2011

Common Fund Strategic Planning Report

We accelerate discovery

National Institutes of Health

Department of Health and Human Services

About the NIH Common Fund

The National Institutes of Health (NIH) Reform Act of 2006 established the Common Fund to support crosscutting, trans-NIH programs that attempt to remove shared obstacles to research progress or would otherwise benefit from strategic planning and coordination. Participation by at least two NIH Institutes or Centers (ICs) is required.

This broad mission has been refined in practice so that the Common Fund programs represent **strategic investments** in cross-cutting areas in which 5- to 10-year initiatives can have a transformative impact. Common Fund programs are therefore expected to address science that is unlikely to be funded by individual NIH ICs or other entities because of their scope or fundamental nature but which will catalyze research in many areas.

The Office of Strategic Coordination (OSC) within the Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI) is responsible for managing and coordinating activities for the NIH Common Fund. Programs supported through the Common Fund are administered by the various NIH ICs.

Our Vision

Historically, Common Fund programs began in 2004 as initiatives under the NIH Roadmap for Medical Research. With the establishment of the Common Fund by the 2006 NIH Reform Act, these programs began to be referred to simply as "Common Fund Programs." The intent of these programs is to provide a strategic and nimble approach to address key *roadblocks* in biomedical research that impede basic scientific discovery and its translation into improved human health. In addition, these programs capitalize on *emerging opportunities* to catalyze the rate of progress across multiple biomedical fields.

Common Fund programs are expected to transform the way a broad spectrum of health research is conducted. Initiatives that comprise Common Fund programs are intended to be *catalytic* in nature, that is, stimulate further research through IC-funded mechanisms.

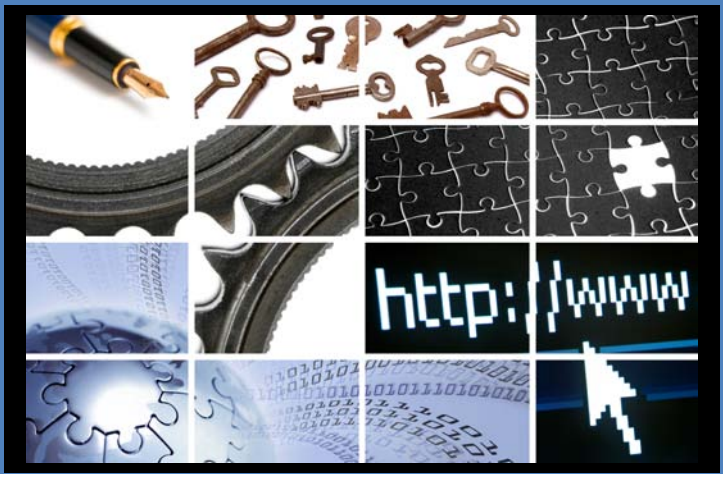
Criteria for Common Fund Programs:

Transformative: Programs have a high potential to affect, in a dramatic way, biomedical and/or behavioral research over the next decade

Synergistic: Multiple NIH Institutes and Centers work together to solve a shared challenge

Crosscutting: Programs address multiple Institute missions, and have relevance for multiple diseases and conditions

Broad Benefit: Concepts no other funding entity is likely or able to support, and research that benefits public health



Goal of Strategic Planning

Strategic planning is used to identify research areas that are not being supported by the ICs but which would enable and synergize with IC-funded research and would best be pursued via limited-term Common Fund investment. Input from NIH stakeholders and an analysis of the trans-NIH research portfolio are used to identify critical gaps or recent discoveries that have the potential to have a transformative impact.

The strategic planning process for the Common Fund varies from year to year to accommodate changing needs of the scientific community, the available level of research funds, emerging opportunities, and the desire to test and optimize new approaches. Although the specific process has varied slightly from year to year, core principles and activities underlie all the planning activities. These include:

- Input is sought from people representing the perspectives of all ICs. This may take the form of input gathered directly from NIH staff and IC Directors or it may be provided through external scientists who represent trans-NIH research interests. The number of people whose input is sought is determined in part by the funds anticipated to be available for new programs. Regardless, Common Fund planning engages people from a wide range of disciplines—including individuals outside of biomedical research—and from individuals across a range of ages and experience levels.

- Input is gathered systematically and transparently rather than through *ad hoc* submission of individual unsolicited ideas. Although many possible Common Fund programs can be envisioned, only a small number can be supported. The process for soliciting ideas for new Common Fund programs must, therefore, be fair in its inclusion of representatives from across the NIH mission and must involve the review of many ideas together, so that competition among many ideas will result in the most compelling programs.

- The trans-NIH portfolio is assessed relative to the concepts that are identified by internal or external stakeholders. Portfolio review is an iterative process that helps in the selection of broad program areas as well as the development of specific initiatives within these broad areas.

- The leadership across NIH must be engaged early in the selection of new program areas to ensure that program development is focused on areas for which there is the greatest enthusiasm and broadest impact.

Common Fund programs do not focus on a specific disease, condition, or target population. They are intended to catalyze research across a broad spectrum of biomedical disciplines by supporting the development of catalytic tools, technologies, databases, models of research and funding, and other resources.

About the Strategic Plan

The Public Health Service Act requires the Director of the NIH to submit a report to Congress containing a strategic plan for funding research that, "…represents important areas of emerging scientific opportunities, rising public health challenges, or knowledge gaps that deserve special emphasis and would benefit from conducting or supporting additional research that involves collaboration between two or more national research institutes or national centers, or would otherwise benefit from strategic coordination and planning" (42 U.S.C. §§ 282(b)(7)(A), 283(a)(3)).

