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CDEC Assay: How to Assess the Costs & Benefits?

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Preface

In the fall of 1988, I wrote two very detailed four-year reports on CDEC: one, for the Sloan Foundation, detailing the strategy and projects of CDEC's Sloan grant activity; the other, for the administration, detailing measures of CDEC's overall productivity, service and impact on campus, with charts galore. It is timely again to assay CDEC's value to the university, not only to answer the perennial CMU question *What've ya done for us lately?* but also to assess what role, if any, CDEC should have in the university's strategic future.

The university needs to assess CDEC's role and performance with respect to its own larger missions: the creation and dissemination of knowledge; the continual improvement of undergraduate education; and, in its distinctive posture as a technologically advanced university, leadership in guiding technology for the benefit of society and education in the new millenium.

For myself, such an assessment is also timely. It was ten years ago January that I was dragooned into writing the proposal to the Sloan Foundation that eventually generated the half million dollar grant that founded CDEC. Five years prior to that, with a 100K educational development grant unprecedented in the humanities at CMU, I was the first faculty member to develop and deploy innovative computer-based courseware for a full-semester, campus-wide course. As a 15-year veteran of educational innovation on the technological frontier, it's time that I made my own assessment of where we've been and where we might go. I'm interested not only in what the university has gotten for its CDEC dollar, but also in the human costs and moral values at stake; the moral point of view is basic to cost-benefit assessment and to strategic vision.

Re-assessment is also timely because we have a new administration innocent of the plans and pretexts of the past. The future can be regarded anew. But I would hope that the lessons of CDEC's own vision and hard-won experience will be more carefully scrutinized than heretofore.

This assay provides some perspective to help the university assess the strategic roles for technology in education and for CDEC in the university. This is a first draft, a basis for beginning a mutual re-assessment. Let it also serve to put my own unvarnished view of life in the trenches at 'Computer U.' on record. For myself, I would like a reading on whether I have been wasting my time on a dead-end mission, or whether there is reason to continue my own commitment to CDEC and therefore to redeem my personal investment to date.

The Question

CDEC's mission is best stated operationally, in terms of specific activities, their rationale and outcomes. Any simple mission statement is uninformative and ambiguous, eg.: "to improve education -- learning as well as teaching -- through well designed applications of advanced computers and computer-based technology." Whose education? In what fields? At what level? Who exactly are the beneficiaries? What are the specific benefits? How do we know? How are they distributed? By what mechanisms are they purveyed: faculty grants, faculty training, trail-blazing applications, classroom deployment, tool building, curriculum development, educational research? The answer to the latter has been *all of the above,* at one time or another.

Obviously, a half dozen faculty, retooled as educational technologists, are not going to improve higher education across the board all by themselves, even on campus. No matter how versatile, they will not directly benefit all faculty or all students in all disciplines. As a small R&D unit our impact is indeed selective albeit excellent; as a small teaching unit our impact is selective albeit exemplary; and as a very small service unit our impact is selective albeit very dedicated.

But since CDEC is part of a campus-wide service organization, the natural expectation is that our impact should be campus-wide. In a very important sense it is, but not in the sense that there is some direct or felt benefit for everybody, as is the case with the campus network.

CDEC's role as a small quasi-academic unit within a campus service organization has therefore generated a lot of inchoate but palpable unease. The more so because we absorb coveted E&GO support in tight times. As we work for what we believe are important goals, even as we garner national acclaim, we do so under a perpetual cloud of doubt about our net worth. The unresolved doubt is as demoralizing to us as it is dissatisfying to the community at large.

We naturally believe that our mission is indispensable to that of the university and that the vision we provide is indispensable to any strategic vision for the university. We would like to believe that our community and adminstration could come anew to share this perception.

The problem, in principle, is straightforward to resolve: look at our mission, look at our activities, look at our impacts, determine appropriateness of fit with university priorities, determine appropriate success criteria, compare costs with benefits on those criteria, and decide whether CDEC is worth the candle. But to do this systematically would be very costly.

