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GUIR Report
+Charge
+Phase I: determine status of current academic
+research enterprise
+Phase II: look more to future...workshops
+i) changing organization and management of universities
+ii) future role of universities
+iii) changing conduct of research
+iv) future of S&E education
+v) future funding of academic research
+Conclusions:
+1) PIs, university administrators, agency officials need
+to assess changes occurring within research enterprise
+2) Universities and research sponsors need to take
+immediate, concrete steps to respond to changes
+...set overall research priorities
+...clarify respective responsibilities for funding
+research
+...update organization and management strategies
+...adapt to societal change (demographics, values)
+...improve S&E education, particularly at UG level
+3) All with a stake in academic research--including
+political, corporate, public interest sectors--
+should think more strategically about options for
+future of research enterprise.
+Working group set out heuristic framework for this:
+Large scale forces that affect the enterprise
+...pace and nature of research
+...the economy
+...politics
+...international events
+Then set forth several scenarios for future size and
+scope of enterprise
+Identified key policies or programs that would be
+required to maintain the quality and productivity
+of enterprise.
+A Vision for the Future
+International research cooperation will become a
+pervasive feature of the US academic research
+enterprise in the next century.
+The availability of the untapped pool of potential talent
+represented by women and minorities, perhaps more
+than any other factor, offers the hope that future
+work-force needs in S&E can be addressed.
+Advances in computers and telecommunciations will
+fundamentally change the way information is assembled,
+stored and disseminated, and change approaches to
+teaching and learning.
+In the 21st Century, the academic research enterprise
+will be even more important to the vitality of the US
+than it is today.
+Achieving the Vision
+Participants in academic research need to assess changes
+occurring within the enterprise.
+Universities and research sponsors need to take immediate,
+concrete steps to "put their houses in order".
+Those with a state in academic research, should begin to
+think strategically about the options for the future
+of the research enterprise.

+Current Realities
+Growth in the number of high quality research opportunities
+is outpace increases in research funding.
+The financial resource base for academic research is
+becoming increasingly diversified.
+(Noted the willingness of public universities--
+particularly those aspiring--to utilize their own
+resources to cover part of the indirect costs of
+externally sponsored research.)
+The organization and management of universities has
+become increasingly complex.
+Societal and demographic changes occurring at large
+within the US are increasingly reflected within the
+research enterprise.
+The university dual missions of research and education
+are under increasing strain.
+Near Term Decisions
+Must set priorities, since growth in the number of high-
+quality research opportunities is likely to outstrip
+increases in research funding. (Few academic
+institutions have engaged in any kind of longterm
+strategic planning necessary to set priorities for
+conducting and supporting research.)
+Clarifying funding responsibilities...the ability of
+most universities to increase their subsidy of
+the research enterprise will be limited.
+Improving organization and management...need better
+and more visible oversight practices, particularly
+those designed to reduce instances of research fraud
+and the wase of resource in academic research
+Adapting to societal change...encouraging women and
+minorities into S&E careers
+Revitalizing education...particularly UG S&E education...
+but also more robust and varied support of graduate
+students (fellowships, traineeships)
+Strategic Options
+Large-scale forces
+The pace and nature of research
+Economic Conditions
+Economic strength of US is key to strength of support
+for research.
+Political Interests
+Importance of influencing political decisionsat
+the local, state, and national levels...
+International Context
+US is funding a disproportionate share of the
+world's published research...although the US
+does allow open access to the results of its
+basic research, many otehr countries are not
+fully reciprocating.
+Alternative Scenarios
+Lots of comparisons of
+...shift toward more comprehensive universities
+...increasing specialization among institutions
+Hopeful vision: research enterprise sustaining
+leadership within a diverse population, taking best
+advantage of frontier technology and contributing
+to the vitality and well-being of the country.
+Pessimistic vision: Growing turmoil within the