This report describes:

- Strategic planning activities for the Common Fund to date
- Status of Common Fund programs designed to meet needs articulated through strategic planning
- Plans for future strategic planning efforts for the Common Fund

Common Fund Strategic Planning 2002-2010

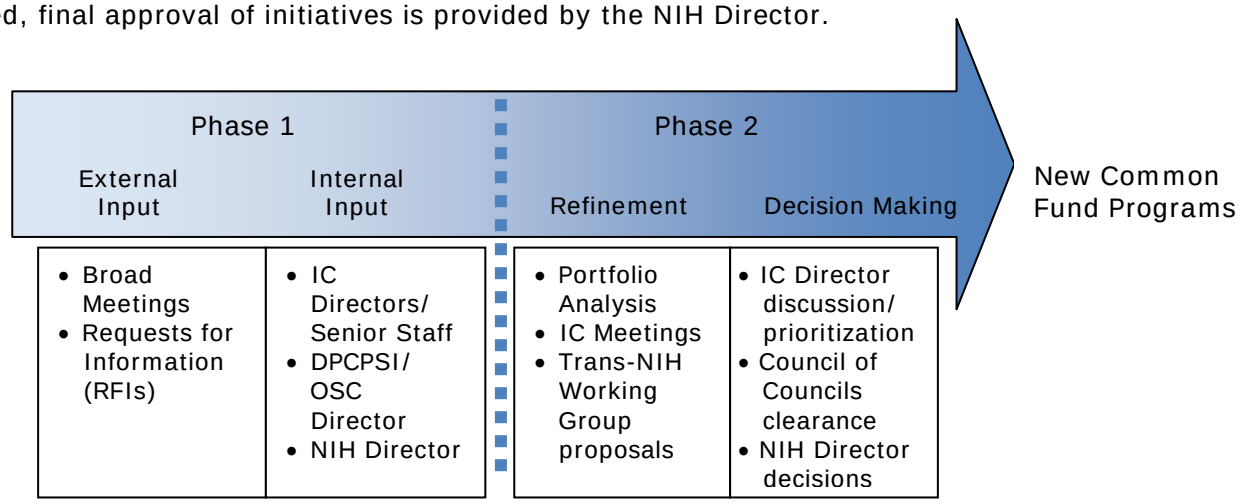
Process

Common Fund programs are intended to catalyze research across the entire spectrum from basic-to-clinical research. Strategic planning involves the identification of broad program areas followed by refinement of these broad areas into a series of well-defined initiatives.

The strategic planning process for the Common Fund consists of two distinct phases:

Phase 1 consists of the identification of broad scientific needs and opportunities through meetings with external experts and stakeholders, through the release of public Requests for Information (RFIs), and through internal group discussions to tap the experience and perspective of senior NIH Leadership. Topics represent significant challenges and emerging opportunities in biomedical research that could benefit from limited-term investment through the Common Fund. In any given year, the volume of input sought through Phase 1 is adjusted according to funds available for new programs.

Phase 2 refines these broad program topics into specific initiatives such as funding opportunities, workshops, and other activities that can be supported through the Common Fund to advance the topic identified in Phase 1. Phase 2 activities may include external and internal meetings and workshops, analyses of the NIH and external research portfolios, formulation of trans-NIH working groups, development of program proposals, and priority setting by the IC, DPCPSI, and NIH Directors. Concepts for initiatives that are the product of Phase 2 planning are reviewed by the Council of Councils, and, if the concepts are cleared, final approval of initiatives is provided by the NIH Director.



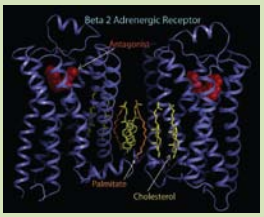
Phase 2 planning produces a strategic plan for a given program area, which includes a set of initiatives with defined goals. The most appropriate funding mechanisms are selected to support the goals and may include individual research grants, creation of research teams and consortia, contracts, and others. Each Common Fund program includes a plan for active program management for the duration of Common Fund support to ensure progress and that changing needs in the community are met. The strategic plan for each new program is therefore reviewed and adjusted annually through program reviews conducted in partnership by the administering ICs and DPCPSI/OSC.

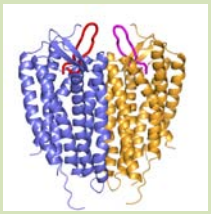
Common Fund Programs Through 2009

The Common Fund Strategic Planning Report for 2009 described the status of current Common Fund programs at that time. Those programs were designed to address key *roadblocks* in biomedical research that impede basic scientific discovery and drug development. However, some of them were also designed to capitalize on *emerging opportunities* to catalyze the rate of progress across multiple biomedical fields. These programs have achieved great success in providing the new tools, technologies, data, and models of research and support needed to meet these goals.

For example, the Structural Biology of Membrane Proteins program and the National Computational Biology Centers program are overcoming technological challenges to conducting biomedical research by developing new approaches for isolating and characterizing membrane proteins in cells that play a key role in basic biology of health and disease, and creating new bioinformatics tools to analyze and mine vast amounts of molecular data generated through research efforts in basic discovery and drug development.