Yet we need to give the issue of CDEC's net worth a hearing, try the facts, weigh the values at stake. No commission, committee, or task force has ever assumed the task of assessing the costs and benefits of CDEC. The Academic Services Advisory Board was in no position to carry out such a task in its brief visit. CDEC received its usual complimentary assessment, without analysis:

> The subcommittee concluded that the education application group was very small but did excellent work. Multimedia in education is an important and expanding tool for instruction and work here should be continued and expanded. [p. 13] . . . . New educational applications and instructional technology development at the Teaching Center [sic] is a major focus of excellence on campus. This is a very small group doing outstanding work. [p. 15]

The fact that we are small and excellent is not news. Nor does it allay doubt about whether CDEC should be supported let alone expanded. My analysis below tries to be more discerning.

Costs

I discuss issues of CDEC's value and impact, and how we might get a handle on them, below; I parse the question of CDEC's benefits in terms that go beyond the slogans and bullet items that constitute our annual reports. But I want first to cut to the bottomline, to begin with the question of fungible cost, one quantity against which to weigh CDEC's benefits.

There are costs to maintaining CDEC and costs to reconfiguring or dismantling CDEC. The question of cost devolves to the marginal cost of maintaining a *center* as opposed to distributing the resources of that center in some other fashion. The larger cost-benefit question then devolves to comparing, speculatively, the cost/benefit of dismembering CDEC against the marginal cost/benefit of pooling our resources in CDEC as at present. The question really becomes one of whether CDEC's human resources should be redeployed, not one of saving money.

We in CDEC are fond of saying that the value of CDEC is hard to quantify, that it must also be assessed in qualitative and operational terms. The cash value of dismantling CDEC might be easier and useful to appraise.

$265K is encumbered by staff under tenure or contract, costs that would in effect be redeployed to other units liable for these staff (Reif, Sherwood, half of Larkin, a quarter of a Burkholder). These costs would not be a cash savings to the university; the staff costs as well as labor would simply be redeployed elsewhere in the university.

My own salary is provided by the applied ethics center (CAAE), not by CDEC. My salary savings to CDEC supports Bend and Cavalier who, on top of many admin and service responsibilities, are the sum total with me and Andersen of CDEC's multimedia team. The express purpose of this leverage arrangement (when my salary line for the CAAE was approved by the old RAB) was to support both multimedia as a CDEC initiative as well as applied ethics education. As a result of my doing double duty directing both synergistic efforts (making applied ethics education the subject of my work in CDEC), the welfare of CDEC and the welfare of the CAAE are tied together like that of Siamese twins; the death of one will prove the death of the other, without careful surgery. In any case, dismembering CDEC will not enrich the university by my salary; it will only disable my multimedia and applied ethics work and redeploy my labor.

$207K is encumbered by whatever moral commitment underlies any staff lines, unless the university wished simply to breach this commitment and dismiss these staff. These staff (Andersen, Bend, Cavalier, Chabay) would otherwise be redeployed, netting no cash savings.

The balance of $150K includes a secretary, a programmer, and an operating budget. Units that would be absorbing the redeployed staff, including Psychology and H&SS, could be expected to vie vigorously for a pro-rata portion of these spoils for the staff they must then absorb.

But $150K could be construed as the net cash savings to the university of dismantling CDEC. This is also one measure of the marginal cost of maintaining rather than dismembering CDEC.

The non-fungible costs of dismantling CDEC, like the value of CDEC under the current arrangement, is less quantifiable and even intangible. There's the usual downside of dismantling any established operation: bad faith, bad blood, bad press, plus the loss of our innovative courses (but these would be replaced by other more standard teaching assignments of the redeployed staff), and the loss of the multimedia work that would no longer be viable.

With the loss of CDEC's infrastructure, the ethics center would lose a lot of its *raison d'etre* and morale as well as the wherewithall to maintain operations (unless H&SS claimed some of the spoils to continue its support). The most visible loss would be in multimedia, a staple of the ethics center's work; also palpable would be the loss of CDEC's concerted leadership, campus collaboration, and the good will of those who provide it.

Then there is the loss of the projects leveraged off CDEC's base, conducted by the ten Pi's who work on spec and soft monies and, though unsalaried by the university, provide several innovative courses and teaching services.

Additionally, there are the future opportunity costs represented by three currently pending grants that are predicated on CDEC's duration and reputation, not including the university's bid for an endowed Markle Foundation chair in Media, Education, & Policy (regarding which we are meeting with Markle's president in May).

This is one instructive way to put the question "Why continue support for CDEC?" Alternative questions are: "Should support for CDEC be diminished in some area?" or "What more should CDEC be doing?" or "What should it be doing differently?" or "Might it be reconfigured into new groups?" I try to provide analysis and perspective for addressing these questions, below.

