ITS has decided to target policy research, and research that plays on the interface between technology (such as electrified vehicles) and policy. However, the rise of advanced vehicle and infrastructure technologies – such as connected and

automated vehicles – raises the possibility that ITS will be too far removed from the major trends affecting consumers as well as policy makers in the coming years. We believe that ITS should specifically include these advanced technologies in strategic planning. ITS should consider whether its recent strategy of spinning off new centers would be a suitable avenue for addressing advanced technology, or the development of new collaborations and partnerships.

An intriguing aspect of the development and use of these technologies in California is the tension between aggressive Silicon Valley moves to driverless vehicles and the restrictions placed on the operation of driverless vehicles in state law. As a key policy advisor to the state, ITS needs to be well equipped to contribute to these debates, especially to the degree that they overlap with ITS's core strengths in transportation energy use, air quality, land use and sustainability.

B. Justification for Continuance

The outside world – peer institutions, governments, industry, scientific organizations and transportation thought leaders – have collectively embraced the existence of ITS-Davis and its many contributions to the sustainability of transportation around the world. Its high esteem is broad and compelling.

Among university transportation institutes, ITS-Davis has a distinct personality and a high reputation. It is among the best of the best, even though direct, objective comparisons are difficult. Transportation has not yet emerged as an academic discipline, and transportation institutes do not fit a mature model. Integration of science, technology, clinical practice/studies, education and research has not yet occurred for transportation, as it has for the field of medicine, for example. Transportation institutes therefore tend to be idiosyncratic, and take time to develop.

The Director's SWOT analysis rightly identifies impressive strengths and exciting opportunities. We would agree that ITS is the premier program in sustainable transportation. And we would agree that many of the difficulties being experienced by ITS are internal to UC Davis. We hope that this report will lead to a positive re-evaluation of ITS's role for good on behalf of the university.

The committee finds that the Director has presented a coherent and well-defined plan for the continued operations of ITS for five years. We would like to see that plan broadened in some respects with respect to the impacts of advanced technologies like automation. However, we find that ITS exhibits an acute sense of the external forces shaping sustainable mobility, as well as the sensibilities and responsibilities of an organization embedded in an academic setting.

We find that ITS has an advanced appreciation of external fundraising and grant writing. For a soft-money institute this is a matter of survival, and ITS has grown and to some extent prospered. ITS has rightly marshaled its limited resources to assist research and tenured faculty alike in the writing of grants and proposals. We would

like to see ITS take a more comprehensive approach to funding opportunities, especially at the federal level.

We find that Indirect Cost (IDC) returns are essential to the identity and health of the institute. The current level of IDC is too low, and both ITS and the university should take action to ensure that IDC returns increase to a more viable level.

We unanimously recommend the continuance of the Institute of Transportation Studies (ITS) at the University of California, Davis.

We take this opportunity to commend the conspicuous service of the founding director, Professor Dan Sperling, and wish him every success with ITS as a continuing Organized Research Unit. We understand that Professor Sperling is available to continue as director, and wish to place it on record that he enjoys the committee's unanimous admiration and support.

C. Committee Recommendations

Plan for Continued Operations

- I. ITS should be approved for continuation as an Organized Research Unit of UC Davis. Given the importance of its mission in sustainable transportation, ITS should be planned, governed and funded over a period of more than five years. We suggest that UC Davis adopt a 2025 perspective of ITS.
- II. Professor Dan Sperling should continue as ITS Director, and the university should support the recruitment and retention of renowned research faculty and collaborating academic faculty for the long-term strategic leadership of ITS.
- III. ITS should continue to pursue its unique California-based strategy for rapid change in transportation sustainability, and to provide a distinctive and compelling voice in national and global sustainability policy.
- IV. ITS should revisit its plan for continued operations, in order to include the impact of advanced mobility technologies such as automation, and new business models such as sharing. ITS should also take a broader view of sponsorship sources, including federal programs operated by departments such as transportation, energy and commerce.

Empowering Research Faculty

- I. UC Davis could provide greater institutional support to ITS research faculty by regularizing teaching and advising appointments and providing a degree of "hard money" support and eventual paths to tenured position.
- II. The university should provide programmatic approvals for qualifying ITS research faculty to advise on dissertations and teach undergraduate courses.

- III. The university should review the attractiveness and effectiveness of graduate studies in transportation, to ensure harmonization of the roles played by ITS faculty and academic faculty in related departments. ITS should be empowered to provide teaching assistantships to graduate students.
- IV. ITS should provide research faculty with support for scholarly publication, and should help position research faculty for national science funding conducive to earning higher “indirects” and worldwide scientific impact.