Overcoming Hurdles to Advance Scientific Discovery and Drug Development





(Beta-Adrenergic Receptor and CXCR4 Receptor, images courtesy R. Stevens, Scripps Research Institute)

Membrane proteins are essential to health and play a profound role in disease and response to therapeutics. Information about the 3-dimensional shape of proteins has been crucial for the design of many drugs that target specific aspects of protein function. However, many of the potentially therapeutic protein targets are embedded in cell membranes, making them extremely difficult to isolate, purify, and characterize structurally. Compared to "soluble" proteins in cells—that is, proteins not bound to cell membranes—only a small fraction of membrane proteins had been isolated and characterized by 2008. Since membrane proteins make up 30 percent of the proteins in a cell and perform critical health functions, we need to overcome these technical hurdles to advance our understanding of protein structure in general and to develop new classes of drugs that interact with membrane-associated proteins.

Researchers in the Common Fund's *Structural Biology of Membrane Proteins* program are *overcoming barriers* to research by developing novel approaches for the production and stabilization of membrane proteins so their structures may be determined at high resolution. These approaches are paying off as increasing numbers of membrane-associated protein structures are being determined. One notable example is solving the structure for the *Beta-2-adrenergic receptor*. This accomplishment arose from collaboration between the Scripps Research Institute and Stanford University. The resulting structure was considered one of the ten most significant scientific advances in 2007 by *Science* magazine. Other membrane proteins involved in health and disease solved through this program include CXCR4, a protein important for HIV infection and growth and metastasis of many cancers; the dopamine D3 receptor involved in regulating movement, cognition and emotion; and others.

The Common Fund's Human Microbiome Project is leveraging advances in high throughput genomic technologies to identify and characterize human microbe communities that reside on and in the human body to address gaps in knowledge about the role of these "bugs in our body" in health and disease. The Interdisciplinary Research program and the Clinical and Translational Science Awards (CTSAs) are overcoming barriers in the way research is conducted by encouraging the formation of research teams that span academic disciplines and bring divergent perspectives and expertise to bear on a common biomedical problem.

The Human Microbiome Project (HMP): Capitalizing on New Technologies to Understand the Bugs in Our Bodies

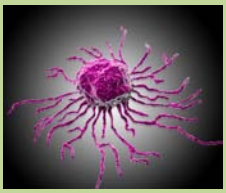
In a normal adult human, there are ten times as many microbial cells as there are human cells. Microbes live on our skin, in our noses and mouths, and in our digestive and reproductive tracts. These microbes—including bacteria, viruses, and fungi—play an important role in human health and disease. However, since these microbial communities have not been well-studied, little is known about their influence on human development, physiology, immunity, and nutrition. Researchers in the Common Fund's *Human Microbiome Project (HMP)* are capitalizing on *emerging opportunities* provided by new high-throughput genomic techniques to analyze genetic material from complete microbial communities harvested from their natural environments on the human body. HMP scientists are analyzing microbes from five sites: nasal passages, oral cavities, skin, the gastrointestinal tract, and the urogenital tract. To date, researchers in the HMP program have sequenced the genomes of over 500 microbial strains and have discovered over 29,000 novel proteins encoded by the human microbiome. Research projects are investigating a diverse set of diseases, including Crohn's Disease, dermatitis, obesity, abdominal inflammation, acne, and undiagnosed fever.

New tools and technologies for analyzing microbial communities, as well as clinical protocols and ethical considerations for the collection of samples, are also being developed to provide the research community with much needed resources to *overcome barriers* to advancing our understanding of how these "bugs in our bodies" contribute to health and disease and may someday be targeted in new treatments.

New Common Fund Programs Since 2009

As with Common Fund programs reported in the 2009 Strategic Planning Report, programs that have resulted from strategic planning efforts in fiscal year 2009 and 2010 are designed to address critical *barriers* to research progress, and to capitalize on *emerging opportunities* in technology and knowledge to catalyze the pace of biomedical discovery and translation. Strategic planning efforts also centered on the NIH Director's five themes for biomedical research:

- *Application of High Throughput Technologies*
- *Translation of Basic Science Discoveries into New and Better Treatments*
- *Using Science to Benefit Health Care Reform*
- *Focusing on Global Health*
- *Reinvigorating the Biomedical Research Community*



The National Center for Regenerative Medicine (NCRM) program is designed to overcome technological and scientific barriers and catalyze the field of regenerative medicine to develop much needed cell-based therapies for diseases such as Parkinson's and diabetes.

Strategic planning in *fiscal year 2009* began with a series of external meetings to generate broad ideas for new Common Fund programs that focused on the NIH Director's priority research themes. Additionally, ideas that emerged from prior years' planning activities were "revisited" to see if scientific progress had created emerging opportunities in these areas. In Phase 2 planning, trans-NIH working groups developed initial program proposals for the highest priority concepts selected by NIH Leadership. This process led to new Common Fund programs that began in FY 2011:

- Global Health
- Gulf Oil Spill
- Health Economics
- HMO Collaboratory
- Knockout Mouse Phenotyping Program (KOMP^2)
- Library of Integrated Network-Based Cellular Signatures (LINCS)
- NIH Center for Regenerative Medicine (NCRM)
- NIH Director's Early Independence Award (EIA)
- Protein Capture Reagents
- Regulatory Science
- Science of Behavior Change

The Common Fund's HMO Collaboratory program is leveraging the scientific expertise, health data, and biospecimens developed by health maintenance organization (HMO) networks to establish a new research platform for conducting large-scale epidemiology studies and clinical trials across a range of diseases and health conditions.