Benefits

I have written and distributed reports itemizing CDEC's projects, service activities, awards, and publications until I'm blue in the face. Whether it's an annualized review, a white paper, or a detailed four-year report, my perception is that nobody seems to read these bureaucratic documents. Yet, information on what we do and to what effect is indispensable to decisionmaking about either CDEC's fate or the long-term strategy of the university.

So, rather than simply itemizing achievements, I will try to be more analytical in assessing CDEC's benefits.

First, let me directly address some background issues, beginning with a plaguing myth.

Why is the university supporting a research group on E&GO?

Several answers.

First, it is simply false that CDEC is a research group supported by E&GO, if that means that CDEC's hard-monied staff exclusively or mainly do research unlike regular faculty in the departments. CDEC's effort allocation, measured in dollars, is at least 60% dedicated to university and educational services, certainly a ratio to rival any academic department where tenure-line faculty are expected to devote 50% effort to research and professional eminence. Measured in hours, time on task, CDEC's service component is far higher: (1) because many of us spend an unreasonable proportion of our salaried *and* personal time on university service and (2) because CDEC's soft-monied personnel also provide service, including teaching, not covered by E&GO. In terms of hours dedicated to campus service, CDEC would rival any among our academic departments. (I shall be much more specific below.)

Moreover, CDEC's research is *applied* research, research applied directly to our educational activities and teaching on campus. There is no published research by CDEC staff that does not have direct application, that is not directly applied to what we do in our classrooms.

It's interesting that when what we in CDEC do in the way of applied research is adjudged for promotion purposes on the academic side it has been classified under "teaching/educational service," but when it is perceived on the academic services side it is classified as "research" simpliciter. Dickering about classification will not help us appraise what it is in fact that we in CDEC do, in general or for the university. But this much needs to be made perfectly clear: By no definition and by no measure is CDEC just a research group uniquely privileged to be supported by E&GO.

Students at the *Tartan* did a telling story on CDEC a few years ago. It was motivated by curiousity. They read our reports and interviewed us and proclaimed in their headline: "Center Dedicated to Research for Students." The reporter who interviewed me expressed amazement that any research -- that important enterprise to which students feel they take a decided back seat -- would be motivated and expressly dedicated to their benefit.

In short, CDEC's applied research pays direct dividends to students on our campus as well as to educational innovation nationwide. These dividends are not paid to each and every student on campus in equal share, any more than the offerings of any department are. But the students got the point. Even CDEC's applied research is in the service of education. It is also in the service of the university's need to understand the import of new technology for education and to have some in-house expertise on same. But the bottomline is that, in either time or dollars, CDEC spends more than its fair share in educational and campus service.

Why this myth adds insult to injury.

The *myth* is that CDEC is a research group specially privileged by E&GO funding, unfairly benefitted compared to other regular faculty. The *injury* is to CDEC's reputation occasioned by the skepticism not to say resentment engendered among our faculty and administration thereby, and the consequent prejudicing of our case for university support. The *insult* is the implication that we are somehow not pulling our fair share of weight in university service.

Lacking time or space to detail the case loads of my colleagues, I will speak for myself, as one case in point. I am perhaps the most belligerent case, because as CDEC's Director I have paid a high price to gainsay this myth and to meet our service obligations; because, therefore, I am personally offended by the suggestion that we are a specially privileged research group.

I decided to accept the position of CDEC Executive Director in January 1985, in spite of having just received a 1.5-year sabbatical in the new Philosophy Department. The theory was that I would be half-time in CDEC and half-time on sabbatical and grants for three years. A bad deal. The job to be done in CDEC amidst the paroxysm of hubris known as the Andrew Project was of impossible proportions. My sabbatical and grant release time was simply sacrificed to the cause. The overload of trying to acquit my grant duties or research projects on top of the overwhelming CDEC workload put me in harness 90 hours a week. The effort triggered the onset of Post Polio Syndrome at that time and permanent new paralysis and disabilities in the spring semesters of 1985 and 1986. This condition worsens and threatens me with the loss of my one good arm and legs, which as a result can no longer support exercise as a stress outlet.

