

Participation in Software Development: Experiences and Lessons From the Hin&Weg Project

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ABSTRACT

Participatory planning holds important lessons for improving local government capabilities and responsiveness, but overall procedural regulations and statutory frameworks make its relevance for participatory IT development often just a matter of compliance. Developing analytical visualisations to support local government faces significant challenges because of the complexity and uncertainty about long-term benefits. The authors designed the process and local government staff understood their participation in an organised process. After each segment and the programming implementation, a new version of the software integrates improvements for participants. The participation process involved staff from ultimately 18 local governments. Participation became a verb describing the process that informed the directions to which the authors took up local government input.

KEYWORDS

Germany, IT Development, Participation, Participatory IT Development, Visualization

INTRODUCTION: PARTICIPATION SHOULD BE A VERB

The ideals of participation can rapidly fade when meeting the contingencies and contexts of IT development practice with governmental agencies. Participatory planning holds important lessons for improving local government capabilities and responsiveness. However, overall procedural regulations and statutory frameworks make its relevance for participatory IT development often just a matter of compliance. In particular, developing analytical visualisations to support local government faces significant challenges because of the complexity and uncertainty about long-term benefits and limited time and human resources available in governmental agencies beyond necessary routine tasks. Participation is more than a phase, and in this sense, it is integral to each step of participatory IT development.

DOI: 10.4018/IJEPR.307563

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In the article, we consider the project *hin&weg*, which follows the goal of **developing an ultimately open-source software package** for analysing **and visualising users' origin-destination mobility data**, with multiple local governments' involvement. We turn to concepts from participatory IT development, also known as participatory design (Schuler and Namioka, 1993), for ideas on enhancing IT development through **structured participatory input**. The participation process in the *hin&weg* project consisted of alpha- and a beta-phase involving staff from ultimately 18 local governments, followed by a third phase for preparing the software release. Project outcomes were continuously open for refinement and redefinition during the software development. However, we structured participation activities into phases and shorter intensive software development periods built on each other. After each intensive development period, users' inputs became part of project-internal discussions, deliberations, and programming to improve specific software functions.

Further, we drew from the inputs for preparing workshops and other project materials for participants and interested groups. At the end of each intensive period of participation and programming implementation, a new version of the software integrated improvements for participants. We continued to collect their comments, occasionally identified other issues, and motivated participants to remain engaged. As such, local government staff understood their participation as part of an organised process in the project. With this approach, participation describes the process that informed how the IT development took up local government input to achieve project goals.

The context for this participatory software development is the technology transfer project known by its German name, *hin&weg* (a German idiom for *up&away*), taking place from May 2018 to May 2022. The participating local governments volunteered to support this project, which aims to create an interactive and flexible software package for the temporal and geographical visual analysis of origin-destination mobility data (e.g. migration, commuting) on multiple spatial scales. It uses choropleth maps and a range of graphic visualisations integrated with data analysis functions. A previous version of the *hin&weg* software had been developed before the start of the current project, in the early 2000s, to support a limited range of analysis and visualisation functions. It was used by a small number of cities in Germany to analyse registry data (i.e. data collected under existing statutes for all changes in residence and households in Germany and most continental European countries) in collaboration with researchers. This previous version of *hin&weg* was also developed and successfully used for interactive public exhibitions around Germany, but the software architecture and program libraries (some were not supported anymore) needed a prohibitively expensive revision half-decade later. Recognising the interest in the analytical and visualisation potential of registry data, in 2018, the Leibniz Institute of Regional Geography (IfL) received grant funds from the independent Leibniz-Association to develop a new version of the software, which would be made widely available to governments and other interest groups of the broad public. A free and open-source version of *hin&weg* (with both a German and an English interface) will be made available by the end of the project in the spring of 2022.

We recognised that the project's success and long-term sustainability depend on involving governmental staff that regularly works with registry data to assess the impact of mobility and migration flows on local and regional development processes, as they would benefit the most from the analysis and visualisation functions of the *hin&weg* application. With this user group primarily in mind, the *hin&weg* project focused on developing a participatory process that connected government users' needs with the creation and revision of specifications for the external IT developers in a learning process for developers and participants alike. This approach explained further in the paper ensures that the software development receives specific inputs to guide the development of functionalities that serve participating cities' needs and desires.

The next section of the article presents the concepts from public participation and IT-development participation we drew on. It also discusses issues in using participatory design to improve analytical visualisation. The subsequent section describes the participatory software development process the *hin&weg* project used and provides two functions with corresponding interface elements as a specific example for the impact of participation in the software development. An analysis of this approach to

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