Table 1 and Appendix B describe how these programs catalyze research. Budget information for all Common Fund programs is provided in Appendix A.

Table 1. New Common Fund Programs Since 2009 (See Appendix B for Details)

Program	Catalyzing Feature
Global Health	• Fill gaps in biomedical training and education in Africa • Build capacity for genomics, genetics, and population studies to stimulate IC investments in disease-specific research • NIH theme: global health
Gulf Oil Spill	• Seize an unprecedented opportunity to examine environmental and genetic factors for illness in clean-up workers and inform future responses to environmental disasters
Health Economics	• Establish the scientific data needed to support effective health care decisions • NIH theme: using science to benefit health care reform
NIH Director's Early Independence Award (EIA)	• Address the need for more innovative approaches to support research and encourage exceptional early stage scientists to pursue careers in biomedical research • NIH theme: reinvigorate the biomedical research community
HMO Collaboratory	• Leverage existing resources within health maintenance organization (HMO) networks to address barriers to conducting large-scale population studies and clinical trials • NIH theme: using science to benefit health care reform
Knockout Mouse Phenotyping (KOMP^2)	• Capitalize on emerging technologies in high-throughput technologies and informatics to provide the scientific community with an unparalleled resource of new experimental models of human biology and disease • NIH theme: application of high-throughput technologies
Library of Integrated Network-Based Cellular Signatures (LINCS)	• Capitalize on emerging technologies in high-throughput technology and informatics to provide the scientific community with new tools and data on cellular responses to perturbing agents and inform drug development and basic research • NIH theme: application of high-throughput technologies
NIH Center for Regenerative Medicine (NCRM)	• Leverage recent advances in stem cell biology to develop much needed resources to accelerate the field of regenerative medicine • NIH theme: translation of basic science discoveries into new and better treatments
Protein Capture Reagents	• Address a critical barrier to research and drug development by providing new resources and tools to isolate and characterize proteins that regulate gene expression and function
Regulatory Science	• Provide the scientific evidence base needed to improve the assessment of experimental and clinical therapies, preventives, and diagnostics • Leverage NIH and Food and Drug Administration (FDA) investments in basic research and translation • NIH theme: translation of basic science discoveries into new and better treatments
Science of Behavior Change	• Address a critical knowledge gap to better understand the biological, social, and cultural contexts of human behavior, ultimately leading to more effective and economical behavioral interventions and improved health of our Nation • NIH theme: using science to benefit health care reform

A new cycle of strategic planning was initiated in *fiscal year 2010* with a "Big Think" meeting of external and internal experts representing a wide variety of scientific disciplines. Meeting participants identified pressing needs and opportunities related to three themes: Application of High Throughput Technologies, Translation of Basic Science, and Utilization of Science to Benefit Health Care Reform. Of the many ideas generated, two were selected by NIH Leadership for further development and planning: *Single Cell Analysis* and *Metabolomics*. The Phase 2 refinement for these concepts is ongoing.

The OSC conducted an analysis of Phase 1 and Phase 2 strategic planning activities for the Common Fund since 2002 to determine how specific activities have varied from year to year and to identify those that have been most useful for generating Common Fund ideas over time.

Several "lessons learned" emerged from the analysis of Common Fund Strategic Planning activities to date.

- Input is needed across a wide range of disciplines, including individuals outside of biomedical research, and from individuals across a range of ages and experience levels.
- Public meetings are useful for gathering input from external stakeholders, while open-ended RFIs tend to produce ideas that are extremely broad and that may not meet the criteria for Common Fund programs.
- Input from the NIH Leadership at the conclusion of Phase 1 is critical so that Phase 2 planning efforts focus on concepts that will be useful to and synergistic with a broad cross-section of IC-supported research.
- Portfolio analysis is critical during both Phase 1 and Phase 2 planning, and should be iterative. During Phase 1, it helps to prioritize among potential new program areas by determining the level of investment already being made in each area. During Phase 2, it helps to provide a strategic focus and to prevent redundancy with IC investments.

Two Concepts for Phase 2 Strategic Planning in FY 2011:

Single Cell Analysis seeks to address gaps in knowledge, technology, and methodology related to the biological properties of a single cell. Overcoming these challenges could lead to new cellular markers of disease risk and progression, improved diagnostic tests, and a greater understanding of the effects of treatment impact across a broad range of cell types and diseases. Areas under consideration include:

- Application of *"-omics"* approaches such as genomics, epigenomics, proteomics, and metabolomics
- Understanding cellular development and physiology, cell motility, and cell communication pathways
- Addressing technological and methodological limitations such as sensitivity of analytical tests and approaches to data collection and analysis

Metabolomics seeks to leverage existing technologies and to promote the development of new technologies to accelerate the use of "metabolomics" – the analysis of all metabolites in a cell – in clinical diagnoses, prevention, and treatment. Areas under consideration include:

- Developing standardized protocols for analysis and reporting of metabolomics data
- Characterizing normal variations in the "metabolome" among populations and within individuals
- Establishing critical, accessible databases and informatics tools
- Designing new devices for making diagnoses "in the field," outside of the clinic
- Analyzing the metabolome within specific parts of a cell

