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INPLASY

Protocol for How Interactive Systems Shape Asymmetric Collaboration in Early Spatial Design: A Systematic Review through a Design Tensions Lens

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ADMINISTRATIVE INFORMATION

Support - None.

Review stage at the time of initial registration - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 November 2026 and was last updated on 21 November 2026.

INTRODUCTION

Review question / Objective We examined how interactive systems support collaboration between professionals and non-professionals on early spatial proposals. We asked how representations, interactions and workflows support understanding, expression, revision and shared progress, under what conditions competing requirements can be met together, and which design strategies could help collaborators manage those requirements.

Condition being studied Asymmetric collaboration in early spatial design. Architects and planners work with residents, clients and other users who bring knowledge of a place but may have different skills, authority and access to design tools. The review examined how these differences affect the joint development and review of spatial proposals.

METHODS

Search strategy We searched Scopus, Web of Science, ACM Digital Library and IEEE Xplore from 5 June to 15 September 2026. Three searches were run in each database. The first combined architecture, housing, building or interior design terms with direct participation terms. The second combined these design terms with broader collaboration terms and roles such as client or resident. The third combined urban, landscape or public-space design terms with participation terms and interactive technology terms. We searched titles, abstracts and keywords in Scopus, Topic in Web of Science, titles, abstracts and keywords in ACM Digital Library, and document titles and abstracts in IEEE Xplore. A publication-year filter of 2007–2027 was applied in all four databases, within the Scopus and Web of Science expressions and separately for ACM and IEEE. No additional language or document-type filters were applied.

We also traced references from 16 prior reviews without imposing the database lower year limit.
Scopus 1 — architecture/direct participation
TITLE-ABS-KEY("architectural design" OR "building design" OR "healthcare design" OR "architectural programming" OR "architectural design review" OR "housing design" OR "housing programming" OR "apartment plan" OR "self-build housing" OR "kitchen design" OR "interior design" OR "interior design briefs" OR "residential design" OR "apartment design" OR "floor plan" OR "floorplan" OR "housing customisation" OR "housing customization") AND TITLE-ABS-KEY("architect-client communication" OR "architect and client interaction" OR "client briefing" OR "client involvement" OR "client participation" OR "user participation" OR "user involvement" OR "end-user participation" OR "end-user involvement" OR "resident participation" OR "resident involvement" OR "participatory design" OR "participatory planning") AND PUBYEAR > 2006 AND PUBYEAR 2006 AND PUBYEAR 2006 AND PUBYEAR < 2028

The three expressions for each of the four databases are provided in the review supplementary materials.

Participant or population The target relationship was between design or planning professionals and non-professional contributors, including residents, clients and people who use the space. Eligible systems could be explicitly designed for this relationship, including when the reported evaluation used role-play participants or expert stand-ins. Direct operation of the system by a non-professional was not required.

Intervention Implemented interactive computational systems used or explicitly designed to support contributions to early spatial proposals, including physical materials linked to a digital system. They could support expressing preferences, understanding and comparing alternatives, revising proposals or carrying contributions into later design work.

Comparator No common comparator was required. Where a report directly compared systems, representations or workflows, we retained the comparison in its task context. The qualitative synthesis also compared similar tasks across different arrangements and examined changes in configuration within reports.

Study designs to be included Original system studies reporting a completed prototype or technical test, user study, field use or observation, expert assessment, or a checkable original case analysis. Qualitative, quantitative and mixed-methods evidence could qualify.

Eligibility criteria Eligible reports addressed an early spatial proposal in architecture, housing, interior design, urban or neighbourhood planning, landscape design, or public space. They had to document the target professional–non-professional relationship or a system explicitly designed to support it, implemented computational interaction, and original material. On 13 October 2026, scope was narrowed to interactive computational systems. On 14 October, after some full-text reading and coding, a minimum evidence criterion was added: an identifiable system and research activity, a completed system-related test, use, observation, expert assessment or checkable case analysis, and a corresponding output or finding. The final criteria were applied to earlier candidates as well. Conceptual systems without implementation, solely manual activities, and secondary accounts without eligible original material were excluded.

Information sources We searched Scopus, Web of Science, ACM Digital Library and IEEE Xplore and traced original reports from the references of 16 prior reviews. Search activity ran from 5 June to 15 September 2026. The database searches used a 2007–2027 publication-year filter, without additional language or document-type filters. The lower year limit did not apply to reference tracing. One further author-supplied candidate was subsequently assessed and excluded.

Main outcome(s) We sought reported consequences for how people expressed ideas about a spatial proposal, understood or appraised it, tried and rechecked changes, and carried contributions into subsequent professional design work. We recorded the observation stage, participant or task, evidential basis and any reported denominator. Intended benefits and implemented capabilities were distinguished from observed use and consequences. Numerical results were retained as reported without conversion to a common effect measure.

Quality assessment / Risk of bias analysis During the reporting revision on 23 October 2026, we added result-specific appraisal, checks for missing results, and confidence judgments for the synthesis findings. Two authors assessed selection and confounding where relevant, data collection and measurement, completeness of outcome data, analysis and selective presentation, and the fit of evidence to the claim. They used source records

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and original method and result pages. A third author checked a sample, and disagreements were resolved by discussion. Applicability was recorded separately. No overall numerical quality score was assigned.

Strategy of data synthesis We used a theory-guided qualitative cross-case synthesis informed by Tatar's design tensions framework. Six extraction dimensions described tasks, roles, systems and consequences. Coded requirements located comparable situations, and we compared reported actions and outcomes within and across cases to identify recurring mechanisms and conditional relationships. Contrasting observations informed the interpretation. Descriptive distributions counted unique reports per category. Cross-tabulations paired categories within analysis units before counting distinct reports. No meta-analysis was conducted.

Subgroup analysis The original review used qualitative comparisons across tasks, participant relationships, participation routes, system configurations and support arrangements. It did not estimate pooled effects by participant type or conduct statistical subgroup tests.

Sensitivity analysis No sensitivity analysis was conducted in the original review. The minimum evidence criterion was introduced during full-text screening. At the time of this retrospective registration, the effect of removing that criterion on the included corpus and synthesis findings had not been established.

Country(ies) involved China.

Keywords early spatial design; asymmetric collaboration; interactive systems; participatory design; design tensions; systematic review.

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