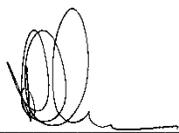
Collaboration with Academic Faculty

- I. ITS should expand support provided to academic faculty, in the writing of grants and proposals for sponsored research.
- II. ITS should continue the successful practice of spinning off adjacent research centers in mobility, environment, business and energy, and engaging more academic faculty as directors of such centers.

Funding & External Fundraising

- I. ITS should expand its portfolio of research sponsors to include sources with higher IDC.
- II. The university should increase the return of IDC to ITS, in order that ITS has a critical mass of core funding. The current IDC return is insufficient for the long-term stability and development of the institute.
- III. The university should provide core funding to ITS for the specific purposes of research administration, communications (as it does for the colleges) and further exploitation of the West Village as an innovative environment.
- IV. The university should allow ITS to participate in fundraising and donor stewardship. ITS should expand its fundraising capabilities.

Report respectfully submitted by:



Peter Sweatman, Chair

1/7/16
Date



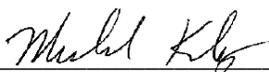
Thomas Cahill

11/20/15
Date



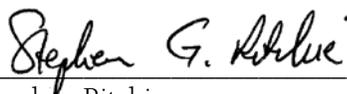
Robert Faris

11/16/15
Date



Michael Kubly

11/18/15
Date



Stephen Ritchie

12/15/15
Date



JENNIFER SINCLAIR CURTIS, DEAN
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February 24, 2016

VICE CHANCELLOR HARRIS LEWIN
Office of Research

RE: Comments on the Institute for Transportation Studies Review

Dear Harris,

Thank you for soliciting my comments on the ORU review of the Institute of Transportation Studies (ITS). Based on the information contained in the review report, I certainly agree with the report's conclusion regarding the continuation of the Center as an ORU at UC Davis and the continuation of its Director Dan Sperling. The exceptionally high research profile of the Center and its impact on policy and industry are extremely commendable and a model for other Centers to follow.

Based on the reading of the review report, I believe two key issues to address are the ability of the Center's research scientists to have the ability to co-advise on dissertations and serve on student dissertation committees (along with an Academic Senate faculty) and participate in teaching. Given the technical expertise that they possess, these research scientists should have some formalized channels/mechanisms for direct interaction with our students. In addition, I believe these research scientists should have the ability to serve as PIs (at least co-PIs) on grants which it sounds like is currently being accomplished via a more circuitous path. All of these would aid in the career development of the research scientists and help them in their future career opportunities. Also, the recommendation regarding adding more research awards with higher IDC to the Center's funding portfolio appears to be a great need for the Center to provide it with a more stable base of funding.

Below are some additional comments based my reading of the review report:

- Frankly, I am not a big fan of graduate students being (solely) supported on a teaching assistantship as, in my experience, it tends to delay the graduation of students and lessen motivation of researchers to seek external student support. If teaching assistantships are to be given to the Center, they should be allocated in such a way that any individual student is only supported by a teaching assistantship for a maximum of a couple of quarters. In this way, the teaching assistantship provides the student the opportunity to engage in teaching activities to assist them in their career development.
- It would have been good to see in this and other Center review reports the extent of co-authored publications and co-PI funding by researchers within the Center which is also another measure of the value-added by the Center and the collaboration within the Center. Perhaps this information was provided by the Center to the review team.
- It would be helpful to include the affiliations of the review team members in the review report. Does the review team consist of internal and external members?

- Is an NSF I/UCRC a possible funding framework for STEPS? This funding mechanism would provide some administrative support and additional possibilities for other NSF support.
- The in-house development team should have some reporting structure to campus development if it is does not already.

Thank you for soliciting my comments and please let me know if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Jennifer Sinclair Curtis". The signature is written in a cursive style and is contained within a thin black rectangular border.

Jennifer Sinclair Curtis
Dean of Engineering



College of Agricultural and Environmental Sciences
Office of the Dean
150 Mrak Hall
One Shields Avenue
Davis, CA 95616
(530) 752-1605

February 16, 2016

CHANCELLOR HARRIS LEWIN

Dear Vice Chancellor Harris Lewin,

I have read through the report and I note that the report is generally very supportive/laudatory. I offer a few of my thoughts below.