Summary of Common Fund Strategic Planning Activities To-Date

Year	PHASE 1			PHASE 2				
	External Input		Internal Input	Refinement			Decision Making	
	Meetings	**Request for Information (RFI)**	**NIH IC Staff, IC Directors (ICDs), NIH Director**	**Portfolio Analysis**	**IC-led Meeting/ Workshop**	**Trans-NIH Working Group (WG) Proposals**	**IC Directors Discussion/ Priority Setting**	**NIH Director**
2002	5 external meetings, mostly senior PIs	No	IC program staff and ICDs participate in external meetings	Informal	No	WGs develop proposals for subset of ideas selected by ICDs and NIH Director	ICDs and WGs prioritize proposals	Approves 9 new programs
2006	5 external meetings, mostly senior PIs	Yes	ICDs submit ideas for consideration	Yes	No	WGs develop 11 proposals selected by ICDs	ICDs recommend 2 new programs	Approves 3 new programs
2007-2008	No	RFI ideas reconsidered	IC program staff provide ideas, self-assemble around specific topics/develop proposals	Yes	IC-led workshops to define research barriers and gaps	WGs develop proposals	ICDs refine proposals, recommend 6 for further consideration	Approves 1 new program, combines other 5 topics into one program (TR01)
2008	IC-led meetings	Yes	IC Senior staff submit ideas	Yes	WGs solicit public input on 3 ideas selected by IC Senior staff	WGs develop proposals	Concepts discussed at the NIH Council of Councils Meeting	Concepts on hold until NIH Director appointed
2009-2010	Series of small external meetings, some IC-led	No	External meetings focused on NIH Director's themes; ICDs and NIH Director select program areas for development	Informal	Ideas from IC-led meetings	WGs develop proposals	Concepts discussed at NIH Council of Councils meeting with ICD input	Approves 11 new programs
2010-2011	1 external "Big Think" meeting	No	ICDs attend "Big Think" meeting	Yes	IC-led workshops to define gaps and opportunity	WGs developing proposals	Concepts to be discussed at NIH Council of Councils meeting in spring 2011	Decision-making in spring 2011

Key: IC = Institute/Center; ICD = Institute/Center Director; PIs = Principal Investigators; WG = Working Group

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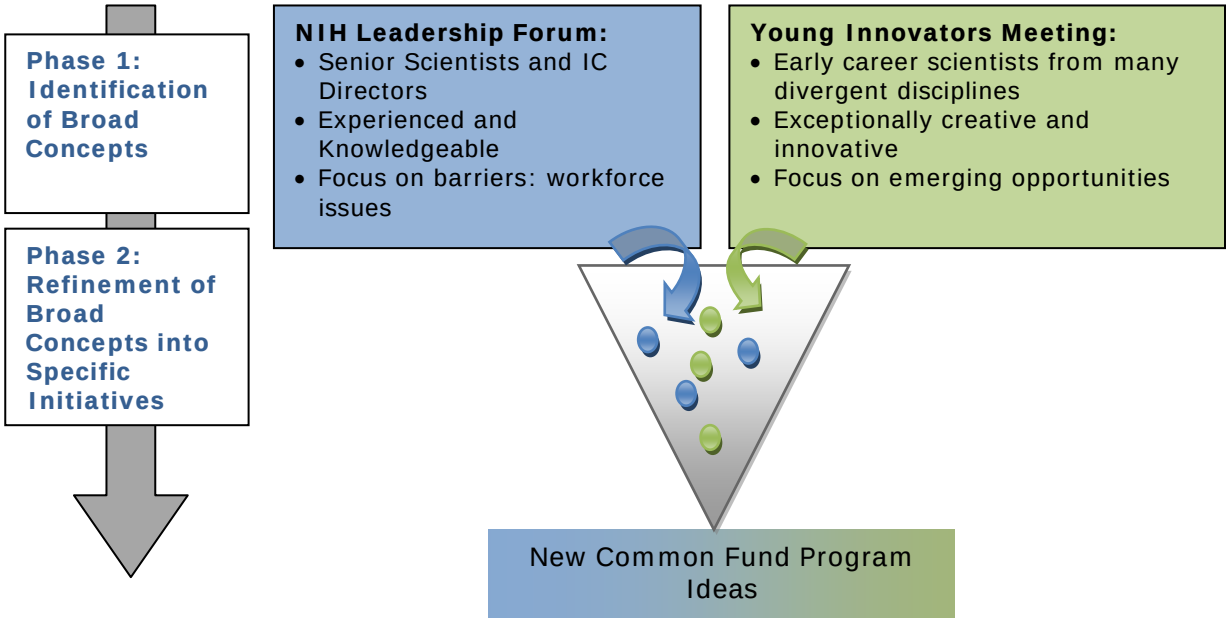
Next Steps: Strategic Planning for FY 2013 and Beyond

A new round of strategic planning has begun in FY 2011 that will build on lessons learned from past years while allowing new approaches to be tested. Concepts that emerge from Phase 1 strategic planning in FY 2011 will be refined into program initiatives that will result in awards beginning in FY 2013.

Previous strategic planning efforts that led to Roadmap/Common Fund programs have been particularly successful at identifying *barriers* to research discovery and translation. They have also taken advantage of *emerging scientific opportunities* to catalyze research and development across many disciplines. Strategic planning in FY 2011 is continuing to focus on these two overall goals, with a greater emphasis on emerging opportunities.