In the turbulent wake of Andrew, periodic changes in adminstration and reorganizations, and the press of technological change, crying needs and shortfalls on campus, the last seven years up to the present moment have been unspeakably hellacious. I have dedicated my entire life for seven years to make good on CMU's ambitions and technology's promise to improve education. Besides covering five of those seven years of service with grant monies or sabbatical time, I have expended all my salaried time on administrative and service activities. My own research, development, and professional work have come out of my own hide, reducing my personal and family time to a few precisely scheduled, niggardly hours a week. I have taken no vacation time; my surrogate has been professional development and conference activities. On a few occasions I actually managed to plan vacations, only to have them countermanded by institutional crises. I work all but five days a year, every weekend, 80- to 90-hour weeks. I've tried every trick in the book to alleviate this abysmal situation, but it's just been *one damn thing after another.*

In short, by no conceivable accounting have I enjoyed any research rewards on salaried time; my own research has been relegated to an after-hours hobby, at the expense of my family life.

The convenient theory with which folk would like to explain this over-commitment away as some kind of personal aberration has been that I must just enjoy the self-abuse of overweening ambition. Well, in fact, I detest it. My explanation, which I could document at length, is quite different. As a line officer on the front lines, I see the problems realistically and daily, up close. I am also dedicated to decent security and working conditions for the personnel under my aegis. I cannot take leave of these responsibilities and I will not simply disavow my own work, without which I could not provide the substantive and intellectual leadership an operation like CDEC requires. I account my overwork to the unrealistic expectations of our community, unrealistically appraised problems, and a chronically unstable/changing political environment in which the need to defend CDEC and the cause of education requires the vigilance of a commander under siege. Indeed, the state of affairs in the trenches where I have worked these many years is better described by the metaphors of war than those of the groves of academe. For example, the Zulu wars are an apt metaphor for the Andrew Project, unseemly in human and moral costs; but ultimately the gold mines were captured for the glory and benefit of a few.

CDEC is, in effect, a scout patrol trying to do the work of an expeditionary force. CDEC's most indispensable service, in fact, is scouting and providing the best intelligence available on what in fact it takes to "improve education" by harnessing technology. We do this in the lab and we do it in the classroom. It is a point of ceaseless amazement to me that a university so eminent in myriad empirical and analytical sciences has not applied the same scientific savvy to appraising the challenges of educational technology. We have in the past been driven by grand if inchoate visions, speculations, wishful thinking, and a preoccupation with hardware; CDEC's mission is precisely to do better than this, standing ready to inform planning should planning ever substantially supplant short-term crises and gratification as the animus of the campus. Vision we have; but, more than this, we work hard at the hard implemention and evaluation without which visions of sugarplums are childish ingulgence.

To help get CDEC's job done, I have worked hellaciously hard to stretch the resources of our small group to provide exemplary impact and well-targeted service on campus as well as national visibility. It is the undue pressure to assuage the myriad appetites, threats and headaches that beset our university that keeps me at the helm for unconscionable hours. I not only do not enjoy a luxurious research life on the university's dime, conducting my own work on my own time; I'm in wretched health and just plain don't have a life. So it is that the myth of CDEC as a privileged research group adds insult to injury.

What, then, are the service dimensions of CDEC?

All right, already; what then does all this purported service effort come to? Obviously, it is not highly visible, else we would not be living under a perpetual cloud of doubt.

Improving Undergraduate Education: Teaching & Curricular Innovations

The university supports 4.75 research faculty in CDEC; counting myself (whose salary line is in the ethics center) and rounding off, call it six research faculty, three of whom are tenured (in Philosophy, Psychology, and Physics) and one of whom is on a Distinguished Service Professor contract. With this stable faculty base and three technical/admin support staff, we leverage another 10 PI's on soft monies (excluding our visiting faculty on Fulbrights and their own sabbatical grants). This crew provides the university with a dozen innovative courses a year. These courses are only one component of our university service, but they are units of service that the university economy understands. The mission of these courses is precisely to test innovations, not just to field needed courses but to find better ways to teach, to invent and deploy better strategies for learning, and to do so in ways that receive national recognition if not acclaim (where national recognition is as essential to validating educational innovation as it is to research). As a result, these courses are highly labor-intensive, well beyond the norm, by an estimable factor of four.

One such course is the Electricity and Magnetism course in the required Physics sequence, which is taught by the team of Sherwood and Chabay and a non-CDEC physics professor both fall and spring semesters to enrollments of 200 to 300 students. Not only is every aspect and assignment of this course under continual refinement, but it serves as a model for a national project to reform undergraduate physics education, it is supported by an NSF grant which received A and A+ ratings from all ten external reviewers, and it deploys CDEC software programs which won first prize in the national physics software competition two years running.

