FINDING ANSWERS TO BIG QUESTIONS:

OVERCOMING DISCIPLINARY BOUNDARIES THROUGH RESEARCH NETWORKS

A Guide To Conceiving, Organizing, Implementing, and Monitoring Interdisciplinary Research Networks.

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Consulting for Interdisciplinary Research Networks

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1. PREFACE

This monograph is a guide to enhance efforts in establishing and supporting interdisciplinary networks. Its primary audience is foundations, but other organizations may find this monograph valuable. Although these recommendations emerge from my experience in establishing and managing successful networks focused on interdisciplinary research in the health and behavioral sciences, the strategies that have proven useful are applicable to a broaden range of collaborations, where it is important to integrate multiple, diverse perspectives.

I was motivated to write the monograph for two reasons. The first grows out of the conviction that knowledge of real world problems can rarely be grasped through the lens of a single discipline. If one accepts this perspective, the next question is how do we gather and carefully blend the range of perspectives necessary to truly understand complex social and natural phenomena if we are going to act effectively to solve that problem? I believe that a particularly effective strategy is to develop and support appropriately constituted interdisciplinary research networks.

This monograph begins with a brief discussion of the rationale of interdisciplinary networks-why do we need them? The next section continues with Preparation for a new network and establishing consensus among the various actors in the foundation about the potential value of such a network. Next is network formation, identifying potential network members and the network chair, requiring important input from the staff.

The process of selection and vetting of the future participants is a key step and most important in establishing a functional and effective network and receives much attention in this monograph, given its crucial importance. The monograph then describes the steps that have proven useful in getting a network up and running and then enhancing their autonomy by shifting responsibility to the network members and chair.

Another important aspect of network development is the communication between the developing network and the foundation staff. The decision to focus on specific issues and the strategies in pursuing these grow out of the interaction between the experts in the network and the program staff, who help interpret the goals of the foundation in establishing the network. This is an iterative process which requires much attention, effort and commitment from both parties. This was one of the more interesting aspects of network development which I particularly enjoyed as it provided a great opportunity for learning for the staff along with the network members.

The section on implementation includes a discussion of foundation financial support of the network and the first phase of funding, which involves writing of the research plan by the network and its review by outside experts. Monitoring of the established network summarizes the crucial role of network meetings and continued interactions with the staff leading up to a final summary of network accomplishments and network review.

My hope is that this description in a step by step fashion will provide interested foundations and their staffs a blueprint that can lead to the successful initiation of new networks that will enable potentially powerful and exciting new contributions to a foundation's agenda.

2. RATIONALE OF INTERDISCIPLINARY NETWORKS

A. Why do we need research networks?

There is a growing consensus that "interdisciplinary collaborations are both a scientific and social imperative"[1]. In part this relates to the complexity of social problems, extending beyond classical disciplinary boundaries. It also derives from the limited capacity of all to master only a few of many relevant scientific disciplines. As Robert Kahn and Denis Prager point out, the structures and rewards within the university discourage active cross-disciplinary work, protecting the boundaries that reinforce isolation or silo-thinking. The impediments to cooperation also extend to funding agencies and to study sections that review grant applications that fosters competition among investigators.

Kahn and Prager describe several stages of: "listening across the gulf, conceptual translation, onset of collaboration and joint projects" that reflect the change in organizations that lead to effective programmatic integration. This monograph describes the processes that promote such interdisciplinary collaboration.

Most recently, significant interest has emerged in what is described as the "science of team science[2]". Two dozen papers were assembled and published describing the conceptual and methodological strategies that enhance collaborative research and training programs[3]. These publications attempt to characterize this new field and the challenges and opportunities in supporting greater collaboration across a variety of research areas and provide greater scientific rationale for the importance of collaborative research.

Collaborative networks serve to bring diverse perspectives, knowledge, expertise and strategies to illuminate complex problems associated with the health, well-being and behavior of individuals and societies in which they live. A key assumption is that network sponsored deliberations and research are structured to exploit the full range of talent represented by network members. Therefore they are better able to address more complex and significant problems than can often be accomplished by individuals working by themselves.

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1   See R.L. Kahn and D.J. Prager, Interdisciplinary collaborations are a scientific and social imperative, The Scientist 8 [14]:12, July 11, 1994.

2   The Science of Team Science- Assessing the Value of Transdisciplinary Research, Eds., D, Stokols, K.L.Hall, R.P. Moser, S.L. Syme, American Journal of Preventive Medicine, Vol. 35, Issue 2, Supplement 1, Pages A1-A8, S77-S252 (August 2008).

3   See footnote 1.

It is useful to understand the thinking at the MacArthur Foundation that animated the decision to seek a broader perspective that was then captured in the development of interdisciplinary research networks.

A very important concept was the agreement among MacArthur's Board that we needed to study success and normal development, not just pathology. So we embarked on exploring successful development across the life span from early children to adolescence to overcoming the challenges of young adulthood, middle age and successful aging, not studied in chronological sequence but eventually covering infancy to old age.

The networks integrated social and psychological development as well as attending to the specific challenges in various environments or those constraints brought about by economic forces or shifts in cultural and social expectations. This required integrating thinking from demography, sociology and psychology. The network members who participated in these efforts commented at the time and later how unique this was and how their respective fields benefited from this input from other disciplines.

In a similar manner, other networks attempted to integrate biological perspectives with social and psychological insights. Others attempted to integrate behavioral and social perspectives and important legal issues or the importance of understanding normal maturation and development on legal decision-making. Another orienting theme was the need to bring together perspectives from developmental neuroscience with those from developmental psychology, which had not been integrated although both deal with the developing infant. In the mind body area the question emerged of how researchers in asthma can learn more about the disease by studying the processes in the brain that mediate inflammation in the lung? There are many examples of the disciplinary mix, depending on the goals of a particular project and approach.

What I observed over many years was that we were able to challenge current thinking and current approaches by facilitating this dialogue across disciplines. Choose a problem and then step back and ask not only how different disciplines approach that problem, but also how they can expand their own explanatory models by learning more about other approaches.

The essence of collaborative networks is the joining together of experts from different disciplines who, under the leadership of a chair, work to define the most salient and accessible problems that are amenable to study and subsequent intervention. Network collaboration in research is a complement, not a replacement for individual scholarly pursuits. Its value lies in mobilizing the talents of individuals to address issues of common concern and to conduct research that would otherwise not be possible.

Brief descriptions of several MacArthur Research Networks are provided in the appendix.