Phase 1 strategic planning in FY 2011 will involve two complementary groups for identifying new concepts for Common Fund support:

- ***NIH Leadership Forum:*** The NIH Leadership, consisting of the NIH and DPCPSI Directors, IC Directors, and other Office Directors, meets annually to consider issues affecting the entire agency. These meetings represent an opportunity for the Leadership to think collectively about the priorities and needs of the agency. Depending on the concept, the Common Fund can be a potential source of funds to pilot solutions to trans-NIH problems that are identified. In the fall of 2010, the Leadership Forum focused on issues affecting the biomedical workforce. This discussion led to the decision to form an internal task force to consider new models to support the workforce. This concept is still being formulated, and if specific models are developed that could be piloted effectively through the Common Fund, the task force will develop a proposal for consideration by the NIH and DPCPSI Directors. In future years, the Leadership Forum could provide possible concepts for Common Fund programs, although that is not the primary objective of these meetings.

- ***Innovation Brainstorm: Transforming Discovery into Impact:*** NIH is hosting a meeting in 2011 to identify recent discoveries with a high potential for transformative impact and to articulate ways that strategic investments by the Common Fund can reduce the amount of time for that potential to be realized. The meeting involves mostly early career scientists who represent new voices from a wide range of disciplines. Participants are selected based on evidence of exceptional creativity and innovation, either from ICs who support their research or from other awarding institutions. The meeting is intended to capitalize on the creative energies of early career, innovative scientists who are using diverse and novel approaches in many disparate areas of health research. The format tests a new approach to brainstorming and concept development similar to a "journal club." Participants select and discuss recent papers in the scientific literature that have the potential for exceptionally high impact and articulate ways in which strategic investments by the Common Fund might enable the potential to be realized more effectively.

Concepts that emerge from these Phase 1 activities will enter Phase 2 planning in the summer of FY 2011. Refined concepts will be reviewed by the Council of Councils and the NIH Director in the spring of 2012, and approved initiatives would be launched for possible funding beginning in FY 2013.

As the Common Fund grows, the NIH will continue to fine tune its strategic planning process to ensure that new programs and activities are responsive to the most pressing needs of the biomedical community.

Appendix A: Common Fund Budget Data

Dollars in Millions	FY 2008 Actual B.A.	FY 2009 Actual B.A.	FY 2010 Actual B.A.	FY 2011 CR	FY 2012 Request
Roadmap/Common Fund	$498.24	$541.13	$544.03	$544.03	$556.89
Roadmap/Common Fund Percent of NIH Labor/HHS Budget Authority[1]	1.71%	1.80%	1.77%	1.79%	1.77%

[1] Adjusted for Type I Diabetes, Global Fund for AIDS, Superfund, and Secretary's transfer authority for the National Library of Medicine.

Appendix B: Strategic Plan Summaries for Programs Launched Since FY 2009

Global Health

The NIH Director held a meeting in January 2010 of internal and external participants with the goal of developing recommendations for a Common Fund Global Health Program. This meeting was accompanied by an assessment of ongoing activities funded by NIH ICs and by other agencies within the Department of Health and Human Services. Many needs were identified, all of which would require partnership with other entities to ensure sustainability and to leverage resources. Further discussions with the NIH Fogarty International Center and the Wellcome Trust—a global charity based in London—led to the identification of two opportunities where Common Fund investments could be leveraged to address needs that cut across multiple diseases and IC missions. The Wellcome Trust plans to support research projects under the second of the two funding opportunities.

- The Medical Education Partnership Initiative is a joint venture between the Common Fund, five NIH ICs, two additional DPCPSI Offices, and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). The goal is to develop or expand medical education and research training programs, with an emphasis on models that will lead to higher trainee retention rates in Africa. The Common Fund's contribution to this program enables the program to extend beyond acquired immunodeficiency syndrome (AIDS) to other disease areas. Common Fund awards are developing expertise in maternal and child health, cardiovascular disease, cancer, mental health, and emergency medicine.
- The Human Health and Heredity in Africa (H3Africa) Program, which is being implemented through a partnership with the Wellcome Trust and the NIH ICs, acknowledges that African populations are one of the most genetically diverse and that understanding the genetic contributions to common disease and disease susceptibility could enable better treatments to be developed. It also builds on the recognition that most research about African populations is conducted not by Africans themselves but by foreign scientists. The H3Africa program is developing resources and partnerships across the continent to enable African scientists to have robust genetic research programs that address health concerns of local populations. The Common Fund partnership with NIH ICs and the Wellcome Trust will help ensure that the programs are sustainable after the Common Fund capacity-building efforts end. In addition, the NIH is reaching out to possible industry partners to expand the scope of H3Africa and to help ensure longevity.

Gulf Oil Spill

The oil from the April 20, 2010, explosion on the Deepwater Horizon oil rig in the Gulf of Mexico contaminated the Gulf and has settled along the coastline and marshes of Alabama, Louisiana, and Florida. In his testimony before the Subcommittee on Health of the Senate Committee on Energy and Commerce on June 15, 2010, the NIH Director pledged support from the Office of the Director and the NIH Common Fund for research into the environmental health hazards posed by the Gulf oil spill. This marks the first use of the Common Fund as a "nimble fund" for the NIH Director, in which a strategic solution for a sudden and pressing need is identified and implemented. The Gulf program, initiated with FY 2010 funds, includes a prospective study of clean-up workers, called the Gulf Long-term Follow-up (GuLF) study. Longer-term requirements for funds

from the Common Fund will be determined when information concerning the availability of additional funds from BP becomes available. The NIH efforts on this Gulf program complement and are coordinated with response efforts of other Federal, State, and local agencies and institutions working in the Gulf region.

