

Contradictions as a Tool in IT-design - Some Notes

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A major invention of the critical systems development movement emerging in Scandinavia in the late seventies was the conflict perspective, based on the dual tenet that:

- 1) Information systems development is organizational development
- 2) Organizations are settings for conflict.

In the critical system development tradition the notion of hard contradictions and conflict was predominant (Bansler 1987), and ideal design as the negotiation between conflicting parties (Ehn & Sandberg 1979). For a while systems development research became a mode of political action, but gradually the external political critique was turned into an internal critique and reformation of methods and techniques in design and research. From the early eighties and onwards class struggle was not the primary focus in the tradition that (to some peoples dismay) came to be labeled participatory design. However, it is still a strong and effective analytical perspective to focus on conflicting perspectives and interests in the use and design of IT. Below, I discuss how the concept of contradictions in developmental work research (Engeström 1987), can provide a more sophisticated, yet simple to use, analytical tool for design and research. The discussion is based on earlier works, in particular (Bertelsen 1996) from which parts of this text has been copied.

Contradictions are oppositions between things, concepts, persons, etc. E.g., good/bad, old/new, female/male, red/green, night/day desire/reality, labor/capital. Partial synonyms for contradiction are; tension, contrast, opposition, dichotomy, conflict, disconnection. Contradictions are basic means for understanding the world surrounding us: structuralist anthropology and linguistics understand the world in terms of binary oppositions; in dialectical thinking, the world in general, and its dynamics in particular is understood as the eternal resolving of inner antagonist contradictions. Developmental work research (Engeström 1987) classifies contradictions in, and between activity systems. The basic unit of analysis in activity theory is human activity (e.g. work), i.e. the endeavor of a group of people to realize some object. Engeström depicts this unit of analysis as a double triangular figure, and analyses how contradictions, both internally in a considered central activity, and between the central activity and related activities, are the driving forces in development.

The **primary contradiction** is the contradiction of commodity between use and exchange value. This double nature is a basic feature of the economic structure in capitalist culture; this contradiction penetrates every single corner of the triangle and is the basic source of instability and development (Marx 1962; Engeström, 1987). In IT use and design I will suggest that the contradiction between what we say and what we do, i.e. the contradiction between principles, formalization and specification on one hand and concrete practice on the other is a primary contradiction in the same sense as the inner contradiction of commodity.

Secondary contradictions of an activity system are contradictions between the corners of the triangle, e.g. between the skills of the subject and the instrument he is using, or between rigid rules and new flexible instruments.

Tertiary contradictions are contradictions between the central activity and a culturally more advanced activity. Such contradictions can be generated by representatives from an other culture introducing culturally more advanced objects or motives into the central activity. The obvious problem is to know what is more advanced without subscribing to a very deterministic idea of history. However, the concept of a culturally more advanced activity does not necessarily imply historical determinism; it can also be interpreted as actual or potential different ways of conducting the central activity.

Quaternary contradictions are contradictions between the central activity and the neighboring activities; i.e.: 1) object-activities where the immediate objects of the central activity are embedded, 2) instrument producing activities where key instruments of the central activity are produced, 3) subject producing activities educating the subject of the central activity, and finally 4) rule producing activities like administration and legislation. An example of a quaternary contradiction is the contradiction between education of computer scientists at the university, focusing on mathematical formalization and the central activity of computer scientists working as system developers in the industry.

The festival example

In a post hoc attempt to make sense of a participatory research project with a music festival, the use of DWR contradictions turned out to be highly effective. The approach taken was to start by identifying everything that could be labeled contradictions, both things we observed in the festival organization and encounters we experienced in the project with the festival. Subsequently, contradictions were grouped under suitable labels, if possible, and the contradictions were classified according to the DWR terminology. I rephrase a few examples.

Management vs. Volunteers. The festival was mainly organized by unpaid volunteer, driven by their enthusiasm and their feeling of ownership. The festival, at the same time, was managed from the top, where a small group would concentrate power and information. This contradiction seemingly was a quaternary contradiction between two activity systems, in a relation where festival management was acting like the capital side of the basic (primary?) capital - labor contradiction. At a closer analysis it turned out that what we perceived as a contradiction between management and volunteers to a large extent was an inherent contradiction *between openness and security* throughout the festival organization.