3. PREPARATION - Considerations prior to starting a network

A. Establishing Foundation support

The crucial first step in developing new networks is to open discussion about the focus and rationale for a new network or collaborative program within the foundation. This requires considerable dialog among the Board, foundation leadership, and program staff. Some of the questions that usually come up are:
- Are the questions that the new program might address central to the interests of the foundation and will the results they hope to obtain show substantial promise for impacting policy or practice?
- How will this network, involving interdisciplinary collaboration, provide a particularly effective way of enhancing the goals of the foundation?
- Does this potential new entity, which will require substantial commitments of funds and staff time, reflect the core missions of the foundation?

Early in this process, in addition to discussions among staff, it may be useful to obtain early consultation from senior leaders in the field acting as consultants along with input from program staff. It is useful to discuss various options, advantages and disadvantages of specific areas with leaders in the field who do not have a specific interest in becoming a member of the new network.

Foundations differ in their usual practices in identifying new areas to support and the process whereby Board, executive leadership and staff interact in coming to future consensus. Some Boards exercise very close management of these decisions, others rely more on decisions from the President and senior officers working with the staff.

If there is early enthusiasm for the general area of inquiry that the to-be-established network might address, the expectation is that this will grow in intensity and conviction as expert consultants are asked to present to one another and to the staff. If not, then the idea should be dropped. When several related candidate topics, clustered around one or two general themes are identified, but are not yet tightly defined or circumscribed, it is appropriate to begin thinking about the next step where potential members of the new network will be identified, who can take on the task of working to narrow the choices and strategies.

B. Pre-network development

The selection of network members and the definition and refinement of questions to be addressed by the future group is an iterative process involving staff and network members. Preliminary choices are conveyed back to the foundation, whose opinions are solicited, and then carried back to the group of initial network members. As consensus develops about the most important topics, it becomes clearer whether there is a need to add new members with the other disciplinary perspectives to participate in the network. Network membership is an evolving process and not achieved all at once.

One useful way of proceeding is to invite four to five experts to a meeting sponsored by the foundation. The decision to invite these initial guests, as well as other potential members, results from inquiry by foundation staff members, contacting colleagues, studying the relevant literature in order to gather information about potential members, including both their reputation as experts in their fields and their capacity for collaboration.

Those who are invited for these first meetings are sent a list of 3-4 questions that they will be asked to comment on during the meeting. They should be counseled not to give a long PowerPoint presentations, but rather limit their remarks to 10-15 minutes and told they will have substantial time to engage in questions and answers during the meeting.

It is very important that several program staff listen to the conversations among the invited guests, in order to get multiple perspectives on the individuals that have presented as well as the salience and importance of various topics. It is useful to get feed-back from several staff who attended as to who was particularly helpful in the meeting and who demonstrated substantial capacity for interdisciplinary collaboration, such as:

- listened carefully to others' presentation
- asked thoughtful, penetrating questions
- articulated clearly the perspectives and orientation of their discipline
- were tolerant of different approaches
- exemplified curiosity and enthusiasm.

One way of running these initial discovery meetings is to ask the guests to come at 4 PM and from 4 PM to 6 PM each guest presents a summary of his/her work and their disciplinary perspective in about 10 to 15 minutes. The group then adjourns for dinner together and reconvenes the next day. The planning for this second day usually involves one person being asked in advance to take a leadership role in chairing a discussion of several hours, during which time all participants are encouraged to ask and answer questions. It is very important to keep formal presentations to a minimum to facilitate interactions among the participants. Such interactions provide insight into potential future network behavior.

It is often helpful to repeat this process several times, using the same or related questions with different groups of 4-5 invitees. It is also very important to invite individuals from different disciplines to come together to get insight into how similar questions or issues are approached with different disciplinary perspectives, as well as observing how a different set of guests interact with one another. This will help the staff gain greater insight into consistency in thinking about the important questions, the probability of collaborations among differing disciplines, as well as helping select potentially helpful and exciting network members.

As these meetings progress, the staff should pay close attention to how participants learn about others' expertise, how well do they collaborate in refining questions and think about various strategies to address these questions. After several meetings each involving a small number of guests, there usually is a consensus that develops among the program staff about the most likely candidates for membership in the network, as well as what may be the most

interesting and informative issues that would be both tractable and interesting for the new network to focus on.

The process of identifying potential presenters to join in small groups and repeating these sessions several times usually takes 6 to 12 months, depending on how many staff will be working on this and how many other responsibilities they have. At the end of this period a small number have been invited to join the "proto-network", along with specifying major questions to be addressed and major strategies that could be employed in pursuit of answers.

C. Responsibilities of program staff.

Once staff has decided to begin exploring specific areas and inviting guests, they need to communicate with various leaders in the relevant fields to help develop a list of potential guests/invitees to come and present. As noted the staff needs to assess the communication among those asked to present in terms of how well various individuals work together. There needs to be flexibility and tolerance for some ambiguity among the staff in the development of a new network. It is difficult and even counterproductive to define or circumscribe ahead of time exactly what the network should focus on or precisely what approaches they should take. This is because one important reason for undertaking the development of a new network is the search for better ways to define and pursue difficult issues. This includes the redefinition of the underlying questions as well as searching for new strategies to answer these questions. Being too prescriptive in the beginning of this process may unnecessarily constrain this process.

The decision to embark on a strategy that truly spans multiple disciplines is a daunting task, and cannot be pursued in a strictly linear fashion. The decision to embark on a new network is usually undertaken because what has been done in the past needs to be re-evaluated, new approaches are deemed necessary and the work of the new network is to raise various new ideas or approaches that can take advantage of the multiple perspectives that are being brought together.

It is important to emphasize that a truly interdisciplinary or transdisciplinary network (one where members actually adopt and integrate strategies from other disciplines) is a difficult undertaking. Most of the incentive structure and operation of departments in the academy is one of differentiation and maintenance of separation of disciplines and even sub-disciplines. Individuals who work across boundaries often find themselves labeled as neither fish nor fowl and fall between the cracks and find it difficult to be promoted or receive tenure. That is one reason why it is usual to search for and select senior scholars whose reputation has already been established and can take chances in wandering across disciplinary boundaries.

To summarize these initial steps:
- Clarify foundation support for concept, rationale and focus on the general area where the network will function.
- Solicit input from experts within and outside the institution about important topics.
- Identify a small group of potential network members that will collaborate in both refining and expanding the questions and adding additional members. The staff plays an active role in planning and listening in these meetings.