Health Economics

Health care costs in the United States are rising at an unsustainable rate and present increasingly challenging obstacles to many individuals, organizations, and businesses in the health care system. In recent years a wide-ranging set of approaches to restraining health care costs has emerged, in both the public and private sectors, which require rigorous evaluation. In addition, the Affordable Care Act of 2010 affords the opportunity to slow the growth of health care costs while promoting technological innovation and ensuring access to high-value care.

A workshop was conducted in May 2010 to identify strategic objectives within the broad umbrella of health economics research. That meeting identified the following research priorities:

- Fostering the collection of data that will be most useful for policy-relevant analysis;
- Examining the economic effects of changes in incentives for consumers, providers, and insurers;
- Exploring the ways in which structure and organization on the supply side of the medical market affect health care spending and clinical outcomes; and
- Investigating the potential of preventive measures to improve health and mitigate cost growth.

Data provided through this program are expected to be used by the health care industry and policymakers as it evolves under the Act.

NIH Director's Early Independence Award

The Common Fund is testing new models of supporting innovation across the NIH and providing unique opportunities for investigators across the NIH to conduct risky but potentially transformative research. Ideas for new ways to foster innovation have come from multiple strategic planning processes, resulting in new initiatives being developed within this program over time. Prior years have produced multiple initiatives with different objectives:

- *Pioneer Award Program*—provides support for creative investigators to launch entirely new research programs without the need for substantial preliminary data.
- *New Innovator Award Program*—provides early career investigators with the freedom to pursue transformative work without substantial preliminary data.
- *Transformative R01 (T-R01) Award Program*—allows investigators to develop projects that are as big as necessary to achieve transformative aims.

A new initiative—the Early Independence Award (EIA)—pilots the idea that exceptional young investigators can thrive as independent, innovative scientists without undergoing postdoctoral training, and that providing them with early independence encourages them to maintain a scientific career. The EIA initiative allows young investigators to establish independent labs within one year of their doctoral degree, thereby skipping the traditional period of postdoctoral training. Recent trends show an increase in the length of the traditional scientific training period with a concomitant increase in the age at which scientists establish independent research careers. To help reverse this trend and encourage more young people to choose science as a career, the EIA initiative provides

a mechanism for exceptional, early career scientists who are U.S. residents or permanent citizens to omit traditional postdoctoral training and move into temporary, independent academic positions at U.S. institutions directly upon completion of their graduate degrees (Ph.D., M.D., or equivalent). The NIH Director's EIA is funding the first cadre of exceptional research scientists in FY 2011, and, if successful, the program will be expanded to support additional promising young investigators in FY 2012.

HMO Collaboratory

In the context of health care reform activities, the NIH is eager to step up the production of comparative effectiveness research (CER) and health systems analyses to develop faster, more personalized and cost-effective data regarding which interventions work best for whom. In addition, clinical research across the NIH requires access to well-characterized patient populations with electronic medical records. With these needs in mind, the Common Fund supported a meeting in January 2010, and one in March 2010, to consider multiple models of research on large patient cohorts.

With input from these meetings and with information gathered through an analysis of the NIH-wide portfolio of cohort studies, the NIH and DPCPSI Directors decided to make strategic investments that leverage the existing national HMO Research Network (HMORN), a network of 15 HMO health care delivery systems with integrated research divisions. The HMORN's mission is to use their collective scientific capabilities to integrate research and practice for the improvement of health and health care among diverse populations. Research support is derived largely from Federal health agencies.

This investment through the Common Fund leverages support from ICs to expand the capabilities of the HMORN to better serve the NIH as a whole. Common Fund support will improve integration across the network of member organizations and will allow the network to develop research expertise in a broader array of disciplines. New collaborative activities across the HMORN, and with other health service organizations, are intended to speed the implementation of efficiencies, generate faster evidence, take advantage of high-throughput technologies, and leverage known economies of scale. The HMORN research organizations, because of their history of public sector research and their affiliation with leading-edge integrated health care delivery systems, are ideally positioned to lead new research efforts in a number of cross-cutting NIH interest areas, including Mega-Epidemiology Studies, Clinical Trial Enterprise, and Health Care Delivery.

Knockout Mouse Phenotyping (KOMP^2)

Strategic investments in the development of mouse models of disease are intended to stimulate disease-focused research across the NIH. The laboratory mouse has been considered the premiere experimental model of human biology and disease since 1902 when it was first used to demonstrate how genetic traits could be transferred from parents to offspring via classical or "Mendelian" inheritance in mammals. In just over a century, an impressive array of genetic tools, reagents, and processes have been developed in the mouse, including mice that have been engineered to carry a gene that has been made inactive or "knocked out." Recognizing the value and utility of a readily accessible collection of knockout mice as the lynchpin to determine how mammalian genes function, an international set of programs, including a trans-NIH initiative with funding from multiple ICs, was launched in 2006 to develop these mutant mouse strains. Collectively, these programs have created almost 8,000 prototype knockout mice, and they are on track to complete the resource by the end of 2011. Common Fund support was provided to expand the characterization of these strains beyond the level that the ICs could support alone. The new Common Fund KOMP^2 program will expand the efforts

to characterize (phenotype) the mutant strains and will make data rapidly available to the entire research community through an internationally-coordinated data coordinating center. Initiatives for the KOMP^2 program are beginning in FY 2011.

