

"Scientific Credibility, Positivism, & Social Integration"

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Abstract

Social relations of project design and negotiation of research implementation are examined in the case of the Hood River Conservation Project, a \$20 million dollar electricity conservation demonstration project in a small semi-rural Oregon community. The focus, using examples, is on the social process of negotiation among diverse interests with a stake in research outcomes. The viewpoint is that of critical theory, in which research is seen as human activity dependent upon social integration and essentially as a process of formation. Scientific credibility requires consensus among members of a knowledge community, and in applied social research the consensus process must extend to diverse and sometimes adversarial interests. In the overall process of research, the positivist tradition has an important but subordinate role, the qualifications of which are particularly visible in applied research which is intended to be "used and useful".

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INTRODUCTION

The Hood River Conservation Project (HRCP) is a \$20 million dollar federally funded demonstration research project in the conservation of electricity in existing residences through retrofit with "high-level" weatherization measures. To provide an overview, HRCP research objectives are presented in Figure 1, lines of research supporting these objectives are shown in Figure 2, and high levels of weatherization measures employed are indicated in Figure 3. A complete account of HRCP research instrumentation, the project's community mobilization dimension, and early findings is available in the research papers listed at the end of this paper.

HRCP is designed as an empirical test of the "reasonably achievable penetration levels" and associated energy savings which may be obtained through vigorous marketing of residential retrofit weatherization. The high levels employed are cost-justified at nearly four times present cost ceiling. The weatherization package is virtually free to dwelling owners. The weatherization package, although high-level by today's standards, has been developed to meet practical expectations as an alternative to the construction of new power plants under foreseeable conditions of energy shortage. The underlying concept in this effort is the purchase of conservation as an energy resource.

This paper focuses on HRCP research planning and implementation as a social process. HRCP is viewed as a practical experiment in interorganizational cooperation in applied research.

FIGURE 1
RESEARCH OBJECTIVES

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- OBJECTIVE 1:** To determine the impact of conservation measures by --
- A. Evaluating the transmission and distribution effects of a comprehensive conservation effort.
 - B. Evaluating individual customer load characteristics:
 - C. Evaluating actual versus estimated savings (KWH) from conventional heat loss methodologies.
- OBJECTIVE 2:** To determine the achievable penetration rate of the Program and levels of potentially cost-effective weatherization measures.
- OBJECTIVE 3:** To determine the effectiveness of rigorous conservation marketing.
- OBJECTIVE 4:** To determine the characteristics of community social interaction and impacts under aggressive conservation program conditions.
- OBJECTIVE 5:** To determine the costs associated with the development and implementation of an aggressive conservation effort.
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SOURCE: Project document.

SOCIAL/ORGANIZATIONAL BACKGROUND

In the post "energy shock" period through the late 1970's the U.S. experienced a period of projected power supply shortage and concern for the conservation and efficient use of energy. This problem was also set in the context of increasing relative cost for new power plants. In this period, and as a result of several years of discussion, negotiation, and compromise among several affected interests, the problem of projected shortage was addressed in a "new" form in the Pacific Northwest. In an "indicative planning" model similar to the French system, responsibility for meeting "demand" for new electrical energy production (meeting new "load") was federalized in the Pacific Northwest through enactment of the Pacific Northwest Electric