4. NETWORK FORMATION

A. Identifying potential network members

The decisions about whom to invite become members of the research network are among the most crucial decisions that must be made in developing new networks. The decisions on what will be the specific focus of the work sponsored by the network, the collaboration and integration of the various disciplines represented, and the decision to expand to include other perspectives are all directly dependent on those asked to join the network. As it is also very difficult to disinvite a member once they have been asked to join the group, selections must be made cautiously and not in haste.

The decision to invite additional members to those already identified as core or proto network members needs to be a product of discussion between the network director, the staff and those initially asked to join the group. It is therefore useful on occasion to ask prospective candidates not only to give an initial presentation to the group, but to ask them to attend several of the meetings to see how they fit into the group, to observe their interactions with others and their grasp of the larger picture and their enthusiasm and interest. The decision whom to invite is facilitated by knowledgeable staff and if a network is a very novel undertaking by a foundation, the advice and consultation from others who have experience in this area is often most useful.

If there are serious misgivings about a new potential member from others who have already been asked to join the group or the network chair, it raises a red flag and it becomes questionable if this individual should be asked to join. This is true even if the individual under question brings a crucial and as yet unduplicated area of expertise. If this turns out to be the case, it is incumbent to search elsewhere. From our experience a "lone wolf" or persistently contentious or dogmatic individual can significantly disrupt the development of an effective collaborative network and impair its ability to design and execute effective collaborative projects.

B. Characteristics of network members

The characteristics of potential network members that the program staff should be on the lookout for are:
- Clear expertise in a given field
- Breadth of interests
- Curiosity
- Capacity to re-frame new information into one's own model system
- Lack of disciplinary defensiveness
- Senior status in the profession
- Selection from a broad geographical base (not just a member in a few visible universities)
- Interest and potential capacity to commit the time and effort required

After several (approximately 4-6) potential future members are identified, they should be encouraged to take a more active role, collaborating with staff in identifying additional

disciplinary perspectives that need to be brought into the new network. These presentations from new guests provide the initial core group with a common experience of being exposed to new ideas and to take on the task of integrating what they are learning into their own models and understanding. This is an important element in developing a functional network, i.e., the capacity of the group to synthesize and integrate new ideas.

C. Problems of disciplinary isolation

In searching for prospective network members one of the most important guiding principles is to look broadly across disciplines. This is often difficult as most researchers or academics are not accustomed to close contact or interchange with others from more disparate fields. Although there are some indications that disciplinary boundaries or 'silos' are softening, the general propensity is for ever more finely divided approaches. Much effort is expended in the academy to define differences in models or strategies and to criticize or depreciate those outside one's own immediate field.

A crucial goal of the network is to generate innovative insights with investigators from different disciplines, different frameworks and different evidentiary approaches. In order to facilitate this collaboration, the composition and function of the new network has to overcome the traditional isolation and discomfort in dealing with those outside one's own field.

These issues are often problematic between various social and behavioral sciences between various psychological sub-specialties as well as between psychological sociological and biological approaches. Often networks must integrate across levels from more macro, cultural and legal perspectives with those focusing on individual behavioral differences and also need to incorporate approaches that are physiological or genetic and that deal with risk or course of disease.

Networks are one of the few opportunities to harness these traditionally separate approaches. The challenges are great to bring together in a truly functional, collaborative manner scholars and scientists that come from arts and sciences with those in biomedicine or from public health.

An early strategy that the MacArthur staff employed in setting up new networks in an attempt to bring individuals working in disparate fields was to organize the work around "nodes" involving groups of researchers from one or more universities close geographically. As the parent university was the recipient of the grant it was felt this could serve to facilitate collaboration and help bridge disciplinary divides.

In evaluating these early networks, it became clear that this was not as successful as had been anticipated. The choice of network members was significantly constrained by having to choose individuals working in various departments in the parent university and not being able to look broadly to select individuals who demonstrated a real interest and capacity to reach across disciplines and work to define an truly integrated interdisciplinary approach in defining the network's agenda.

One other problem with the "nodes" approach was that the network members did not have to work particularly hard or diligently to overcome their individual approaches or biases in order to achieve a really integrated approach. Their selection as members came more from working at the university and not so much because of their capacity to collaborate. The 'network' aspect was too much taken for granted and not achieved by spending a lot of time together working on hammering out differences.

In the selection of members in networks established after this initial phase, the Foundation searched broadly across the country and at times in foreign countries to bring together individuals with diverse expertise combined with a deep commitment to work collaboratively in defining a research agenda that would not have emerged from their working by themselves or within their own discipline.

Another crucial issue that needs to be resolved in the formation of networks is designating the chair of the network. Along with establishing the network focus and how it will proceed to collect and integrate new information, choosing the network chair is the most important decision in establishing a new network. Sometimes who will function as chair is made at the very beginning of the process in deciding to develop a new network. Sometimes it becomes evident very early in the meetings of potential members and sometimes it emerges as a consensus among those who will be asked to join early on and among the staff.

D. Attributes of network chair

The following are some important attributes of the Network Chair
- The leader has to value input from all the members and enhance or facilitate input and contributions from all members.
- The leader must facilitate the focus of discussions and eventually limit the number of questions or issues that are pursued in the agenda of the network, accomplishing this without being dogmatic or arbitrary.
- The leader must communicate the sense that the network is 'owned' by all and not the intellectual property of just the leader, even though it may be referred to as his or her network. Ownership is facilitated by the creation of a shared network vision that requires the leader to help in the translation of network goals and strategies into the particular language and models used by each network member.
- The leader must be even-handed and perceived as fair in distributing the funds to the various labs or centers represented by network members. This is facilitated by the network as a whole discussing the priorities for research that are the focus of network goals and the nature of the data to be collected.

The selection of the network chair often requires considerable discussion among foundation staff and vetting of candidates by contacting leaders in their field. It also should be discussed with the other members of the early core network, if they have already been identified. Are they comfortable and enthusiastic about the choice? Other issues that need to be taken into consideration are whether this candidate for chair can take on the considerable obligations of time and energy that are involved in leading a network. Most chairs have found that they need

to commit at least half time to this responsibility and some even a larger percentage of time. They also need to find out if their parent department or institution will support their efforts. This support is usually enhanced by the fact that the department and institution will be the recipient of significant funding from the foundation. Budgetary management is facilitated by having just one institution receive the funds for the network. Sub-contracts are then negotiated with other institutions when the research is conducted.