Library of Integrated Network-Based Cellular Signatures (LINCS)
Understanding how interconnected components of biological pathways and networks are maintained in health, and how they become perturbed by genetic and environmental stressors and cause disease, is challenging, but it is essential to developing new and better therapies to return perturbed networks to their normal state. Although most ICs invest in this type of fundamental biological research, a central data source that gathers data across tissue systems and allows investigators to compare the results of prior research with his/her own data is lacking. The goal of the LINCS program is to stimulate investigator-initiated research within the ICs by providing a central data source that allows investigators working in different cellular systems to learn from each other.

To achieve this goal, the LINCS program aims to provide the following central, cross-cutting resources, technologies, and data:

- A "library" of molecular signatures based on gene expression and other cellular changes that describe the response elicited by different types of cells when they are exposed to various perturbing agents, including small interfering RNAs (siRNAs), and small bioactive molecules
- High-throughput screening approaches, used to interrogate the cells
- Mathematical approaches used to describe the molecular changes and patterns of response
- New data that are collected in a standardized, integrated, and coordinated manner to promote consistency and comparison across different cell types
- A database, common data standards, and public user interface for accessing the data
- New computational tools and integrative data analyses
- Integration of existing datasets into LINCS

Investigators across the NIH will be able to use these research data and tools to develop hypotheses about possible causes of disease and to develop new therapeutic strategies.

NIH Center for Regenerative Medicine (NCRM)
Recent advances in stem cell technology now make it possible to bring regenerative medicine into patient-centered therapies for life-threatening diseases that involve deterioration or death of vital tissues and organs. Scientists are now able to create induced pluripotent stem cells (iPSCs) in the lab, which behave like embryonic stem cells but are derived from adult human cells that may be obtained from the patient. They are developing methods to induce the iPSCs to grow into new, healthy organs that can be transplanted back into the patient, minimizing the risks of organ rejection. Scientists have also improved the method of producing iPSCs without introducing foreign genetic material (DNA) into the adult cell, which can cause toxicity and cell death.

In January 2010, the NIH Director held a meeting to determine whether the Common Fund could make a unique and cross-cutting contribution to stimulate the translation of these basic discoveries. The meeting participants described the gamut of basic science being conducted worldwide but agreed that clinical-grade cells, new technologies, and new scientific collaborations would need to be developed to realize the therapeutic potential of stem cells. As a result, the NIH Center for Regenerative Medicine (NCRM), initiated in FY 2010, was established to accelerate the development of stem cell-based therapies for regenerative medicine. Because of its unique clinical and translational

facilities, NCRM is housed within the NIH intramural program. This Center is intended to provide research resources and collaborative partnerships with intramural and extramural investigators. In FY 2010, NCRM began providing pilot funds to intramural investigators to launch clinically-driven regenerative medicine projects that will then feed into the core activities of the Center. Another near-term goal for NCRM is to establish a laboratory for the Director of the Center within the NIH intramural program, with the expectation that the Center Director will be a leader in clinical application of stem cell technologies. Under the leadership of the new Center Director, NCRM will continue to develop a stem cell core facility that will serve as a resource to the scientific community by providing stem cells and the supporting protocols and standard operating procedures used to derive, culture, and differentiate them into different cell types.

Protein Capture Reagents

Most NIH ICs support research projects that aim to understand the function and dysfunction of proteins in cells of the body that may play a role in health and disease. Investigators develop molecular tools, such as laboratory reagents, on an *ad hoc* basis for use in their research. The result is a scattered set of resources of variable quality and accessibility, resulting in funds being used inefficiently and the pace of science slowed. The Common Fund Protein Capture program is intended to provide a central resource for high-quality reagents that will facilitate the study of protein function in health and disease NIH-wide. The Protein Capture Reagents Program is organized as a pilot program that began in FY 2010. It focuses on a class of proteins that bind DNA—called transcription factors—as a test case to examine the feasibility and value of generating a community resource of low cost, renewable reagents to use to "capture" or isolate and study all human proteins. The reagents must be specifically designed for high quality and broad experimental utility in order to meet the growing demands of biomedical researchers. Based on what is learned from the pilot phase, the program may expand to a larger production effort to provide a broad community resource of human protein capture reagents.

Regulatory Science

The NIH and the FDA have formed an interagency partnership to foster regulatory science, a specialized and interdisciplinary area of biomedical research that serves to generate new knowledge and tools for assessing experimental therapies, preventives, and diagnostics. A key goal of this new Regulatory Science program is to accelerate the development and use of new tools, standards, and approaches to develop products and more effectively evaluate product safety, efficacy, and quality. In FY 2010, the Regulatory Science program initiated support for research in four distinct, high priority areas of regulatory science, which include an adaptive clinical trial design, a novel strategy to predict ocular irritancy, a heart-lung model to test the safety and efficacy of drugs, and nanoparticle characterization.

Science of Behavior Change

The study of human behavior and its impact on health and disease represents a significant interest for many ICs and the Office of the Director. Unfortunately, we still lack a comprehensive understanding of motivation and how to motivate changes in behavior. A series of workshops, as well as a review of the trans-NIH portfolio, indicated that a strategic investment in the understanding of behavior change by the Common Fund could have a transformative impact on behavioral research as a whole. The Common Fund launched the Science of Behavior Change program in FY 2010 to provide support for research that integrates basic and translational science and cuts across disciplines such as cognitive and affective neuroscience, neuroeconomics, behavioral genetics, and behavioral economics. This program will establish the groundwork for a

unified science of behavior change by supporting basic research to improve our understanding of human motivation and maintenance of behavior change across multiple diseases and conditions. This knowledge will be critical for developing more effective and economical behavioral interventions in the future.