+research community, inability to pursue research
+opportunities of critical importance to US, and
+a gradual decline for the research enterprise.
+Key choices
+control them.
+Worry that
+...the university
+...federal government
+...traditional structures for intellectual pursuits
+such as research
+may be as obsolete and irrelevant to our future
+as the American corporation of the 1950s...
+We need new social structures, capable of sensing,
+and understanding change, and engaging in the
+strategic processes necessary to adapt.
+Things I would have liked to have seen in report
+1) Research is a "people-intensive" activity.
+Now matter how much money, how fine a set of facilities,
+how effective an organization, if we don't have great
+people going into these fields, we won't do good
+research.
+Face it. Our best talent...our smartest students...
+are NOT attracted to research or academic careers.
+Instead they are attracted to law, business, ...
+politics...to wealth, power, fame...not to
+intellectual excitement.
+How do we change this?
+2) Impact of information technology--computers, networks,
+HDTV, ubiquitious computing, knowbots--will be very
+profound and, I believe, undermine most of the current
+assumptions about the research enterprise.
+i) Will the "University of the 21st Century"
+be localized in space and time...or will it be a
+meta-structure, involving people through their
+lives distributed about the planet?
+ii) Is the specialist really necessary...or relevant...
+to a future in which the most interesting problems
+will require "big think" rather than "small think"...
+when intelligent agents can wander through robust
+networks containing the knowledge of the world and
+instantly and effortlessly extract whatever a
+person wants to know?
+iii) When lifestyles will become more nomad-like...
+where people will live and travel whether they
+wish, taking their work--and social interactions--
+along with them?
+Perhaps we should pay far more attention to evolving
+structures such as "collaboratories" rather than old
+structures such as federal agencies, research
+universities or laboratories, research projects, and
+such.
+3) Holistic View of the university
+Modern "research" university is complex and
+multidimensional
+Beyond the classic triad of T, R, & S, society has
+assigned to university over past several decades
+a variety of other roles
+...health care
+...parenting (in the words of Lord Rugby,

+"converting savages into gentlemen"
+...social mobility
+...entertainment (intercollegiate athletics)
+...national security
+...space
+and now asks us to assume even other roles
+...K-12 education
+...economic competitiveness
+...assimilating minority populations
+Unfortunately, most folks...and most agencies of the
+federal government see "the university elephant"
+only in terms of the part they can "feel"...
+student financial aid...health care...research...
+Nobody in Washington worries about the whole
+enchilada.
+And nobody seems to care that shifting federal
+priorities, policies, or support aimed at one
+area will inevitably have a impact on other
+roles of the university...e.g., cost shifting
+through excessive cost-sharing requirements or
+inadequate support of overhead will inevitably
+cause fund-shifting from the education function
+of the university to the research function.
+4) The changing role of the faculty
+or...it just ain't much fun being a faculty member
+anymore... Roland Schmitt has noted that in spite
+of the fact that research support is stronger than
+ever, faculty morale is probably lower than ever,
+particularly in the research university. Faculty
+are stressed out, portraying the university as
+"a holding company for research entrepreneurs",
+overloaded from grantmanship, paperwork, committees,
+review responsibilities, oversight,...with little
+TIME for teaching and research and thinking...
+5) Role of federal research labs
+("The marching army syndrome"...)
+Is the nation investing too much of its resources
+in massive federal research laboratories,
+originally designed for highly specific roles...
+atomic energy, defense research...but now seeking
+other missions to justify their existence.
+6) Networking
+If information technology will indeed allow--indeed,
+require--new paradigms for research organization,
+should the United States not place a far higher
+priority on linking together its scientists and
+engineers with each other...and the rest of the
+world. This is a modest investment compared to
+the megaprojects that now characterize science
+(SSC, Human Genome,...). Further, without making
+this investment first, we may well find ourselves
+making massive investments in research structures
+of the past!
+7) Specialist vs Generalist
+..."Small think" vs "big think"...
+...Most exciting problems require broad view...
+With modern knowledge resources (knowbots), may
+be able to return to the generalist again.
+8) Not so optimistic that present political systems

+are capable of the strategic thinking necessary to
+support basic research...increasingly dominated by
+quarter-to-quarter, election-to-election time
+horizons

+9) More responsibility from those using technical
+manpower to pay for its development...federal
+mission agencies...corporate America

+10) Stressing traditional decision process such as
+consensus, inclusiveness, broad-based constituences,
+joint planning...may simply be too slow to track
+the changes in our world. May need to abandon
+"Wait until one achieves consensus" with "Act
+then fix"...