Gesture-Based Process Modeling Using Multi-Touch Devices

Jens Kolb, Ulm University, Ulm, Germany
Benjamin Rudner, Ulm University, Ulm, Germany
Manfred Reichert, Ulm University, Ulm, Baden-Württemberg, Germany

ABSTRACT

Contemporary business process modeling tools provide menu-based user interfaces for defining and visualizing process models. Such menu-based interactions have been optimized for applications running on desktop computers, but are limited regarding their use on multi-touch devices. At the same time, the widespread use of mobile devices in daily business life as well as their multi-touch capabilities offer promising perspectives for intuitively defining and changing business process models. Additionally, multi-touch tables will foster collaborative business process modeling based on natural as well as intuitive gestures and interactions. This paper presents the results of an experiment that investigated the way users define and change business process models using multi-touch devices. Based on experiment results, a core gesture set is designed enabling the easy definition and change of business process models with multi-touch devices. Finally, a proof-of-concept implementation of this core gesture set is presented. Overall, gesture-based process modeling and multi-touch devices will foster new ways of (collaborative) business process modeling.

Keywords: Business Process Modeling, Gestures, Multi-Touch Application, Process Change Patterns, User-centered Process Modeling

INTRODUCTION

During the last years multi-touch devices have been increasingly used for realizing business applications, and have become more and more useful for the daily work of business people (Pryss, Langer, Reichert, & Hallerbach, 2012; Pryss, Tiedeken, Kreher, & Reichert, 2010). Multi-touch devices used in companies range from smartphones to tablets to multi-touch tables and walls. Obviously, screen size affects both mobility and application areas. While smartphones are primarily used for mobile communication (e.g., e-mailing and messaging), tablets and multi-touch tables are applied in the context of collaborative tasks (e.g., joint editing of a business document). In particular, multi-touch devices can be applied to business process modeling as well, i.e., to capture and model business processes while interviewing process participants. In turn, multi-touch devices having larger screens (e.g., multi-touch tables) can be used to collaboratively model and change business processes (Frisch, Heydekorn, & Dachselt, 2010).

DOI: 10.4018/ijismd.2013100103
Traditional business process modeling tools have not been designed with multi-touch devices in mind, and hence do not take the specific properties (e.g., small screen size) and interaction possibilities (e.g., gesture-based interaction) of these devices into account (Gong & Tarasewich, 2004; Kabicher-Fuchs, Rinderle-Ma, et al., 2012; X. Wang, Ghanam, & Maurer, 2008). Hence, research is required that enables the optimized use of multi-touch devices for business process modeling.

This paper introduces a core set of gestures for business process modeling on multi-touch devices. This core gesture set enables process designers to define and change business process models in an intuitive and comprehensible manner. The paper focuses on the introduction and implementation of the core gesture set and less on the design of a concrete user interface. The core gesture set we suggest is applicable to all screen sizes independent of the multi-touch device used. Furthermore, we exemplarily implemented the gesture set for Apple iPad in the proView project (cf. www.dbis.info/proView), which aims at human-centric business process management (Kolb, Hübner, & Reichert, 2012a, 2012b; Kolb, Kammerer, & Reichert, 2012; Rudner, 2011). In particular, proView provides techniques that enable personalized visualizations of and interactions with process models based on updatable process views (Bobrik, Bauer, & Reichert, 2006; Reichert, Kolb, Bobrik, & Bauer, 2012). Furthermore, intuitive ways of displaying process models are provided, e.g., diagrams, forms, and trees (Kolb & Reichert, 2012). Gesture-based process modeling complements this work with sophisticated and intuitive concepts for interacting with process models using multi-touch devices.

Note that this paper significantly extends previous work we presented in (Kolb, Rudner, & Reichert, 2012). First, we provide by far more technical details, e.g., regarding the design and execution of the experiment identifying the gestures required for business process modeling. Second, we now provide an advanced proof-of-concept prototype of a gesture-based process modeling tool. In particular, this implementation utilizes results of the experiment we conducted. Third, we show how gesture-based process modeling is integrated in the proView framework.

The remainder of this paper is structured as follows: The background section gives fundamental insights into multi-touch applications and introduces the process modeling functions to be supported by the gesture set. The following section presents the results of an experiment we conducted to understand how users interact with multi-touch devices and which kind of gestures they prefer when modeling and changing processes. These experimental results provide the foundation of the core gesture set introduced in the subsequent section. The section on proView describes how gesture-based process modeling is integrated in our overall process modeling and visualization framework. A proof-of-concept prototype is presented in the implementation section, while the related work section discusses other approaches targeting at human-centric business process management. The paper concludes with a summary and an outlook.

BACKGROUND

This section describes background information needed for understanding this paper. First, general interaction concepts are introduced, which may be used to interact with an application running on a multi-touch device. Following this, common characteristics of multi-touch applications are discussed. Finally, a core function set required for defining and changing business process models is presented.

Multi-Touch Interaction Concepts

Generally, users may interact in different ways with a multi-touch application.

First, interaction concepts suggested in the context of conventional desktop applications may be applied to multi-touch applications as well; e.g., menu-based interactions rely on menus and toolbars to provide available functions to users. As an advantage, this concept al-
Creating Applications for Real-Time Collaboration with XMPP and Android on Mobile Devices  
Daniel Schuster, István Koren, Thomas Springer, Dirk Hering, Benjamin Söllner,  
Markus Endler and Alexander Schill (2012). Handbook of Research on Mobile  
Software Engineering: Design, Implementation, and Emergent Applications (pp. 824-844).

www.igi-global.com/chapter/creating-applications-real-time-collaboration/66501?camid=4v1a

An Introduction to Remote Installation Vulnerability in Content Management Systems  
Secure Software Engineering (pp. 52-63).

www.igi-global.com/article/an-introduction-to-remote-installation-vulnerability-in-content-management-systems/142040?camid=4v1a