FIGURE 2
LINES OF RESEARCH

1. **BLOWER DOOR STUDY**
Focus: Reliability of Blower Door Measurement of Air Changes per hour.
2. **HOUSE DOCTOR ASSESSMENT**
Focus: Effectiveness of "House Doctoring" as a weatherization measure beyond advanced weatherization levels included in the planned project measures.
3. **HEAT LOSS STUDY**
Focus: Comparison of alternate heat loss models (BPA vs. SUNDAY/SUNCODE) contrasted with empirical findings.
4. **ENERGY CHANGES ANALYSIS**
Focus: Comprehensive evaluation of energy use changes (KWH) in Hood River and comparison communities in contrast to prior historical levels.
5. **PROJECT PENETRATION ANALYSIS**
Focus: Acceptance of weatherization project in the community.
6. **MEASURES PENETRATION ANALYSIS**
Focus: Acceptance of measures and target levels of measures in the residences of Hood River (Social and physical barriers analysis).
7. **MARKETING CASE STUDY**
Focus: Interpretation and analysis of project and measure penetration in relation to execution of marketing plan.
8. **SURVEY RESEARCH ANALYSIS**
Focus: Integration and interpretation of baseline and "follow after" survey research from Hood River, comparison communities, and Pacific Northwest random sample. Integration of results with marketing questionnaire data including regional survey results.
9. **REGIONAL SURVEY INITIAL ANALYSIS**
Focus: Report on results of modified regional survey questionnaire for 325 Hood River homes in the residential load study.
10. **GENERALIZABILITY ANALYSIS**
Focus: Short research paper based on analysis of Hood River regional survey results in contrast to BPA Pacific Northwest results; review of Survey Research Analysis study results with regard to generalizability; instructions and cautions for secondary analysis of Hood River Conservation Project database for regional applications.
11. **RESIDENTIAL LOAD STUDY**
Focus: Interpretation of energy use and changes in energy use in 325 residential load study homes.
12. **FEEDER LOAD STUDY**
Focus: Analysis of capacity and diversity effects of residential weatherization.
13. **PROCESS EVALUATION**
Focus: Independent analysis of project effects, "The Hood River Story," study of constraints, staff and community perceptions over time, and development of Implementation Guide for projects of similar type.
14. **WEATHER DATA ANALYSIS**
Focus: Statistical structure search of all weather monitoring data elements in relation to energy and load.
15. **WOOD HEAT STUDY**
Focus: Review of wood heat effects developed in the residential load sample of 325 homes, and a thorough integration of results with survey data.
16. **COST STUDY**
Focus: Detailed study of project weatherization and research costs.

SOURCE: Hood River Conservation Project Research & Evaluation Overview, 5-10-84.

Power Planning & Conservation Act of 1980 (PL 96-501). This responsibility is administratively implemented through the Bonneville Power Administration (BPA), with the guidance of the Regional Power Plan (Regional Plan) constructed by the Pacific Northwest Power Planning Council (Regional Council). The

FIGURE 3

PROJECT LEVELS OF WEATHERIZATION MEASURES IN RETROFIT
OF ELECTRICALLY HEATED DWELLINGS IN HOOD RIVER

1. Home energy audit	All electrical heated homes
2. Ceiling insulation and appropriate ventilation	R-49
3. Floor insulation	R-38
4. Wall insulation	R-11 to R-19
5. Cold and hot water pipe insulation	R-3
6. Dehumidifiers and air-to-air heat exchangers	As required
7. Clock thermostats	Where applicable
8. Duct insulation	Crawl space R-11 Attic R-30
9. Stock windows and thermal replacement sash and glazing	Triple Glazing
10. Storm doors, thermal doors and double glazed sliding doors	Where applicable
11. Caulking and weatherstripping	Where applicable
12. Outlet and switchplate gaskets	Where applicable
13. Heat pump conversion of existing electric furnace systems	Where appropriate conventional measures cannot be installed
14. Electric water heater wraps	R-11
15. Hot water flow regulators	As required

NOTE: Homes are audited for cost-effectiveness of proposed measures and levels. Each home is considered as a unit so that one measure may "carry" another within the home, but one residence may not "carry" another. The cost-effective ceiling for HRCF is \$1.15 per kilowatt hour saved in the first year.
SOURCE: Project document.

Regional Council, created through provisions of PL 96-501, represents a new entity in the regional power planning process. It is a representative organization the members of which are appointed by the governors of the Pacific Northwest states. The council is chartered to give energy conservation priority over the construction of new plant as a power resource, and it

is also responsible for widening the process of consultation across a much broader range of organizations and social interests than were previously provided effective channels of participation in the development of power plans. The vehicle for the council's effort is the Regional Plan, which includes a 20-year forecast of electricity supply and demand.

With advent of construction of the first Regional Plan, in a public, representative, and organizationally inclusive process, the social process of power planning became a new ballgame. In the new process, the role of public interest groups, and environmental interest groups became more visible. The new process afforded standing to such groups at least equal to that of utilities and representatives of federal agencies for power administration. Several organizational and interest "stakeholders" approached the planning effort from overlapping but different frames of reference. One key difference -- the equivalent power generation potential of residential retrofit weatherization -- became the focus of HRCF.