The leaders of MacArthur networks have used very different executive styles to get the work done; some tending toward the CEO approach, others toward a more egalitarian approach. Neither is correct and it is neither feasible nor desirable to attempt to force a leader to adopt a style that is other than the one that has made him or her successful to this point. It is useful to get candidate leaders to articulate their management / decision-making styles. That will influence members and the relationship staff has with the network.

5. NETWORK IMPLEMENTATION

A. Establishing a functional network

By this time there has been substantial progress in defining more precisely what are the most important questions that should be addressed by the network. This includes whether the focus and goals of the new network are central to the interests of the foundation and do the results they hope to obtain show substantial promise for impacting policy or practice?

These issues continue to be refined in the implementation of the network as more members are identified and their individual views are integrated. The establishment of a functional network involves ever greater specificity and the determination of exactly what are the most essential questions that the group decides it will pursue.   `

It is important to emphasize that network preparation and implementation usually takes 18 months to two years to accomplish. This time is necessary to clarify interest and support within the foundation for exploring a particular theme or topic as a central focus of a new network. Some of this is taken up by determining the necessary disciplinary input and this can be facilitated by obtaining early consultation from experts in various fields.

In more recent years it has become standard practice for the networks supported by the MacArthur Foundation to add expertise earlier in the network to include individuals who are experienced and skilled in the translation of research findings to policy and practice. They are often practitioners whose perspective on what matters and how it becomes more visible and will be more readily adopted by other practitioners. It has become evident to staff that it is not sufficient to wait until all the data has been collected before thinking about its practical value or utility. We have found that having this perspective earlier in the process serves to provide an important and complementary focus on what should be studied or tested that will have greater relevance to practice or policy.

B. First phase of funding

Up to this point, most of the work and major decisions in establishing the new network have been in the hands of program staff. The costs of the meetings where potential members present, including travel and honorarium, have been borne by the foundation.

In this next phase of network implementation, after the group receives funding from the foundation, there is a shift in responsibilities to the newly established network with the designated chair and approximately six or so core members. This phase is also characterized by the new network taking responsibility for organizing meetings, inviting guests, and deciding on additional disciplinary expertise that needs to be considered in building the larger network. As described later, these efforts are greatly facilitated by hiring a network administrator, often someone with whom the network director has collaborated with in the past, although at times this person has been selected because of past experience with other networks.

As the new network emerges with a designated chair and a critical number of early network members, the first major challenge for the group is writing the first proposal to the foundation or agency for review and funding. This challenge also serves to clarify their sense of purpose and commitment and it reflects their best understanding of what needs to be studied and how they anticipate they will accomplish this work.

The staff needs to provide feedback to the network as to what they perceive as the readiness of the group to write this initial request for funding. Should they proceed as they are currently constituted, or should they add more members? There is a tendency for the initial network members that have been selected to resist expanding the group. It is a lot of work for members to have to explain once again to newcomers what they do and the rationale for their work as well as their having to absorb what new members are working on.

After the first round of funding is received, the network chair, assisted by the network administrator, becomes responsible for budget. The budget usually includes several categories: operating costs, including partial salary support of the chair; the salary of the network administrator (see below for a description of this job); and costs of meetings. Another major expense involves support of preliminary studies, including collection of pilot data and/or scholarly reviews of extant literature or synopses of other work being conducted in the field. The specific budget is a topic of frequent discussion between the network chair and program staff responsible for support and continued interactions with the network.

The nature of the discussion of budgetary issues between the chair and members of the network differs, given the style of leadership and interactions among the group. It is important that the network members have an opportunity to discuss and review the priorities of the specific research agenda. There needs to be a developing consensus on what the actual focus of future work that will characterize the agenda of the network. The chair needs to carefully monitor where monies are committed. However most often, there is not a specific vote of the entire group of network members on the actual dollars spent for various projects. The issue of budgetary decision making is usually a product of discussion and agreement among the

chair, network administrator and the responsible staff. This means that the entire group does not vote on specific budgetary items, except that the group must support the priorities for upcoming work that reflect the commitments and sense of investment of the network.

The chair, assisted by the other members, should write a proposal for the first phase of independent funding to support the network's activities. We have found that it is not necessary for the group to produce a large 50+ page NIH-like proposal. What is required is their exposition of the major questions that need to be addressed, how different disciplines will contribute to defining these questions, what the group feels at this point in time as to most probable strategies to collect and integrate new information, and what the goals are for the next 2-3 years in expanding the network and refining its agenda. This proposal and request for funding from the Foundation reflects the transition from a staff-driven process to one in which the new network takes over responsibility for the activities of the group. This proposal should be presented as a product of group discussion and work, not just the responsibility of the chair.

i. The role of foundation staff

This is not to indicate that the foundation staff withdraw and leave the network totally to their own devices. It is still essential that the staff actively attend many network meetings, listen to the presentations and consult with the network chair in helping the network grow as an effective group. The chair should be supported by the staff in setting expectations from the members including the need to attend to each of the 3-4 meetings a year that are essential to the work of the network. This needs to be communicated earlier in the process of network development at the time that members are identified and asked to join the group.

As noted, adding new members to the core group at times is often met with resistance from those already designated as in the network. The staff and network chair must support the group in developing a sufficient breadth of expertise or the group will not be able to capitalize on a true interdisciplinary perspective. The addition of more members adding crucial disciplinary perspective can occur after writing this first proposal, but it should not be delayed too long, as it can disrupt the development of consensus.

ii. Budget

The staff should communicate to the network that they may request funds for a number of items. These include the costs of the group meeting 3-4 times a year, usually for a couple of days, support for focused literature reviews, perhaps even an edited volume that summarizes work done to date in given areas, partial support for the salary of the chair and support for a network administrator that we have found is essential in helping organize meetings, arrange travel, keep minutes, etc. If all of these fall on the network chair they will quickly become overwhelmed and distracted from the intellectual work of leading the network.

It has not been the practice for the network budget to include substantial portions of the salary of various network members, save the chair, for to do so would absorb much of the budget. To recognize the contributions of network members, but not to incur the very substantial costs of paying for a significant portion of 12 or so network members, which characterize a mature network, many chairs have included in the budget funds to pay an honorarium to each network member in the vicinity of $15,000 a year. This honorarium acknowledges the commitment of time and effort that must come from each network member. Network members are usually senior leaders in their field with very busy schedules and the honorarium is an attempt to reflect the appreciation by the foundation of their importance and their value to the process. That leaves the majority of funding to the network to cover the actual costs of the proposed research. However, the costs for the conduct of the actual studies do not usually occur until after implementing of research projects. During this third phase, most of the effort is still in the building of the network, inviting additional guests to present along with substantive reviews of work accomplished to date.