Research: The reviewers were highly impressed with the 4 centers and their international reputations as well as those of the center directors. They also singled out the National Center for Sustainable Transportation as a major success of ITS. The reviewers were impressed with the level of overall research support, though they were concerned that too much comes from low IDC sources (state, etc.) and thus the ITS lacks the ICR that can make it more financially stable in the long run. Concerns were expressed that most of the extramural awards are obtained by early-career professional researchers and postdocs, which also can threaten long-term viability of ITS (when accounts expire soft-funded folks often need to move on, taking valuable expertise with them). The reviewers were impressed with the number and quality of research publications, although they would like to see more from the early-career researchers. The reviewers felt that more faculty participation, in addition to increased ICR, would better stabilize the institute.

On teaching, the reviewers expressed strong support for the Transportation Technology and Policy (TTP) Ph.D. Program and its interdisciplinary nature, and were quite impressed with the number of participating faculty as well as the transportation courses they administer. They were also impressed with the financial support offered students (via fellowships and GSRs), and the travel funding available for meeting attendance. However, they were a bit concerned about the disconnected nature of ITS, as faculty and students are often housed in different locations. Also, there was concern expressed that while ITS has a long list of researchers, there are too few faculty to officially mentor students. On the positive, the institute has a strong record of placing graduates in career positions (graduates are well regarded).

On impact on campus, the committee was very impressed with the strong commitment of ITS faculty to the institute, and the committee considers ITS to be the premier national organization for sustainable transportation research..quite a high honor. Graduate student comments to the committee mirrored their assessment, as they indicated that it was the strong reputation of the institute that attracted them to UCD. Beyond campus the committee noted the strong mission of ITS to disseminate research findings to the broader public, with the goal of changing current transportation technologies.

The committee listed a number of specific recommendations, addressing the strengths and needs as touched upon above. I would agree with all of them. My only concern was the recommendation to adopt a 2025 perspective of ITS, which includes funding instead of a 5 year window. I think the world situation is changing much too fast to be bounded by a 10 year agreement and perspective.

It is a strong program, but as with any program there is always room for improvement. On the whole, we should be quite proud of the accomplishments and standing of ITS.

Sincerely,

A handwritten signature in blue ink, appearing to read "Helene R. Dillard".

Helene R. Dillard, Ph.D.
Dean, College of Agricultural and Environmental Sciences
Professor, Plant Pathology

Christine Parks

From: Perry King
Sent: Friday, March 04, 2016 8:33 AM
To: Paul Dodd; Christine Parks; Nancy A Bulger
Subject: FW: REQUEST FOR COMMENTS: ITS Review Committee Report

Please see below.

Perry King
Executive Analyst for
Vice Chancellor – Office of Research
UC Davis
1850 Research Park Drive
Suite 300
Davis, CA 95618
530-754-1025 office
530-304-8137 cell
pking@ucdavis.edu

From: Ann Stevens
Sent: Thursday, March 03, 2016 5:40 PM
To: Perry King
Subject: RE: REQUEST FOR COMMENTS: ITS Review Committee Report

(Please forward to Vice Chancellor Lewin, the following brief comments on the ITS Review Committee Report)

I have read the committee report on the review of ITS. I find the report to be very thorough and largely agree with the conclusions. ITS continues to be a highly successful example of applied research at UC Davis.

My only point of dissent with the report is that I do not see that a strong case has been made for increased hard funding from the University for faculty lines or research administration expenses. Faculty lines seem best left in the schools and colleges and, as the report notes, increased IDC are needed and these could be used to enhance research admin support.

Ann Stevens

From: Perry King
Sent: Thursday, March 03, 2016 3:50 PM
To: Ann Stevens <annstevens@ucdavis.edu>
Cc: James T Kelly <jtkell@ucdavis.edu>; Paul Dodd <pdodd@ucdavis.edu>; Nancy A Bulger <nabulger@ucdavis.edu>; Christine Parks <ceparks@ucdavis.edu>
Subject: RE: REQUEST FOR COMMENTS: ITS Review Committee Report

Hello Dean Stevens, I'm following up on the request below. Will you be providing comments on the ad-hoc review committee's report from the recent 5-year Organized Research Unit (ORU) review of the Institute of Transportation Studies (ITS)?

Perry King
Executive Analyst for
Vice Chancellor – Office of Research

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530-304-8137 cell
pking@ucdavis.edu

From: Perry King
Sent: Monday, January 25, 2016 2:09 PM
To: Ann Stevens (annstevens@ucdavis.edu)
Cc: James T Kelly; Paul Dodd; Nancy A Bulger; Christine Parks
Subject: REQUEST FOR COMMENTS: ITS Review Committee Report

Hello Dean Stevens, attached is a letter from Vice Chancellor Lewin that requests your comments by February 18, 2016 on the *ad-hoc* review committee's report from the recent 5-year Organized Research Unit (ORU) review of the Institute of Transportations Studies (ITS).