Probably the most interesting feature of this inter-organizational interaction was that the question addressed was couched in a technical language and each organization or organizational coalition might have treated it as a purely technical problem if it had been able to dominate the planning process with claims of exclusionary expertise. Estimation of the conservation potential of residential retrofit actually turned out to be what Mitroff & Mason (1981) have termed an

"ill-defined" problem. Different organizational technical teams, interpreting the estimation problem through their organizational frames of reference emphasized different aspects of the problem. Much of the early discussion was almost confrontational, and there was much time spent "talking past each other" before the true nature of the problem began to become clear.

As in a debate, the various teams initially marshalled evidence, cited the literature, spoke from experience and made what they believed to be technical cases on various points. But the process of intensive interaction which took place around the draft regional plan moved on to mutual inspection of models, calculations, and assumptions. In this process, it became evident that the Natural Resource Defense Council's plan (Cavanagh, Gardner & Goldstein 1982) matched the technical level and mastery of technique, and showed the same familiarity with the relevant literature as the work of teams of utility technical specialists coordinated through the Pacific Northwest Utilities Conference Committee (PNUCC). In a sustained interaction, with the representative nature of the new power planning process giving an at least equal voice to the NRDC as to the utilities, the various technical staffs began to reach tentative appreciation and mutual respect for each others' work. Yet there seemed to be no way that continued managerial/technical consultation would arrive at a consensus definition of the potential of residential retrofit weatherization.

A way out was suggested by Ralph Cavanagh of the NRDC who approached the chief executive of Pacific Power & Light and the administrator of the Bonneville Power Administration with the concept which eventually became the HRCP. In the year and one-half of project planning work between concept and implementation, seven organizations jointly participated in working out common definitions of research objectives and research designs aimed at achieving those objectives. The HRCP may be seen as a part of a tendency toward removing disputes from adversary processes to resolve "ill-defined" problems through industry/government/public interest group cooperation (cf: Wessel 1980).

SCIENTIFIC CREDIBILITY

The basic idea was to run a demonstration and see what might be achieved and what were the barriers to achievement. This would involve vigorous promotion of residential retrofit in one small semi-isolated semi-rural community judged to be near typical of the electric service territory of the region. With this initial idea, the research planning process opened up several levels of questions which had to be resolved through a consensus process (Peach, Oliver, & Goldstein 1984). The common interest of the seven groups which cooperated in the research planning process and currently meet monthly as the HRCP Regional Advisory Group to review implementation is in the credibility of the research. This common interest in credibility leads to an interaction process which sustains observance of science norms, while at the same time continued

observance of science norms sustains the interorganizational relationship (Peach 1983). So far, this appears to be a stabilizing relationship which -- though several times pushed out of balance by the unilateral actions of one or another group in tests of strength and in less than self-critical displays of internal perspective -- returns to its balance point.

