

ENVOI

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Vision, strategies, tactics, and operating details have been presented in abundance in these 11 chapters. Above all, remember these three points:

1. This is a premier model.
2. The variables critical to success are known.
3. The NSF three-stage screening process must be successfully completed before you are on your way to building and managing an NSF-I/UCRC.

THIS IS A PREMIER MODEL

The NSF/I/UCRC model works. These centers produce trained, educated student scientists and basic, precompetitive research. Center research has intrinsic merit evidenced by companies investing their money in new research activities for their own strategic and tactical needs. Each dollar of I/UCRC funds triggers \$1.50 to \$7 of company research activity. R&D dollar multipliers of 1.5, 1.7, and, at one center, 7.0 are common. This is a remarkable return on basic research investments.

Further, pooling of all monies and company and faculty collaboration to co-design, co-develop, and co-manage precompetitive research projects leverages IAB membership fees by 10, 15, 30, or more times.

VARIABLES CRITICAL TO SUCCESS ARE KNOWN

Precompetitive, interdisciplinary research of intrinsic merit is the kind of research universities perform. Industry competitors are more likely to share their expertise and pool their funding for these kinds of non-competitive projects.

A Center Director held in esteem by scientific colleagues who has entrepreneurial skill, is persistent, and is trusted, will excel.

I/UCRC structure, organization, and management stimulate interactive collaboration and initiation of center research and policies. Other knowns include composition, function, and fees of the IAB; minimum critical mass of \$300,000; patents and procedures; awareness of public law 98-620 "march in rights;" university cost-sharing; publication delay; semi-annual IAB meetings; and evaluators and evaluation.

Recruiting and sustaining members are critical to the vitality of a center. Up to 70 percent of a Center Director's time is spent on marketing the I/UCRC to companies, faculty, students, administrators, federal and state legislators, and anyone else who can provide significant R&D dollar leveraging and high R&D dollar multipliers.

I/UCRC's organization structure, management protocols, policies, and reports stimulate knowledge exchange between faculty and companies and among companies. More importantly, knowledge and technology transfer between faculty and companies is accelerated.

One-on-one contacts, IAB meetings, poster sessions, evaluation surveys, LIFE forms, center coffee breaks, and social functions foster feedback and exchange of ideas with researchers and the center leadership.

Knowledge transfer begins when an IAB member collaborates with faculty. IAB representatives contact individual researchers, track research progress, use LIFE forms, offer suggestions, material, equipment and special instrumentation. They also take advantage of on-site visits, and one-on-one discussions during the two day IAB meetings. Center members get early diffusion of new precompetitive research knowledge, technology, and artifacts long before they appear in journal articles or published proceedings.

Making certain that the value of the research knowledge reaches those who can authorize the steps necessary to transform center precompetitive knowledge into a form which can then be made to fit a company's particular strategic and tactical needs is the ultimate challenge of knowledge transfer.

The director must manage the entire I/UCRC organization so that the promise of its prospectus is fulfilled. New formal and informal information systems covering all center activities must be tailor-made to fit the I/UCRC non-hierarchical, boundary-less organization and then be dovetailed into the university, member companies, and NSF information systems.

The center and the university information system should be sensitive and responsive to rates of change. The center must generate periodic comparative analyses of activities. Operating, accounting, budget and progress reports which are 60, 90, 120 days after the fact are not much help in taking on-line corrective action.

I/UCRC evaluator reports and variance analyses provide a broad scan of all center activities. Variance signals situations which must be examined further. Causes, consequences, and the effect of various alternative solutions must be gauged before appropriate action.

Control by fear alienates. Incentives are better but lean in a university setting. The best control is to have people in I/UCRCs who understand center values, share them, and commit to them emotionally to do the right thing in an ethical, timely, cost-effective way.

A Center Director has two primary responsibilities: to improve constantly the asset base and research productivity of the center, and to put in place plans and programs of industrial relevance which provide quantum jumps in the asset base, and in research output of intrinsic merit.

Said the Red Queen to Alice, "You have to run faster and faster just to stay in the same place," which is very relevant for I/UCRCs. For instance, student researchers will graduate. New outstanding students must be recruited. Outstanding faculty retire or may be hired away. They must be replaced. Companies withdraw from the center. New members must be recruited.

Intensive recruiting, integration of research and diversification of research are some strategies. Tying research programs with other centers, other agencies, i.e., national laboratories, ARPA, and building multi-site I/UCRCs, are others. Let there be enough ambiguity in structure, protocols, and strategic planning to stimulate persistent, dynamic growth.

THE NSF I/UCRC SCREENING PROCESS

The ideas presented in this handbook really do work. I/UCRCs can be adapted to fit other models and the local situation and terrain. I/UCRCs work in the U.S. and overseas. In February 1997, QUESTOR Centre at Queens University, Belfast, Northern Ireland,

was awarded the Queen's Anniversary Medal for Achievement. This center was formed in the I/UCRC image. It has a tie program with a U.S. NSF I/UCRC at New Jersey Institute of Technology, and an NSF I/UCRC evaluator.

As you have read, there is more to setting up and managing an I/UCRC than a proposal of scientific merit. The NSF/I/UCRC is the foremost piece of social technology for managing cooperative research. Besides good science, you have to build and effectively manage an organization. Successfully completing the NSF three-stage screening process proves that you can.