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February 2, 2016

RE: Director Comments on External 5 Year Review of ITS

Below are four major findings and recommendations of the external Review that we agree with, followed by a few comments by me regarding campus actions undertaken (or not) since the campus visit by the Review Committee (one year ago) vis-à-vis Review recommendations.

1. ITS is a world class institute

- “It is among the best of the best.” (p.15)
- “ITS is the premier national organization for sustainable transportation research.” (p.9)
- “ITS very much fulfills an important raison d’etre of independent research centers by being strongly interdisciplinary.” (p.4)

2. ITS is a model for others

- “ITS is a model for other centers and institutes at UC Davis, and such centers generate further layers of positive impact for the campus.” (p.10)
- “There is no doubt that ITS is a flagship research program for UC Davis, and generates strong outreach nationally and internationally.” (p.9)

3. ITS should be continued

- “In the committee’s view, the continuation of ITS and its leadership should not be in question. Rarely would we see such impact nationally, for the state and for the university, achieved with so little continuing investment.” (p.11)
- “The valuable achievements of ITS on behalf of the university cannot be overstated.” (p.9)
- “ITS should be approved for continuation as an Organized Research Unit of UC Davis. Given the importance of its mission in sustainable transportation, ITS should be planned, governed and funded over a period of more than five years. We suggest that UC Davis adopt a 2025 perspective of ITS.” (p.16)

4. UC Davis should treat ITS better

- “ITS is a “crown jewel” for UC Davis, and we suggest that the university treat ITS more as a strategic asset.” (p.11)
- “We find that Indirect Cost (IDC) returns are essential to the identity and health of the institute. The current level of IDC is too low, and both ITS and the university should take action to ensure that IDC returns increase to a more viable level.” (p.16)

- “UC Davis could provide greater institutional support to ITS research faculty by regularizing teaching and advising appointments and providing a degree of “hard money” support and eventual paths to tenured position ... The university should provide programmatic approvals for qualifying ITS research faculty to advise on dissertations and teach undergraduate courses.” (p.16)
- “The university should provide core funding to ITS for the specific purposes of research administration, communications (as it does for the colleges)” (p.17)

As far as providing updates regarding campus actions vis-à-vis recommendations by the external Review, we note the following:

- i. The actual percentage of ICR returned was dropped from 25% to 20% by Office of Research this year (since the review took place), which goes in the opposite direction of what the Review recommends. In 2014-15, we generated \$78,000 more in indirect costs than the previous year, but received \$67,000 less because of the change in the formula.
- ii. As recommended by the Review, campus rules were changed so that Professional Researchers could advise on dissertations and independent research. We still seek rules that allow Ph.D. Project Scientists and non-academic Ph.D.’s to also serve in that role.
- iii. We still seek additional funding from the campus to support our fundraising team, which remains largely self-funded unlike almost all other campus units. The campus has invested an inordinate amount of resources into fundraising in recent years, and we desire an appropriation to backfill the costs of our self-paying, and very successful, fundraising operation.

Best regards,



Dan Sperling
Professor and Director

Date: March 16, 2016

To: Harris Lewin, Vice Chancellor for Research

From: Daniel Sperling, Director, Institute of Transportation Studies (ITS-Davis)

Re: Additional information requested from the Academic Senate, Re: ITS ORU review.

What is the total budget for the Institute of Transportation Studies?

There are many ways of accounting for ITS expenses during the period of review. The first chart below breaks the expenses down by year, but does so for ITS only, and does not include an approximate additional \$3-4 million spent annually by ITS-affiliated faculty on transportation-related projects outside of ITS, i.e., via Civil Engineering, Mechanical Engineering, etc. It also doesn't include a large amount of funding administered by the Transportation and Energy Research cluster located in West Village but not explicitly related to ITS, which totaled \$17.8 million in 2013-14. Below is the most narrow accounting of ITS funding by year:

2006-07	\$3,767,815
2007-08	\$4,895,375
2008-09	\$6,453,917
2009-10	\$5,433,206
2010-11	\$7,285,561
2011-12	\$7,248,202
2012-13	\$8,156,707
2013-14	\$7,445,551
Total	\$50,650,964

A second chart below lists expenses by fund source (2006-2014) -- ~ 94% of which comes from extramural funds.

General Funds	\$1,757,745	3.47%
Other University Funds	\$1,134,543	2.24%
Indirect Cost Return	\$973,560	1.92%
UCOP Grants	\$1,200,915	2.37%
Federal	\$5,665,525	11.19%
State	\$19,067,491	37.64%
Gift	\$11,576,647	22.86%
Private	\$6,496,092	12.83%
Foundation	\$2,778,446	5.49%
Total	\$50,650,964	100%

The third chart lists by expense type, the preponderance of which is associated with personnel (salary and benefits).