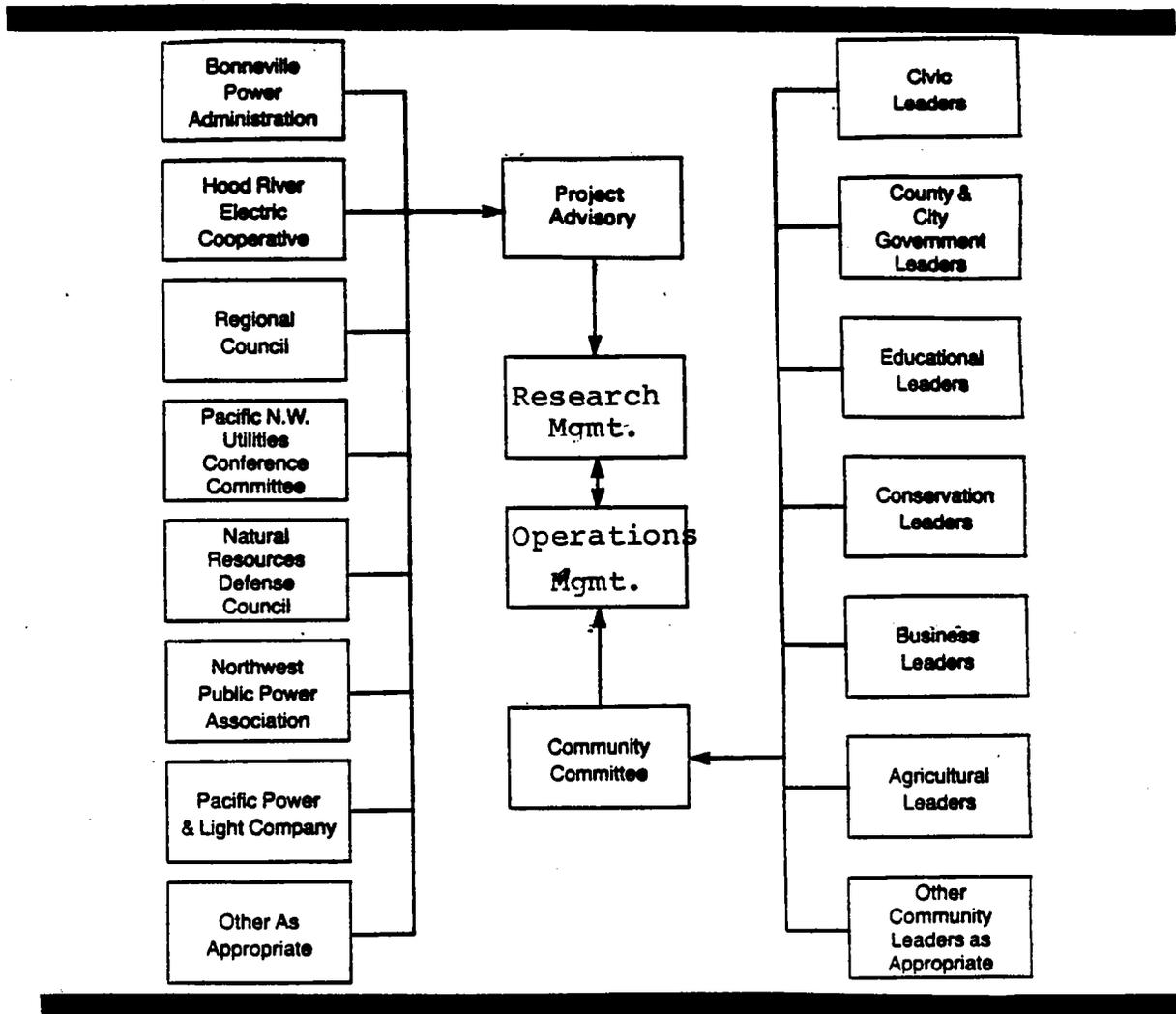
The research integrity of the project was strengthened through standard procedures of evaluation research. These include: (1) separation of the project research & evaluation team from the project operations (weatherization service delivery) effort to insulate research from the priorities and day-to-day problems of operations and underwrite relative freedom and objectivity, (2) contract of major deliverables to an independent laboratory (HRCP energy analysis will be performed under the direction of a national authority in the conservation field at Oak Ridge National Laboratory), (3) contract of process monitoring and continuing social assessment to an independent sociological firm (Social Impact Research, Inc.), and use of well developed quasi-experimental research design (Cook & Campbell 1979). The primary support for the research integrity of the project, however, is the interorganizational process itself. The operative interests and worldviews of the various organizations have been turned to good use in a continuing process of discussion and mutual inspection of implementation and initial findings. So far, this process has resulted in a considerable strengthening of the research effort (for example, improvements in the

weather monitoring system, additional social survey work to improve the generalization of project results, employment of two comparisons communities as insurance in the determination of project effects, laboratory design and pre-testing of a new wood heat instrumentation sensing system, addition of heat loss model comparisons as a research area, addition of house doctor and blower door studies).

The key features of the interorganizational Regional Advisory Group are: (1) it makes for a lively interactive research process in which operative worldviews often embodied in routinized research assumptions, preferences for certain kinds of analysis, and reliance on certain ranges of information are continually surfaced and criticized, (2) because none of the organizations is able to dominate another, discussion usually is free and persuasion is based on better ideas in a process oriented toward the goal of truth, (3) multiple perspectives highlight different aspects of research decisions usually yielding a clearer and better result than any of the organizations would be likely to arrive at through strictly internal processes, (4) there is continuing interest and mutual inspection of results, calculations, and assumptions at each stage (databases are shared for independent analyses when requested). In other words, the process begins to approximate Habermas's model of the "free speech community" and moves out from the realm of contention dominated by the rules of rhetoric. (Habermas 1973, 1984). It