This course is a paradigm of how CDEC-generated courses combine research applied to educational innovation of national acclaim in a very labor-intensive fashion. Sherwood and Chabay annually expend time and effort on this course equivalent to any four average courses; the course itself and the research and development activities that feed into it are their life. Most faculty could not *and should not* expend this kind of resource on a single course; but most courses are not vehicles for a national program of educational reform. And, if we are ever to be serious about improving undergraduate education in radical and robust ways, *some* faculty *must* be licensed to give teaching and curricular innovation this kind of rigorous attention, which means taking it as seriously as any research. Indeed, we need more *research* like that of Larkin and Reif that makes learning itself an important research priority, to provide as rigorous and reliable a scientific basis for educational improvement as we do for sending payloads into space. This is what the national rhetoric proclaims, but this is what CDEC *does.*

Improving Undergraduate Education: Faculty Collaboration & Consulting

Making a priority of radical and robust improvements to undergraduate education, undergirded and guided by serious research, means that not all, but *some* faculty must be willing and enabled to subsume their research careers under its cause, in labor-intensive ways.

This is what CDEC faculty do. Other departmental faculty are needed to do likewise. This is what CDEC is prepared to help them to do; and these are the client faculty on whom CDEC expends a large allocation of its campus service energies. But somebody, namely CDEC, needs to lead the way, to blaze the trail, to learn the hard way through singular dedication to the cause, in order to make it easier for other faculty to follow.

CDEC works with such faculty. The faculty we work with are ones who are ready and able to put their shoulders to the wheel and who will match our helpful efforts with their own dedicated initiative. We do not do the research and development work for these faculty; we cannot. Nor do we evangelize and try to recruit unwitting faculty to the cause. We work with faculty who have already made a decision to dedicate their efforts to innovation. We work with faculty across all colleges and schools, but our most concerted efforts are of course and perforce with faculty in disciplines close to our own. For example, I work closely with Richard Young and David Kaufer in English and Lynn Holden in CFA. But I also consult with and give seminars attended by faculty from GSIA, CIT, MCS, and SCS/SEI. This diffusion of energy and impact brings me to . . .