Depending on how many members have been identified up to this point, the annual budget for the network over the next several years before the actual implementation of the research agenda is in the vicinity of $350,000 to $500,000. This figure escalates significantly in phase four, where the actual collaborative projects chosen by the network begin. Annual budgets for the mature network often are $1 million or more, depending on the nature of research costs, etc.

Some staff may be surprised at these costs, especially those when the network itself becomes responsible for administering its own work. As meetings are a significant part of these costs, it is important to emphasize here the crucial importance of the 3-4 meetings per year of the network. These are the life blood, the essential opportunities for the network to succeed and flourish.

It is at times helpful to the staff and foundation to send this initial proposal out for external review by experts in the various fields that are represented in the network. This is not as crucial as the review of the complete plan for future work that will be required before the beginning of the main efforts. The foundation staff, therefore, may decide not to send this early proposal for review, that depends in part on the breadth and sophistication of the staff.

This external review is useful if it is felt that external feedback is important at this time to provide opinions on the questions being addressed, along with commentary on the proposed strategies, and whether there are important gaps in the proposed work. These reviews are treated as confidential and are shared only with the network chair and other members. The identity of these external reviewers should be kept confidential.

It is also useful for the network to respond to what has been raised by the outside reviewers. Both the reviews and the replies are summarized and presented to those responsible for funding decisions in the foundation and agency. The reviewers also need to be informed that this is not similar to a complete NIH proposal, it represents work in progress, and should not be scrutinized as the more definitive proposal at the end of this second phase of work will be.

C. Role of the network administrator[4]

As the concept and implementation of networks has evolved, it has become clear that the successful operation of a Network requires a tremendous amount of attention not only to scientific and programmatic issues, but also to administrative matters. Accordingly, the need for the network administrator position has become clear and all networks established by MacArthur have been supported by the crucial efforts of an administrator.

The goal of the network administrator is to facilitate the accomplishment of the Network's scientific objectives by establishing and carrying out administrative procedures efficiently and independently. The means for attaining this goal is the development and maintenance of an administrative/organizational infrastructure that facilitates the accomplishment of scientific activities. The network administrator focuses on logistics, information dissemination, and implementation, freeing both network members and the network chair to conduct their activities in an effective and timely manner.

As the network administrator is familiar with all of the network's activities, he/she has a broader (and often historical) perspective on the network than most members. This perspective allows the administrator to occupy a special position within the network and specifically in relation to the network chair. It permits the administrator to act as a liaison between network scientists and the chair, as a primary resource for members in the administrative aspects of their network activities, and in some cases, as an advisor to the chair. A thorough understanding of the network's overall structure and goals allows the administrator to anticipate administrative needs, to act on these needs independently or to develop a plan of action to propose to the chair. This ability to deflect administrative details from the chair and members and to manage administrative matters independently makes the administrator of special value to the network and especially the chair.

Administrators develop a creative and flexible operational style in response both to the needs of the particular network and to the needs and personal style of the chair. Thus, the tasks performed and the scope of responsibilities of each administrator may differ from network to network, but in all networks the administrator's role is viewed as vital.

The administrator plays a central role in facilitating the relationship between the network and the foundation by acting as the administrative liaison to the foundation. The administrator is responsible for overseeing the compliance of grant activities with foundation policies. Many questions the foundation has concerning the network are generally directed initially to the administrator for reply.

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4   The author would like to acknowledge this contribution from Ruth Runeborg, who not only served as network administrator for several networks at the MacArthur Foundation, but also chaired meetings of network administrators from all MacArthur Networks for many years, thus facilitating their knowledge of how to be more effective in this special role.

The administrator acts as the key contact at his/her institution in relation to the grant, its subcontracts, and all other payments from the grant. Any questions the institution has concerning the grant are first directed to the administrator for reply, as opposed to the foundation. In this way, the administrator facilitates the relationship between the foundation and the host institution.

D. Summary of initial recommendations

It might be useful to summarize the process that has occurred up to this point in time in establishing a new interdisciplinary research network.

The first activity, described in preparation, involves establishing support for a new network within the foundation or agency. This requires the emergence of some shared vision among the Board, administration and staff of what a multi-disciplinary group could contribute, why this could be an important element of the portfolio of the institution and what could be its significant contributions to policy and practice.

This commitment should include the designation of program staff who would work on identifying potential members and early clarification of important questions that would shape the focus of the new group. It also involves consultation with outside experts to help identify potential participants. Finally, it requires an internal budget to support inviting potential network members to travel and present their work to one another and to the designated staff.

The next step expands on of what has already has started. Assuming that the initial meetings with potential network members have gone well and there is enthusiasm for the topics as well as initial embracing of interdisciplinary collaboration, the gathering of additional potential members to present is accelerated. It usually takes multiple meetings, approximately 4-6 over many months between various scholars and researchers before the staff have good idea of those who might be invited to join a new network. These meetings are usually held at the host institution so that several staff can listen to the presentations and offer their opinion on both the topics discussed and the attributes of those presenting. Depending on the amount of staff time available for such efforts, these initial steps up to this point will often take nine to twelve months.

In network formation, a subset of those who have presented are asked to become the core group. It is also essential that the staff designate the chair of the network. As this is a very crucial step, it is important that there is consensus among those who have participated in the process to date, i.e., other staff and leaders in the foundation, outside consultants who have been particularly helpful in identifying potential scholars and those who have been invited to be core network members. At times, the network chair has already been chosen early in the process, and has been active in helping select network members, but this is not always the case.

It is evident from this discussion that the evolution of collaborative networks consists of solidifying their agenda as they continue to meet and plan. It should have some degree of fluidity, but decisions need to be made as they move forward. After the first year or 18 months

of their work together, shaped by the input of staff, they become responsible for writing the proposal for support as a more independent group.

The discussions about this first proposal for funding serve to clarify:

- what they are most enthusiastic about and interested in collaborating on
- the strategies involved in designing the relevant research
- the most important gaps in their expertise that need to be filled by adding more network members in the future.