Category	Percentage
Personnel (Salaries & Benefits)	78.37%
Supplies	16.49%
Travel	3.36%
Equipment	1.78%
Total	100.00%

Long before the concept of “clustering” and “shared services” came into vogue, ITS-Davis and the UC Davis Air Quality Research Center established an agreement in February 2008 to leverage the existing administrative strengths of both units and reducing administrative expenses, including elimination of multiple administrative managers (MSOs). In summer 2010, the Energy Institute was added to this arrangement, and the Policy Institute for Energy, Environment and the Economy came on line in 2012. In addition, during the period of review, the Institute initiated and grew centers and programs from within, utilizing existing administrative staff. Now internally named the “Transportation & Energy Cluster,” the pooled resources of all of the units allow for a strong staff in grant administration, purchasing, fundraising, event coordination, communications, and network operations.

In 2013-14, the salary and benefits of the Cluster’s admin costs were almost \$1.7 million, or about 9.4% of the \$17.8 million spent by the Cluster that year. These costs were borne from 82 separate funding sources (accounts). A breakdown by category is below, but it should be noted that there is a lot of overlap in our operations, i.e., sometimes the “fundraising” work bleeds into “outreach;” “communications” supports “fundraising;” etc. We have since trimmed costs further, moving our payroll operations into the campus’ Shared Service Center, and consolidating our IT into the College of Engineering’s IT services group. These two moves will save approximately \$100,000/year. Below is a breakdown of total non-technical expenses.

Administration	\$686,330.73	40.64%
Fundraising & Fundraising Support	\$550,495.20	32.60%
Communications	\$177,373.76	10.50%
Events	\$77,425.32	4.58%
IT	\$197,159.72	11.67%
Total	\$1,688,784.73	100.00%

If additional support/funding from the central campus is being requested, where would that additional support be used within ITS?

This question was not applicable during our ORU review, but since that time, ITS, on behalf of the Transportation and Energy programs in West Village, led a proposal last spring to combine the Energy Efficiency Center and the Energy Institute into one “Energy” entity. As part of that, an additional request was made for core funding to support the new combined program, as well as our administrative, fundraising, and outreach capacity. The campus appropriated a base budget of \$500,000, which fell well short of our request, but is greatly appreciated. All told, the \$500,000 represents 3% of total cluster expenses, and a little less than 1/3 of our administrative, fundraising, communications, and event management costs, a sliver of which were covered previously by base budget.

What would the effects be on ITS if it were part of a college or school, rather than an ORU?

It would greatly hinder and limit the success of ITS. In the absence of ORU standing, which promotes multi-investigator, multi-disciplinary, cross-campus ventures that departments are not as adept at supporting, some opportunities would continue to be pursued by individual faculty or small teams, while others would cease. Operating as an independent ORU has allowed ITS-Davis to serve as a focus for fragmented research efforts and create a world-class research organization, as well as an administrative home to a number of transportation and energy programs in West Village. The Institute has immeasurably enhanced the depth and breadth of transportation and energy research and graduate education on the Davis campus. It has served as the driving force behind a large number of major cross-department and cross-college initiatives, including:

- Launching one and likely two graduate groups (Transportation Technology and Policy grad group, and Energy Graduate Group)
- Hiring of many Professional Researchers and Project Scientists
- Recruitment of many ladder-rank faculty positions across several different departments
- Award and management of three-year \$13 million National Center for Sustainable Transportation (NCST)
- Creation of 4-year \$8 million Sustainable Transportation Energy Pathways (STEPS) program
- Creation of a series of successful centers and institutes, including the China Center for Energy and Transportation, the Plug-In Hybrid Electric Vehicle Center, Energy Efficiency Center, Western Cooling Efficiency Center, and the Policy Institute for Energy, Environment and Economy.
- Efficiently and effectively managing the Energy Institute and the Air Quality Research Center, which were folded under the ITS umbrella during the great recession -- including helping with fundraising, communications and events.

If ITS were not an ORU and serving as the administrative home for all of these programs, then new “homes” would need to be found for these programs -- and they would undoubtedly not receive the highly focused administrative, communications, fundraising, and events

support that greatly enhances their success and profile. UC Davis researchers are more successful and more impactful because of the services and support received from ITS-Davis.

In sum, we concur with the assessment and four major recommendations of the external committee:

- “ITS is a world class institute”
- “ITS is a model for others”
- “ITS should be continued”
- “UC Davis should treat ITS more as a strategic asset”