Improving Undergraduate Education: CDEC Diffusion Models

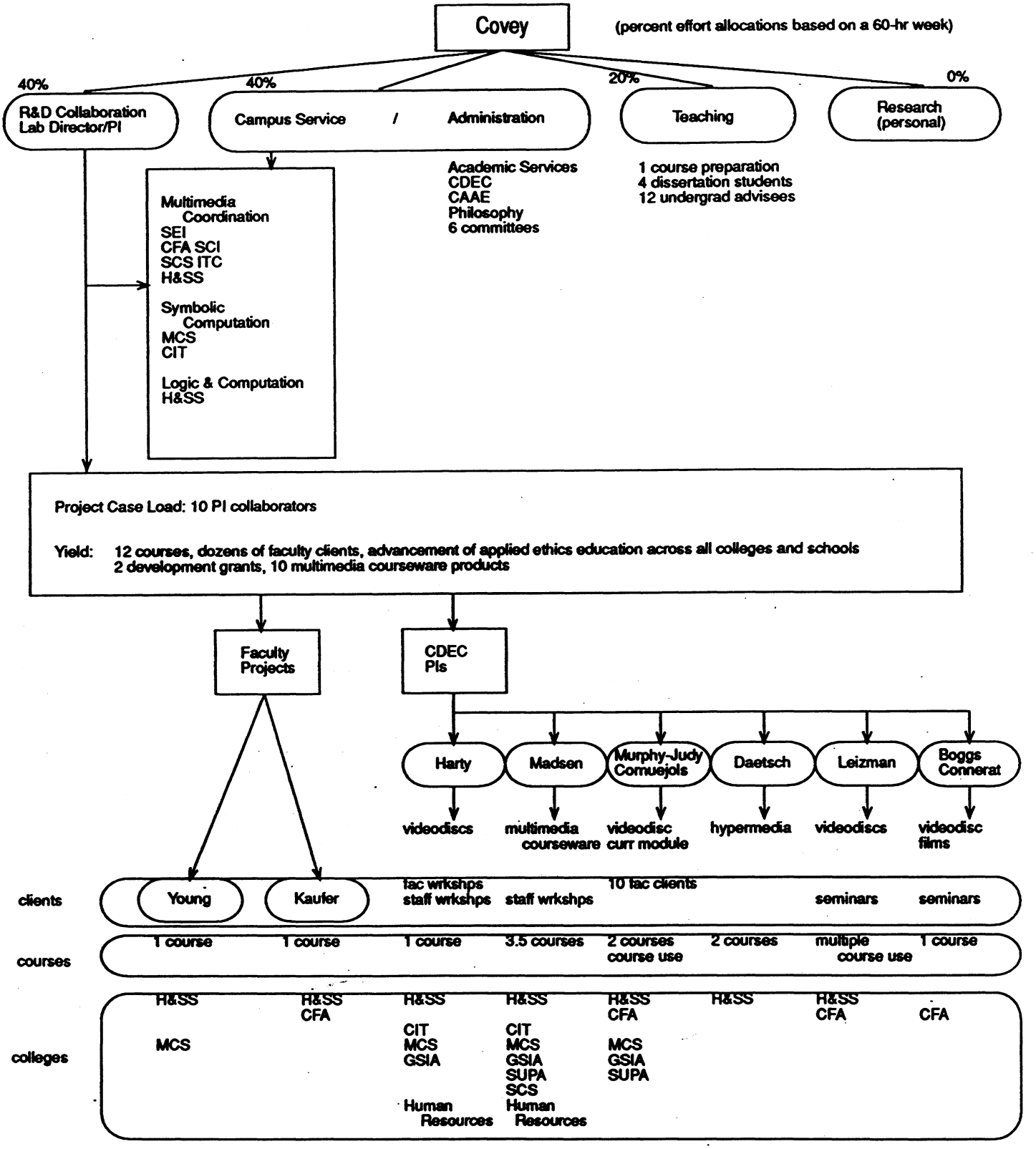
Among us, we serve faculty in all colleges and schools, but our efforts are meant to be exemplary, not comprehensive. We work with a strategic sample of generic and disciplinary innovation, not equally or even equitably with every department; this would be impossible and feckless for such a small group. However, we *do* develop generic tools and applications that apply equally and equitably across all disciplines. Prime examples are our multimedia and course processing tools and applications; the historic example is the cT programming language.

cT is not intended and was not developed to compete with wide-market commercial programming tools; it *could* have such a market, but CDEC lacks the marketing and support staff for such an enterprise. Commercially cT is a modest enterprise, catching on slowly but surely in a grassroots fashion, with strong professional reviews and press. But cT is a tool for helping our faculty to accomplish more easily or more effectively what they cannot accomplish with other commercial tools, especially with the advent of "multimedia" technology. The cT story and strategy would require a report in its own right, but the point here is that cT is one exemplary CDEC tool with wide application with which we can *and do* assist work in all disciplines.

The point is that CDEC's utility and impact on campus cannot be measured alone by counting gross units such as courses taught or tools and applications deployed in non-CDEC courses. I append below an example of what I call a "diffusion model" for representing CDEC's effort allocation and the levels, kinds, and distribution of impact that CDEC works for. I take myself as the example. Similar models could be constructed for everyone in CDEC; they would have different shapes and concentrations. I offer this as a mere example of one way to get a handle on how CDEC benefits our community. It is not the only way and it says nothing about our national impact or research profile.

Taking myself as the example, the model represents my effort allocation and the levels and distribution of my work. For example, I work to support on soft money and collaborate closely with several CDEC Pi's. Our joint work and their own work results in seminars for faculty, technological products for the classroom, innovative courses or innovative deployment of their technological products in others' classrooms. This activity diffuses use of the technology and educational innovation, in each case, into a number of disciplines and colleges. My example:

CDEC Diffusion Model



Note: I directly support and work with a case load of faculty projects on campus and PI's on soft money within CDEC. This work in turn generates innovative courses, innovations with established courses, faculty/staff workshops, and university seminars which serve a very wide base of faculty, staff and students across all colleges and schools. The subject matter of these projects happens to be applied ethics and values; but this is a subject matter in need of attention and very relevant across all colleges and schools. By no measure is there room for my own research on a salaried 60-hr week, so this comes as a free good out of my personal time.