After this initial grant is reviewed and approved by the foundation, the network now assumes administrative responsibility for their work, organizing their own meetings, sponsoring appropriate reviews of the literature and beginning to solidify future research projects. This is greatly facilitated by the addition of a network administrator.

6. NETWORK MONITORING

A.   Crucial role of network meetings

These meetings are the most important venue through which the network members become a cohesive and effectively collaborative unit. The unhurried discussions that occur when network members present their own work, respond to presentations from guests who are under consideration for network membership, discuss the nature of the research they will undertake and the rationale for pursuing these projects all serve to knit the members together into a cohesive group.

In retrospect, many network members have commented that these intensive interactions are the glue that binds them together and is one of the most important rewards for their participation in the network. Indeed, the opportunity for the members to present their own work, along with the models that inform the rationale of their research or area of study, provide a unique opportunity for interdisciplinary debate and discussion that is relatively uncommon in the academy or in many practice settings. The creative tension and resolution of differences that characterizes such discussions can be considered the fabric which knits the group together and leads to the design of exciting and novel research projects. Thus, it is understandable that these frequent meetings and what emerges from them comprise an important reward for participating in research networks.

It also can be argued that it is important to have these network meetings in pleasant venues, not just at airport hotels. The locale and dining out together serve as incentives and rewards for asking very busy and productive people to take three to four days several times each year out of their schedule to travel and meet together. As noted in the budget discussion, network members are not being paid large retainers or significant parts of their salary. Nor will all the members of the network be funded for the projects that are undertaken by the network. So the meetings themselves in pleasant locations plus the rewards of talking and being with one another function as important incentives for participation in the network.

The three to five annual meetings of the network also are important for the group to hear presentations and ask questions from other experts in the various disciplines that have potential contributions to the network. It is important for all members to listen to new findings and approaches with the opportunity to integrate these into the plans for the studies to be sponsored by the network. These presentations from others also provides the group an opportunity to discuss the value of having new disciplinary expertise added to the network and whether specific individuals are a potential good fit with those already selected as network members.

The network administrator also serves a very important function in organizing these meetings, helping the members with their plane reservations, negotiating hotel rates and arranging restaurants where the group will dine. Without such assistance the chair becomes overwhelmed with logistical planning and distracted from pursuing the intellectual and research planning agenda that must emerge from these meetings of the network. In some networks the administrator also is responsible for taking minutes of the meeting and, with the editorial assistance of the chair, in writing the summaries of the meeting.

B. Implementing research agenda

In reaching the next phase the network has emerged as a functioning and significantly autonomous group. Its roster of members is usually complete, most often approximately twelve network members plus chair. This is not a hard and fast rule and sometimes the group will add one or two more members if previously unanticipated gaps in relevant expertise are discovered. The group has actively engaged in frequent meetings, sometimes dividing into smaller task groups that met during the larger meetings or at other times. Their prospective plans have often been reviewed by others and they have also established a close working relationship with the foundation staff. They also most likely will have been engaged in some pilot studies as well as performed systematic reviews of the relevant literature and have already published some of these overviews of the field.

They will have begun to establish a reputation as a group of experts with special knowledge and novel approaches in their domain of study. They will have developed a reputation where writers and journalists turn for answers about areas of interest or controversy that come up.

More recently, established networks have also found it valuable for them to anticipate issues related to the dissemination of their findings both to those in their own fields but also more broadly to the public. This may be facilitated by their contracting with experts in the media who can advise them about laying appropriate groundwork for the dissemination of their research findings. These later efforts can also be enhanced by communicating to writers and journalists what they are studying and why this is important. This can enhance the receptivity to what they learn later on and help establish their reputation as experts in the field.

It is also anticipated that at this point the group has begun its active research agenda. There have been repeated discussions as to the specific questions that must be addressed and the details of the studies or experiments that are supported by the network. Efforts need to

include how the various studies interact and complement one another. Specific methodologies should capitalize on the expertise within the network. It also may involve outside collaboration between other investigators and those within the network. The interdisciplinary nature of the research is often facilitated by the chair and other network members visiting the labs and other worksites of various network members. Sometimes staff members will also accompany network members in these visits.

Another important part of the implementation of the research agenda is for the network members to present the pilot data they have been collecting to others in one of the network meetings. Are the results as expected, is there a need to redesign or alter future studies? The individual members are thus encouraged to use the network as an extension of how they would interact with the members of their team at home. This is just another aspect of building effective interdisciplinary collaboration.

Approximately two years after receiving the first phase of funding from the foundation, which provided support for their meetings and for the design of studies and collection of pilot data, the network is usually at the stage where they can submit a proposal to fund their future research agenda. This is a more comprehensive document than the original request for funding. It also involves the commitment of much greater resources from the foundation, often in the vicinity of $1 million dollars a year for the next three to four years. These funds are often required to implement the much more ambitious series of studies, collection of data from various labs, or more extensive surveys than occurred with the first round of funding.

Consequently, this proposal from the network is most often sent out for external review. It has to be more detailed and needs to set out the rationale for the work, justifying the studies that are proposed as well as greater specification of how the results can be used to influence policy or practice. As with the first proposal, this must be the product of all members of the network, not just the chair. Often network members will use one or more of their meetings to lay out the broader outlines of the proposal and work on drafts of various sections that are then distributed for comments and suggestions from the members.

Foundation staff needs to gather commitments from experts in various fields to review this larger proposal. As before, the identity of the reviewers must be held in confidence. If this is not observed, candid reviews will not be forthcoming. Reviewers are compensated for their efforts and detailed comments are solicited from them. They also need to be informed that their remarks will be shared with the network so that remarks that would identify them are avoided. It is hoped that the majority of comments will be laudatory and supportive of the themes being pursued as well as the details of the studies being undertaken. However, it also is likely that there will be some more critical comments and suggestions. These are to be welcomed for they provide an additional opportunity for the group to reflect on what they are doing and get input from knowledgeable others who have not participated in the discussions to date.

The staff needs to broker these discussions with the network members and chair. The network is provided an opportunity to respond to the reviewers' comments. There should be an attempt to integrate what the outside reviewers suggest and what the network feels is useful or not. It is

unusual for the foundation to cease its support of the network following this review, although on occasion substantial changes have been made in the network's future plans. Reviewers need to know that they have an opportunity for significant input, but also that the network does not necessarily have to follow their recommendations. One small caution is worth mentioning. It is best to avoid choosing reviewers who were actively involved in the early stage of network formation, came to present, but were not ultimately chosen to become network members.

