

Elements of Social Science Engagement in Information Infrastructure Design

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ABSTRACT

Drawing on three cases of information infrastructure building projects with social science participants, we identify four elements which have structured the engagements. The elements we identify are (i) the temporal initiation of social science engagement with the project; (ii) the level of development of the infrastructure at engagement, (iii) the project's participatory model for social science, and; (iv) social scientist's structured relations to project participants.

Categories and Subject Descriptors

K.4.3 [Organizational Impacts]: *Computer-supported collaborative work*

General Terms

Management, Design, Human Factors

Keywords

data interoperability, infrastructure, collaboration methodology, social science, organization, CSCW, science and technology studies, ethnography

1. OVERVIEW

A new space for social science is opening within large-scale technical projects with associated information infrastructure building, frequently designated cyberinfrastructure. These endeavors are framed as complex and ambitious combinations of information technology enactment, research goals, knowledge outputs, and the bringing together of diverse communities. This framing represents an opportunity for the participation of social scientists not only as researchers, but also as project participants in the creation of laboratories, standards, metadata languages, ontologies, 'best practices,' and other design and implementation work. However, within these projects 'intervention', 'collaboration' and 'participation' – the engagement and contribution of the analyst to the field of action – itself remains an under-explored topic. In these examples 'the field of action' is the collaborative practice of science with its associated multiple discipline team dynamics. In this poster we analyze social science engagements with three scientific

information infrastructure projects, drawing from fields of social informatics [4], sociotechnical organizational theory [2]. Our goal is to begin cataloguing the properties of structured relationships between infrastructure projects, social science collaborators, and avenues for intervention. In turn, we intend this research to inform the design and planning of future infrastructure endeavors.

Our three sites of investigation are part of a larger comparative project of the strategies for developing interoperability within large-scale and long-term science (cyber)infrastructures [5]. The three research cases are: GEON, an umbrella cyberinfrastructure for the earth-sciences; the Long Term Ecological Research Program; and Ocean Informatics. Having a research agenda that is strongly coupled to a goal of contributing back to these projects has provided insights into the multiple strategies of collaborative work.

In this poster we show how the abilities of social scientists to contribute within large-scale technical projects has been substantially structured by the configuration of relationships established with the infrastructure projects. In each of GEON, LTER and OI we are participants; but our engagement with each project, and the nature of each project itself, differs in terms of access to the research site, when and how we became involved and what venues exist for communicating findings or collaborating in design.

2. MODELS OF SOCIAL SCIENCE ENGAGEMENT

Differences in style of intervention emerge both from within the nature of the infrastructure projects themselves and from the specificities of the engagement with social science researchers. In making a structural analysis of the positions of the social scientist within engagements, we have consider four elements:

- (i) the *temporal initiation* of social science engagement with the project,
- (ii) the *level of development* of the infrastructure at engagement,
- (iii) the *participatory model* of social science in the project, and;
- (iv) social scientist's *structured relations* to other project participants.

Infrastructure Project	Social Science Temporal Initiation	GEON At formal inception: i - post-proposal; ii -post- funding; iii -pre-enactment.	OI At planning stage: i- pre-proposal; ii - pre-funding; iii- pre-enactment.	LTER At maturity: i- post- proposal; ii- post-funding; iii- post-enactment.
	Level of Deployment At Social Science Engagement	Written and funded proposal, no organizational or technical structure enacted.	Unfunded proposal. No institutional recognition. Technical infrastructure coordination in progress.	Well established organization, communication and technological infrastructure.
Community Engagement	Participatory Model	Social Dimensions Feedback	Collaborative Design	Network Propagation (local collaborative design)
	Relation of Social Scientists to Infrastructure Project	Observation; Project requested presentations at collective meetings; Informal feedback	Stakeholders; Embedded; Participation in multiple design teams and community events	Stakeholders; Single site findings propagated across existing communication network

Table 1. Elements of Social Science Engagements

We have divided these elements for analytic purposes. However, to understand the positions of the social scientist in the structure of the engagement these elements must be understood in combination.

We can roughly describe (i) and (ii) as development features of the infrastructure project. Thus within GEON the social science relationship began at formal inception. At this point the level of development of the infrastructure was ‘made of’ conceptual plans as outlined in the written proposal and shared by project PI’s. These PI’s had begun to form a social network across multiple institutions (such as the SDSC, UTEP, and Virginia Tech), and had secured a promise of finances from the NSF. At formal inception, then, GEON already had a certain trajectory. In contrast the social science engagement with OI is most accurately described as beginning *before* OI. At this point the level of the development of the infrastructure is ‘made of’ informal social networks from which, over time, proposal writing and other collaborative activities began to produce a vision for OI. Within LTER the engagement began with a matured and highly structured organization maintaining a developed vision, technical infrastructure and multiple means of communication and organization. This leads directly to (iii) and (iv) which we can roughly describe as the organizational aspects of the social science engagement. Both OI and LTER engagements have been informed by similar participatory models which we call collaborative design [1, 3]. LTER and OI projects differ by the availability of networks developed for propagation. In contrast, the GEON engagement has been developed with a participatory model we call ‘social dimensions feedback’, in which the structured relations with social scientists can be characterized by project requested presentations at collective meetings on topics such as communication, culture and community. Table 1 summarizes the ties between the four elements in the three infrastructure projects we cover in the poster. The table suggests the kinds of possible interventions that emerge at the intersection of multiple elements.

We take configurations of social science engagements within infrastructure projects as themselves constitutive of varying spaces for purposeful action. The outcome of this research is *not*

a defined list of the ‘four key points to the social dimensions of infrastructure.’ Rather, we seek to produce the resources by which fruitful relations between social and information sciences may be designed and which will then in turn be capable of successfully addressing local and emergent needs within infrastructure projects. We argue that the varying combinations of these elements substantially inform the possibilities for social science contributions to each project. In considering future projects with social science collaboration within infrastructure building projects, careful consideration of these elements will serve to provide insight and facilitate design of the collaborative engagement.

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