FIGURE 4

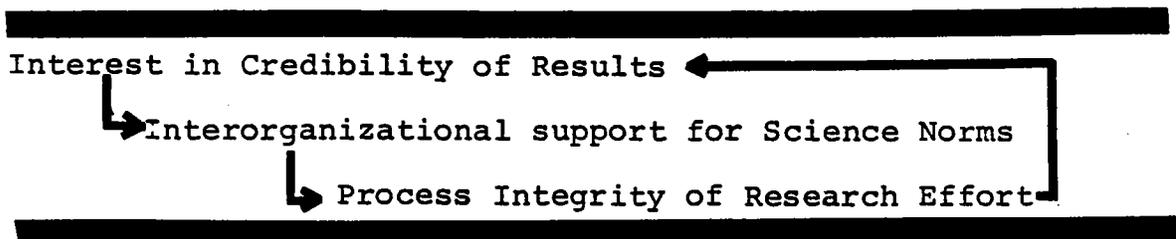
MUTUAL CONSULTATION IN THE HOOD RIVER CONSERVATION PROJECT



SOURCE: Project document, modified for clarity.

FIGURE 5

SELF-STABILIZING CONSENSUS PROCESS



should be noted that the rules of rhetoric applied to research data and statistical analysis (Capaldi 1979) are quite different than the rules of language as a medium for the operation of the consensus theory of truth in the "ideal speech situation" (McCarthy 1973). The specific organizations participating in the consensus process of the Hood River Conservation Project Regional Advisory Group are shown in Figure 4. The schema of the self-stabilizing consensus process is shown in Figure 5. At a minimum, there appear to be four conditions which permit such a process to function in regaining its balance point:

- (1) An initial basis of respect of some order. For HRCRP mutual respect developed out of the mutual inspection of differing technical projections, calculations, models and assumptions in a sustained process of social interaction between organizations.
- (2) None of the parties have the power to dominate the others (Peach, Oliver & Goldstein 1984; Lundy 1984). That is, none of the parties is able to remove some aspect of other party participation or free discussion except by a better argument.
- (3) Free flow of information coupled with mutual inspection of assumptions, implementation, designs, calculations, intermediate and final results.
- (4) Sufficient interest or induced need for parties to continue cooperation as research proceeds through implementation to the production of research products.

These conditions also appear to be required for the results of the research to be put to use (Cf: Dickey & Hampton 1981). Specifically, it is likely that only by such involvement will all parties continue to "own" the research products.