C. Annual meetings of network chair and staff

As noted, it is most useful for the staff to attend many meetings of the network. The staff can be helpful in facilitating the dialogue among the members, provide support to the chair, and learn important details of the projects that are underway.

It also is useful for the chair and perhaps one or two senior members of the network to present to the foundation what they have accomplished, what questions they have about their ongoing work, as well as hear comments or concerns from various staff.

Networks are expensive and potentially unique opportunities for the foundation to pursue its priorities and ultimately find new ways to impact the field. Networks are thus intimately linked to the priorities of the foundation. It is therefore useful to promote a close working relationship between the network and the foundation staff. This is achieved by one or two staff being intimately familiar with the network's focus and its progress. However, this working relationship should also extend to others in the foundation being familiar with the goals and efforts of the network. This knowledge may also translate to support of related grants that complement the work of the network, but not part of their immediate agenda. Therefore, it has been useful for the network to make a more formal presentation to the foundation on a regular basis and many in the foundation are encouraged to attend.

It is also useful for the network to schedule one of its three to four annual meetings to be at the foundation. This enables many more staff to come and listen than just the one or two that have more direct responsibility for the network.

D. Mid-course review

After the network has received funding for implementing their research agenda and has had a few years to pursue this work, it is useful to schedule a mid-course review. This may actually occur a bit after the exact middle of their time together, but not too late to offer useful suggestions as to what their final product will look like and hear about their goals for policy and practice.

This review can be scheduled during one of the annual meetings of the network chair at the foundation. This review should promote a shared understanding of what the network is finding, how these findings can more directly influence the field, how they may be used to impact policy and practice and how the network is planning to communicate and disseminate their findings. The foundation may also be able to provide significant assistance in this latter goal.

It also can provide reassurance to the foundation that the network is on track in its efforts and what it is finding. It also sets the stage for the final installment of funding that is necessary for the network to conclude its research and facilitate communication and dissemination.

E. Length of support

Many MacArthur networks were supported for 10 years, some more and some less. This period of time is necessary for the network to develop slowly, choose its members wisely, and allow sufficient time to decide on the most important issues to focus on and to facilitate dialogue with the foundation. After this has developed, the actual conduct of the studies to clarify the questions that animate the network's existence require an additional four to six years to complete. A final year or two of support is often given to facilitate the communication and dissemination of the network's findings and recommendations to the field.

F. Summary of network accomplishments and network review

Around the final year of network support, it is useful to ask them to organize a summary of their accomplishments. On occasion it may make more sense to do this later on, not only after they have finished their collection of data, but after it has been published and after the field has had an opportunity to respond.

This summary should detail their findings, what has been published, what has been the response in the field, how their findings have been used by others, and what has been the impact, to date, on practice or in policy changes.

This summary forms the core of a network review that the foundation may wish to conduct. This can be a substantial undertaking and requires the efforts of a senior member of the foundation, often with experience in evaluation. At MacArthur it was organized and conducted by Paul Lingenfelter.

This review involved the appointment of a team of outside reviewers, led by a chair, who worked closely with Paul. The four to five members of this review team were asked to review many of the publications that came from the network, as well as to interview many of the network members. The review panel was also provided with copies of the proposals that were made to the foundation for support where they outlined the rationale for their future work, the nature of their studies and what they hoped to achieve with their efforts.

The panel was asked to respond to a number of questions:

- What did the network contribute beyond what could have been accomplished by supporting just the individuals by themselves?
- How well did this network function in an interdisciplinary, collaborative manner?
- How successful was the network in achieving its own goals as stated early in the process and amended as they proceeded?

- How well did they fulfill what they had promised in their proposals to the foundation for support?
- How successful was the leadership of the network?
- Were there important gaps in what the network studied?
- What was the impact of the network's findings in the field?
- What were the important accomplishments of the network in changing practice or in influencing policy?
- Are there specific lessons learned from this network that could be applied to the establishment and managing of future networks, i.e., how the foundation organized the network or interacted with them during its course?

The panel also met on at least one occasion to deliberate and come to its conclusions. Their report was also shared with the network and they were given an opportunity to respond to comments.

7. CONCLUDING REMARKS

Interdisciplinary research networks represent a novel and potentially effective means to bring together differing perspectives to study difficult and important issues that have eluded understanding and potential intervention. Too often the study of many issues that impact well-being or health is seriously constrained by the isolation and insularity of relevant disciplines. This isolation or "silo" thinking occurs across many of the psychological and social sciences as well as among many of the components of biomedicine. It is especially problematic in the interface between the behavioral and biological disciplines.

Another traditional shortcoming of many of our intellectual efforts is the divide between research and practice and research and its impact on policy. Practitioners are often far separated from those who design and conduct new studies, even though they are the ones who ultimately need to benefit from these efforts.

Interdisciplinary research networks provide one means to bridge these usually separate approaches. They offer an exciting opportunity for individuals who are open to such interactions a means to design truly interdisciplinary studies that span disciplines, link researchers and practitioners and scholars and investigators.

This monograph attempts to lay out a blueprint on how to establish such networks within the context of support by a foundation or other like minded organization. It draws heavily from the author's experience at the John D. and Catherine T. MacArthur Foundation in Chicago which was an early pioneer in the support of interdisciplinary research networks. In recent years, other groups have also begun supporting such networks and have found them of particular value.

I hope that the reader is encouraged to think more about the value of such efforts and if so, finds the recommendations that are set forth useful.

8. ACKNOWLEDGEMENTS

Robert M. Rose

Bob Rose was Director of the Health Program at the MacArthur Foundation from 1994 to 2001 and worked with several colleagues in the development and support of over 24 interdisciplinary networks. From 2003 to 2005 he was a special consultant to the President of MacArthur, assisting in the application of the network model to areas beyond mental health and human development. He also was chair of the MacArthur Research Network on Mind-Body Interactions from 1989 to 2000 and in 2002 started a new not-for-profit research group, Mind Brain Body and Health Initiative, which received funding from several philanthropies and the NIH.

9. APPENDIX – EXAMPLES OF MACARTHUR SUCCESSFUL NETWORKS

As noted, the MacArthur Foundation, over the past two decades, has supported a large number of interdisciplinary research networks in several fields. More recently, a number of other foundations, including the Robert Wood Johnson Foundation, the Christopher and Dana Reeve Foundation, and the Lance Armstrong Foundation, as well as the National Institutes of Health, have established networks in the areas of the etiology of tobacco use among youth, spinal cord research, cancer survivorship, and obesity and cancer.