Design situations vs. Design artefacts. Due to the heterogeneity of the Festival year, the researchers' methods for enacting work-like situations did not work as expected, pointing to the need for new instruments for the design activity, new design artefacts. A more straightforward instance of contradictions between design situation and design artefact was the contradiction between the DBMS and the need in the situation to support cooperation in a non-networked architecture. The design artefact versus design situation contradiction is an unavoidable secondary contradiction between instrument and object, but it was also a quaternary contradiction between the

production of instruments for cooperative design in a non-cyclic setting, and the use of these artefacts in the Festival project.

Systematic application of the notion of contradiction yielded important knowledge about the structure behind fundamental obstacles in the Festival project. The classification of contradictions adopted from Developmental Works Research served as a good way of structuring the analysis. The primary contradiction between use and exchange value was present as a contradiction of computers as being both utensils and epaulettes. The only secondary contradiction identified in the analysis was between design and the existing methods for enactment of work-like situations. As the project aimed at developing new instruments for pre-production, secondary contradictions between the available instruments and other corners of the pre-production activity should be expected. A detailed analysis of contradictions between instruments and other corners of a considered activity will be a valuable resource in a design project. However, secondary contradictions emerged in the Festival activities, due to general knowledge among volunteers about how tedious office work can be done easier with computers. Thus tertiary contradiction subsequently induced secondary contradictions in Festival activities. The relation between use and design in the project has some elements of a tertiary contradiction, but in relation to the development of computer support in the Festival, the surrounding culture, e.g. at the volunteers daytime workplaces, was clearly examples of more advanced activities. Most of the identified contradictions were quaternary, which should come as no surprise since the analysis did not depart from the identifications of one central activity.

The main difficulties in applying the activity theory framework for analysis of the project are related to the heterogeneity of the considered project. When heterogeneity can be captured in terms of quaternary contradictions, the Developmental Work Research approach is fruitful, but if the considered activity systems have the cyclic nature of the festival activities, this approach is not straightforward to use. In terms of process-structure and structure-process diagrams (Mathiassen 1981), the problem is that the double triangle does not capture the situation when the considered activity is a structure subsuming a processual succession of more or less stable structures.

Thus, some definitions may need adjustment or re-interpretation. Firstly, The notion of a more advance activity should be re-interpreted to emphasize heterogeneity rather than historical materialism. Secondly, analysis of the Festival project showed the need for methods to deal with interwoven activity systems, and activity systems that have a very cyclic nature; possibly by incorporating Star's (1989) notion of boundary objects (Bertelsen 1998). When developing computer support for praxes with a strongly cyclic nature, it is difficult to establish simulated work situations, because the different phases of the work cycle are only present during the full cycle in the form of anecdotes. Thus simulations of work are likely to degenerate into discussions about work unless new methods are developed. Thirdly, the Festival project showed that politics and power are issues that it is necessary to take into consideration, but due to its strong emphasis on production, activity theory did not yield much in the analysis of this and other strange cultural phenomena.

Conclusion

While activity theory, in general or in some of the specialized versions like the Developmental Works Research framework, seems to be complicated to apply in

design because the designer most often either has to adopt a complete process model or a complete theoretical framework, the pragmatic application of a classification of contradictions informed by activity theory proved to be relatively simple. Arguing along the line with Card et al. (1983), designers need simple concepts and operational handles that can be applied selectively in the course of day-to-day design work. That is, in order to support systems design, concepts and analytical tools need to be sufficiently simple. Activity theory is in its basis pragmatic and realistic, and consequently applicable by basic assumption; the theory is about real phenomena, - the concepts are designed to have a practical impact. However, I am not sure that the application of the concepts and classification of contradictions described above makes much sense if the designer does not have a fairly good understanding of the concepts. The challenge, and our obligation as researchers, is to make the theory accessible and package practical tools in a way so they are readily applicable.

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