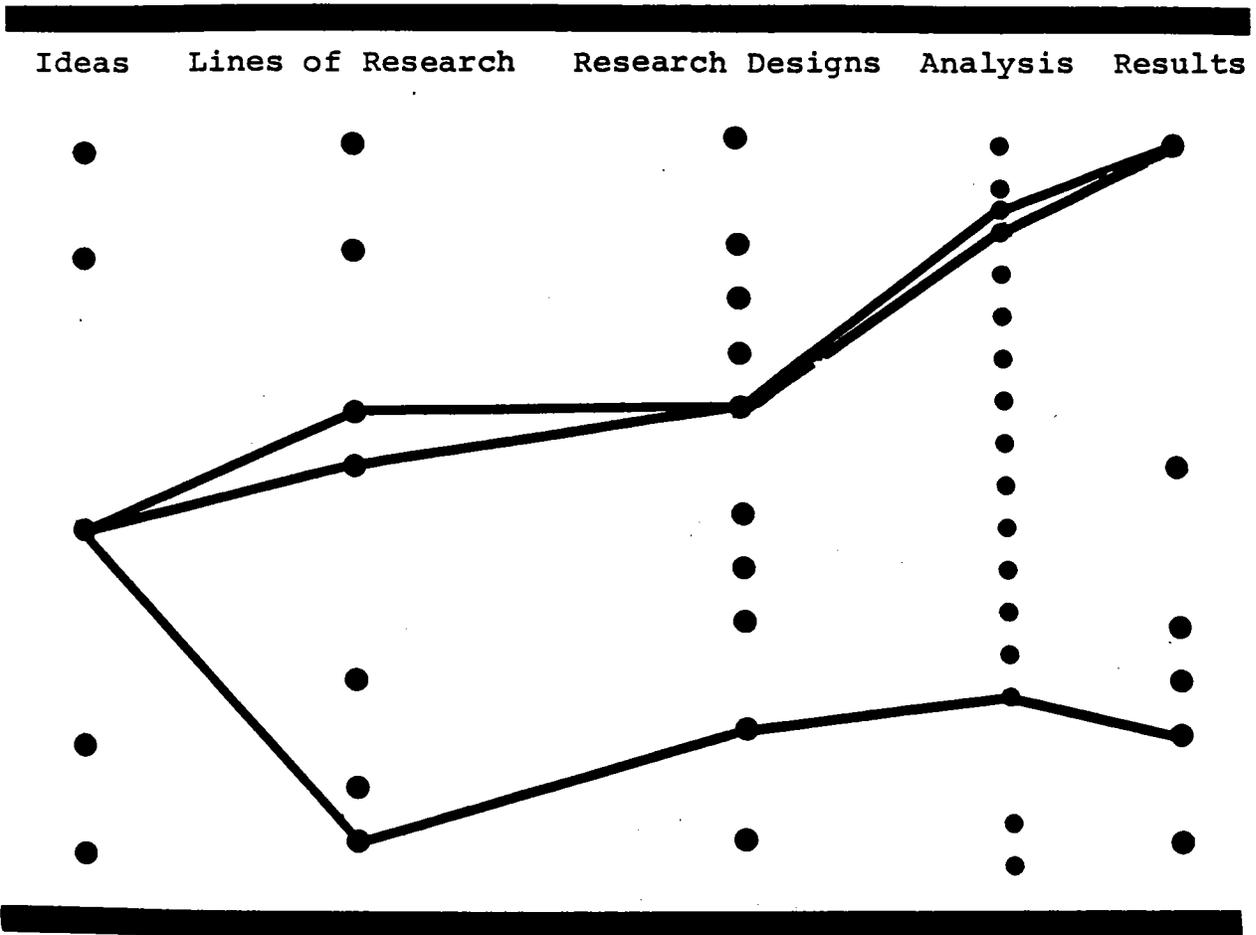
POSITIVISM

Anyone who works closely at research into practical questions in the social realm over a period of time, or who manages an applied research or data analytic staff almost certainly must come to an awareness which couples respect for the power of research and quantification in human affairs with a good bit of skepticism. Particularly in an interorganizational research setting where congenial assumptions are often subject to challenge from other points of view, the embeddedness of theory and perspective in technique becomes evident (Collins 1984). Technical results in applied social research tend to be edited at least as much by the problem of world-view as by nature, as has been asserted by Dunn (1982) and others (Cf: Mitroff, Mason, & Barabba 1983; Campbell & Liberman 1981).

The power of research design and statistical analysis as part of a particular method for learning about relations between factors and events is nothing short of a remarkable human achievement. Yet the field of energy conservation is like the field of medicine in that it is both an applied physical science and an applied social science and combines the problems of both (Shryock 1961; Cf. Morgenstern 1963). The Hood River Conservation Project combines extensive social survey and social observation with state-of-the-art techniques for measurement of household energy consumption and "load". But the use of traditional analytic tools of operational definition, reproducibility, precision, and validity are conditioned by

FIGURE 6

DECISION POINTS IN THE PRODUCTION OF RESEARCH PRODUCTS



judgement, choice, and worldview. Measurement and results are essentially argumentative (Cf. Dunn 1982; Mitroff & Mason 1981). This is illustrated in Figure 6, in which worldview and perspective is operative at decision points at the heart of the research process. Positivistic elements are thus selected among, relativized as "episodes" and woven into the creation of knowledge products based, at least in part, on contextual expectations. Although presented as a branching process in a logical order from left to right, the actual situation is

more highly interactive so that research paths may move from any level to any other. Each level represents the result of a screening process.

SOCIAL INTEGRATION

Scientific credibility in the last analysis requires consensus among members of a knowledge community. In policy areas, the problem of credibility extends to the usefulness of research results. In the Hood River Conservation Project, research planning was successfully guided through a consensus process in which diverse and sometimes adversarial interests worked through differences in emphasis and perspective to arrive at common definitions of problems and methods of approach to the development of relevant knowledge. As noted above, the planning period lasted approximately one and one half years. The project is now over a year into implementation. So far, the process has guided the implementation phase resulting in several alterations in instrumentation and research priorities as potential "threats" to design (and consensus "sign off" on eventual results) have been detected in ongoing mutual inspection and discussion. This process produces higher social integration as well as knowledge products. It stabilizes the organizational base for observance of science norms, and this in turn provides a basis for continued interest in consensus. From the perspective of the consensus theory of truth, and of research with the goal of truth such a process shapes the possible kinds of knowledge to be produced and makes useful results likely.

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