The following are examples of networks that have been particularly effective and that exemplify the integration of scholars and investigators from different fields. The descriptions of them is provided as a means of demonstrating "why bother", given the amount of energy and resources that are required to set us successful networks. More details about these networks as well as brief overviews of other MacArthur supported networks can be found at the MacArthur website (www.macfound.org) under Grantmaking in the US and then Research Networks.

One of the first research networks that MacArthur supported was on Successful Aging, chaired by Jack Rowe, which demonstrated that loss of function is not an inevitable part of the aging process, not solely genetic, but related to life-style and psychological attitudes. Network members came from many fields including gerontology, social epidemiology, psychology, and research using animal models, among others. A best-selling book by Jack Rowe and Bob Kahn, Successful Aging, followed reporting on the network's findings, emphasizing the importance of active engagement with life. A second iteration of this network was recently announced, also chaired by Rowe, the MacArthur Research Network on an Aging Society. It is also very interdisciplinary in nature with the addition of scholars in cognitive neuroscience, macroeconomics and public policy along with those in gerontology, psychology and social epidemiology.

Another very successful early network was on Mental Health and the Law, chaired by John Monahan. This network brought together experts from clinical, developmental and social psychology with those from sociology, psychiatry, law, mental health administration, as well as national and state policy makers. The network had two mandates: "to develop new knowledge about the relationships between mental health and the law and to turn that understanding into improved tools and criteria for evaluating individuals and making decisions that affect their lives."

They conducted several novel and landmark studies on competence among those with mental disorders, the risk for violence in the mentally ill, and the use of coercion in hospitalizing and treating the mentally ill. They found that mental illness alone does not necessarily impair treatment decision making. Risk for violence was more related to history of substance abuse than mental illness without such co-morbidity. The network was also successful in developing strategies to impact how the legal system deals more rationally and compassionately with the mentally ill, incorporating the insights that their research demonstrated.

The Project on Human Development in Chicago Neighborhoods (PHDCN) was led by Tony Earls, Robert Sampson, Steve Raudenbush and Jeanne Brooks-Gunn. The stimulus for this large study was the need for comprehensive and longitudinal research that would clarify the

pathways that lead to conduct disorders, juvenile delinquency, adult crime and substance abuse. They combined two approaches. The first was an intensive study of Chicago's neighborhoods- describing social, economic, organizational, political and cultural structures. The second involved a coordinated series of longitudinal studies of over 6,000 randomly selected children, adolescent and young adults to examine personal characteristics that might lead them toward or away from antisocial behavior.

These two sets of studies required the integration and collaboration of experts from many disciplines, including psychiatry, developmental and clinical psychology, sociology, criminology, public health, medicine, education and statistics. One of the more interesting findings that emerged from on-going data analysis is that the most important influences on a neighborhood's level of crime and violence are not so much race and poverty, but the willingness of the residents to get involved and support one another, which they called "collective efficacy". Future work will also examine the interplay between the contextual influences of neighborhood with the individuals' longitudinal trajectories.

Another network that focuses on individual development and the risk for criminal behavior is the Network on Adolescent Development and Juvenile Justice, chaired by Larry Steinberg. The group seeks to expand the knowledge about the origins, development and treatment of juvenile crime, with an emphasis on disseminating this knowledge to improve decision-making in the current juvenile justice system. This network has incorporated the perspectives of practitioners in social science and the law early in their work together, along with other experts in psychology, sociology and policy.

Their efforts have focused on studies to clarify competence of adolescents, how they differ from adults in their ability to understand the trial process, assist in their own defense and to make decisions about their rights. What is the nature of culpability, how does it develop longitudinally and how should it affect the juvenile justice system's responses? They also studied adolescents' capacity to change and their response to treatment in desisting from future crime. The network has had considerable success to date testifying before various legislative groups in several states about younger adolescent's diminished capacity for judgment and understanding the consequences of their behavior, which usually improves with their continued growth and development.

The efforts of the network Initiative on Depression and Primary Care, chaired by Allen Dietrich and John Williams, emerged from the need to enhance the efforts of primary care physicians in their management of patients with depressive disorders. Their work revealed two barriers: the absence of tools to improve depression management and the lack of time and support in the practice setting for care of these patients. The network integrated the expertise of practitioners and researchers in primary care medicine, psychiatry, psychology and epidemiology with experts in design of intervention research.

They developed the Three Component Model designed to work in a wide variety of primary care settings, focusing on the primary care clinician, the case manager and a mental health professional consultant. They tested the utility of this model in more than 60 practices and 5

health care organizations, demonstrating that those patients who received a higher percentage of the key elements of the Three Component Model had significantly better outcomes. Three-year follow ups determined that the majority of practices continued to support the model. More recently the Initiative has been successful in implementing the model even more widely to many health provider organizations, e.g., New York City Dept. of Health, US Army and others. Their Depression Toolkit has been downloaded by over 20,000 times by clinicians and managers from 100 countries.

The final example provided in this brief overview is the Network on Early Experience and Brain Development, chaired by Charles Nelson. They bridged three related disciplines: development psychology, developmental neurobiology and several sub-disciplines in pediatrics. They drew on expertise in behavior and biology, cognitive neuroscience, neuroimaging, molecular biology, fetal brain development, and effects of psychological trauma on infants and children.

They focused on several major areas: effects of early experience on brain/behavioral development; comparative studies of early brain-behavior in rodents and monkeys; and impacting public policy by educating educators and the media about early brain development and its influence on intellectual and behavioral development.

They also conducted a ground-breaking, randomly controlled and first of its kind study attempting to remediate the effects of institutionalization of Romanian children. They were able to demonstrate that placing children in foster care could reverse many of the negative effects of living in the orphanages. This study also contributed significantly to the government's deciding to close the orphanages in Romania.

Their work on dissemination of research on early childhood development has evolved into a free-standing organization—the National Scientific Council on the Developing Child—which combines developmental research and communications research to educate policy makers and practitioners.

These examples and other successful networks share several characteristics. They all involved input and coordination from experts in many fields. They facilitated the integration of more theoretically oriented scholars with those whose expertise was in experimental design. Many of these networks sought to bring practitioners into the discussions early in their efforts in an attempt to facilitate the real world utility of the studies they would design and implement. They also to varying degrees sought to bring into their group those with expertise in policy, so as to enhance the general impact of what they would learn, beyond the academy or their profession.

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