RD&D = applied research, development, and deployment

I want to add some illustration and detail to my rough diffusion model, because this is one way to try to quantify the assessment of CDEC's impact and because this illustrates a priority strategy for campus impact in 1992 and future. The model, simply put, is: I work with and support the PI on the project and the PI impacts a generation of faculty some of whom in turn will adopt the project's technology or strategy and impact other generations of faculty in turn. This cycle is repeated semesterly or annually, so that there is always a new generation of faculty that receive direct hands-on impact. Over time, this diffusion model integrates the educational technology at the grass roots of faculty participation and adoption. A key to this diffusion strategy is selection of topical material and methodologies that have high potential for import into a wide variety of disciplinary, curricular *and extra-curricular* settings. Cavalier's "course processing" model is the well known case (see appended *EDUCOM Review,* March 4 '92). Three new cases in point:

Murphy-Judy:

Murphy-Judy this year developed a videodisc database of international advertisements on a variety of topics from sex and gender issues to public health care and AIDS. She deploys the videodisc to help students critically explore cultural diversity and their own tacit cultural values through these cultural artifacts (the educational project) and to provide a window on how students respond to and process these differences (the research project). She has received invitations and funding to present her research and videodisc at several professional and international conferences regarding cultural and language studies; GSIA's Carnegie Bosch Institute may fund an educational program predicated on her multimedia work and research.

She is right now taking this videodisc into ten classrooms in ten different courses, by faculty invitation, in H&SS, MCS, GSIA, CFA, and SUPA. This videodisc is another example (like *A Right to Die?*) of the CDEC strategy that an instructional resource can support innovative curricular modules in many different disciplinary and curricular settings. Like the other cases below, it also address the Commission on Undergraduate Education's priority on developing mechanisms and resources to support *extra*-curricular educational opportunities. She will import her educational module, tailored to the curricular program of these different courses, thereby demonstrating to the willing faculty in those courses how they can integrate her videodisc resource and learning strategies into their teaching in future. This disseminates the technology, awareness of new possibilities with the technology, and educational innovation.

Madsen:

Madsen, by living and developing his applied ethics curricula within CDEC and working with me, has developed a multimedia package and strategy for teaching professional ethics both in a "classroom without walls" format and in "distance learning" programs (at Penn State and the University of Southern Florida, which have huge distance-learning enrollments and degree programs). Funded by the Florida Endowment for the Humanities and matching grants, with Research Associate Robert Mertzman, Madsen co-organized a national conference for the fall of 1991, *Doing the Right Thing: Revolutions in Professional Ethics,* held in Tampa, Florida, with Governor Chiles of Florida as the keynote speaker. The Tampa PBS affiliate videotaped the proceedings for a three-part national PBS broadcast. Madsen and Mertzman have now developed for publication instructional video material and study guides for a 14-week multimedia survey course for distance learning programs entitled *Ethical Issues in Professional Life.* They are pursuing funding to develop topical video material for specific professions in more depth.

Madsen will revamp his Professional Ethics course next fall as a self-paced course using this courseware. This courseware is a prime candidate for the collaborative SEI/ITC team to be led by Scott Stevens to develop a digital multimedia package as a proof of concept of Raj Reddi's "Just in Time Learning" concept -- because the curriculum and video of a full-blown 14-part semester course are already produced and will be classroom tested next fall. As either a standard multimedia package or as a digital multimedia package proffered in a self-paced schedule on the distance-learning model, the courseware will allow many more CMU students to take a Professional Ethics course. (This gets around the scheduling problem so many students complain about: their required course schedules presently don't allow them to take such courses at the rigid and arbitrary hours at which they are presently scheduled.) This will make possible a bold experiment in flex-time education as well as provide a stand-alone resource for extra-curricular education. But the 14-part package is modularized so that relevant stand-alone modules can be imported into IM, SDS, engineering, and science courses, making it much easier for more faculty to do what a few enterprising faculty like Jim Hoburg and EPP do now: import cogent ethics modules into their professional courses and programs. This is a dissemination and diffusion design that will allow more students exposure to ethics outside curricular constraints and more faculty to integrate ethics into courses in more disciplines.

