

ing a system was tacit declaration of an intent to do so, which put us in the position of assuming significant corporate authority. With that single act, we won a measure of both immunity from cancellation of the project and anxiety about corporate reaction.

In contrast to our peer community was the customer community, where our work and our participation was highly valued. That esteem was expressed in several ways. First, they were committing important, seriously decayed materials to the system early in the project. Their doing so made us nervous because we were less confident than they in what we had so far built. Second, we were recognized and welcomed. Our work was eagerly awaited and continues to prompt a flow of energy and creative ideas from them. The system is enthusiastically represented by the customer to other institutions. The team continues to be invited to the customer's planning functions where further deployment of the system is contemplated. Finally, the customer commits time to help us as we spread the word of the available opportunities within our own corporation.

This work also has socially redeeming value. If successful, we will have had some small part in preserving the intellectual heritage of the last 150 years. Also, this technology holds the promise of democratizing access to materials the way the printing press democratized literacy. The consequential restructuring of our educational and commercial institutions will offer many new opportunities to society at large.

Our good feelings about the customer and our feelings of disenfranchisement from our own community led us to feel closer to the customer than to our parent organization. In the effort to lower our mutual barriers, we unwittingly blurred the boundaries as well. We began to think of those individuals on the customer's staff who used our equipment as part of our engineering group. We even considered rewarding them with performance awards similar to those given within our corporation. Fortunately, we had the foresight to ask whether such an act was appropriate, and we were as-

The Benefits of Intentional Tension

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The Work System Design project at NYNEX Science and Technology was a year-long effort to redesign an existing work system called T.1 Provisioning. This work system evolved within a regulated monopoly business, but came under serious competitive pressure as a result of significant changes in both technology and the regulatory environment. Our approach to redesign aimed to transform the existing work system by questioning a number of embedded assumptions about work, people, and technology.

The T.1 Provisioning project addressed a work process that, for a single order, required involvement by an average of 41 people who were employees of five different assistant vice presidential organizations. The project was geared to radically redesign this work process.

We faced a set of assumptions, commonly held in today's corporate and industrial environment, about organizational change:

- work is a rational process that can be understood solely through discrete task analysis,
- decisions about change should be solely in the hands of managers making decisions about their work units,
- ideas for improvement can be abstracted (i.e., are not essentially situated), and
- technology should be used primarily to effect change through automation.

We designed the T.1 Provisioning project in a way that would challenge these assumptions. We conceived of our *action research* approach in the spirit of Lewin, in which we tried to continually develop new ways effecting change in the midst of an actual change effort. At each stage of the process we reflected on the successes and failures of the approaches we used, developing new ways to handle problems and issues, whose success or failure we then reflected on again. We consider this dynamic relation between practice and reflection by participants from several occupations and positions in the hierarchy to be crucial in developing a grounded redesign effort.

The guiding principles we have devel-

oped for Work Systems Design are:

- **End-to-end PD:** craft and first-line managers, who work in several departments across the work system, actually design the work
- **Transformative changes:** a search for radical rather than incremental improvement
- **Change management:** implementation of changes by the workers who designed the work, and who will return to the new work system
- **Analysis of social systems:** discovering the ways in which informal social work practices are crucial to getting work accomplished and using these insights in redesigning the work system
- **Coproduction:** collaboration of workers and senior management in developing and implementing the new work system
- **Organization-friendly systems:** designing technology to support the work system itself

The approach employed some traditional aspects of socio-technical design. It was structured as three teams: a design team composed of workers in various departments encompassed by the work process; a team of facilitators composed of a knowledge engineer, an anthropologist, a computer scientist, a quality specialist, and a veteran of 30 years in phone company operations; and a steering committee with a vice president as champion and each of the general managers responsible for a piece of the operation.

Our approach toward Work Systems Design was developed with intentional tension, that is, with advance knowledge that members of all three teams would be in conflict about what had to be done to move toward an effective redesign. We believe the creative tension of multiple perspectives produces innovative thinking and action, and establishes a powerful learning environment for producing change.

The new T.1 Provisioning work system developed by the design team was implemented in New York City in late September 1992. Early indications are that the new work system is effective in terms of the numbers, the development of people, and new roles created. During the course of the trial, we have come to recognize the need for a process that maintains and improves the work system reinforcing principles embodied in Work Systems Design.

NYNEX panel members included from NYNEX: Jack Flammholz, Elizabeth Graham, Paul Kowalski, and Dave Torok; from New York Telephone: Mike Picciano, and Eric Wilson.