

## Doctoral Thesis Defense

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### ABSTRACT

Currently, there is much interest in harnessing the potential of new and affordable Information and Communication Technologies (ICT) such as mobile phones, to assist in reducing disparities in socioeconomic conditions throughout the world. Such efforts have come to be known as *ICT for Development* or ICT4D. While this field of research holds much promise, few projects have managed to achieve long-term sustained success. Among the many reasons for this, from a software engineering perspective, in many cases it can be attributed to inadequacies in the gathering and defining of software requirements. Failures in realising sustainable systems can be attributed to incomplete software requirements arising from inadequate consideration given to the high-level socioeconomic development goals, neglect of environmental constraints, and a lack of adequate input from end-users regarding their specific needs and sociocultural context. The situation is exacerbated by inadequate reporting on the social impact of such interventions, making it difficult to assess a project's success, let alone apply lessons learned to new projects.

We propose enhancements to the requirements elicitation methodology specifically adapted to address these shortcomings. Our approach incorporates the novel technique of *Structured Digital Storytelling* to elicit input from end-users having limited literacy in the form of stories. It provides a systematic method for extracting and interpreting the informational content of the stories and applies a conceptual model derived from Communications Theory to analyse the constraints arising from the users' sociocultural context. It introduces an *ICT4D quality model* identifying non-functional requirements related to the sociodynamics of a system's sustained use in a rural community. The needs, goals and constraints thus identified are integrated using a goal-based analysis to produce a more informed understanding of the potential areas of technology intervention and the needed software requirements. The resulting goal model is also used in deriving a measurement framework for assessing a project's success based on its social impact. We illustrate our approach and validate its effectiveness with a field study.