Harty:

I am co-principal with Martha Harty on interactive multimedia courseware to teach conflict management and dispute resolution skills, specifically addressing diversity issues which plague college and university campuses. This is an example of the CDEC principle that the content of practical multimedia courseware answer to professional practitioner standards: Harty is a certified mediator and mediation trainer. She has taught dispute resolution for CMU staff under the auspices of Barbara Smith, Director of Human Resources. We were invited to submit a final proposal to FIPSE for a 2.5-year grant. The project is to develop multimedia courseware that would support dispute resolution training for faculty, counselors, staff, and students in formats ranging from three-hour workshops to three-day workshops to a full semester academic course in which dispute resolution is taught in the wider context of the study of conflict and diversity issues. The dissemination and diffusion plan, as regards campus, is manifold, again supporting both curricular and extra-curricular impacts:

- A Freshman Seminar co-taught by Harty and myself in *Conflict, Culture, & Dispute Resolution* beginning next fall and continuing annually as a Philosophy Department course; this will be the alpha-test, beta-test, and academic deployment vehicle for the multimedia courseware. We have a stellar advisory board from Harvard University's Negotiation Project.

- Importing short-course versions of the program into courses, in the manner of Murphy-Judy's project (identifying faculty clients through a survey, part of the project's dissemination plan). We will work closely with the new Role Model and the Minority Studies programs.

- Offering faculty training workshops for faculty who would like to tailor use of the multimedia materials to their own curricula. (The same as Madsen will do, above.)

- Offering extra-curricular student workshops and staff workshops using the multimedia materials, as a pilot effort in Barbara Smith's Human Resources plan to develop diversity training for the university community.

- Offering same to the Human Resources counseling staff.

Improving Undergraduate Education: Grassroots versus Blitzkrieg Models

A final brief word on overall strategy.

There are various approaches to going about improving undergraduate education, both curricular and extra-curricular. I talked about three models, and their combination, in my 1988 report on the Universitiy Studies (aka University Core) project when I was an erstwhile Vice Provost for same: top-down, bottom-up, middle-out.

The University Core project was a top-down approach on a blitzkrieg model. Trouble was, it didn't have the machinery for a blitzkrieg. So I turned it into a bottom-up, grassroots project renamed University Studies.

The Andrew Project was another top-down blitzkrieg project that had the top-down impetus *and* the machinery to pull off the *blitz;* for those of us who served under this project, it felt indeed like a *krieg.* Indeed, the hubris of the Andrew Project was to "revolutionize" education by storm, by force of technology. In this respect, it was a dismal failure; that failure of hype and expectation is responsible for untold skepticism and distrust on campus as regards the legitimate promise of technology to help us improve education. If there's a line to testify against this vainglorious enterprise, let me be first in line. (This is not to detract from the genuine and multiple gains of the Andrew Project, not the least of which is our world-class distributed computing network.)

The point of these thumbnail history lessons is that blitzkrieg is often a benighted approach. Whether part of a mixed top-down/bottom-up strategy or not, there is an alternative, whose results can be equally radical (or not, as appropriate) but less noxious, more systemic and robust: a grassroots approach. This is CDEC's overall approach, as illustrated selectively above.

An example of the yield or impact of this approach, where modest resources were applied with sensible designs, is the Writing Across the Curriculum project of old. As part of the Core project, WAC also began as an expensive, unaffordable, ill-considered blitzkrieg, and fizzled out accordingly (as I detailed in my 1988 University Studies report). Richard Young and I turned this effort into a targeted grassroots project, on the model of current CDEC projects. One paradigmatic result is the stellar and nationally recognized success of integrating writing into disciplinary teaching (eg. Linda Kaufman's biology lab course). The net result of our grassroots projects is that their robustness, duration, and success do not depend on expensive interventions from without (by the likes of Richard Young and myself); rather, they depend on close collaboration, incremental progress, and innovation taking root in the professional practice of the faculty (like Linda Kaufman, with others learning from and applying her example).

The grassroots approach harks to an organic, evolutionary model of change or reform, not a martial one. It does not grab wholesale glory and headlines in quick time, like the Gulf War; it evolves (more slowly, less dramatically), with lasting and significant qualitative improvement.

One value of CDEC is that we know something about this process as regards the so-called "revolution" that technology promised, falsely, for education; and we've have had documentable success with a more modest approach. Improving undergraduate education is more like curing cancer than a blitzkrieg. This is one reason that CDEC's work is less visible than it might be; we work close to the ground, at a level of detail that makes progress but not good theater. in due time, we also make headlines (cf. *Chronicle of Higher Education,* March 4 '92).