

BPMNGen: A Conversational Environment for Collaborative and Multi-Perspective Process Modeling

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Abstract

Conceptual modeling is increasingly supported by Large Language Models (LLMs) through conversational interaction. In the domain of business process modeling, existing approaches have demonstrated the feasibility of generating BPMN 2.0 process models from natural language. However, their support for collaborative process elicitation, multi-perspective BPMN 2.0 modeling, and process understanding remains limited. This paper presents BPMNGen, an LLM-based conversational environment that enables brainstorming-based BPMN 2.0 modeling, as well as the generation of collaboration, choreography, and conversation BPMN 2.0 diagrams. Moreover, BPMNGen supports transformations between these BPMN diagram types and BPMN-to-text transformations to foster process understanding and documentation. BPMNGen provides hands-on insights into LLM-assisted collaborative business process modeling and will be of particular interest to researchers and practitioners working on conceptual modeling, Business Process Management (BPM), and generative AI.

Keywords

Conceptual Modeling, Large Language Models, Collaborative Process Discovery, Multi-Perspective Modeling

1. Introduction

Conceptual modeling plays a central role in understanding, communicating, and analyzing complex domains. In the domain of Business Process Management (BPM), business process modeling enables organizations to document, analyze, and optimize their business processes [1]. In practice, however, process knowledge is often collaboratively elicited in workshops and discussions involving multiple stakeholders with heterogeneous expertise and varying familiarity with BPMN 2.0 [2]. Creating formal and sound BPMN 2.0 process models from such fragmented and evolving process information remains a challenging and time-consuming task, particularly for non-expert users [3]. Recent advances in Large Language Models (LLMs) have led to increasing research efforts on supporting conceptual modeling tasks through conversational interaction. In business process modeling, existing approaches have demonstrated the feasibility of automatically generating BPMN 2.0 process models from natural language process descriptions [4, 5, 6]. In practice, however, process modeling rarely starts with a complete process description. Instead, process knowledge is iteratively elicited, discussed, and refined by multiple stakeholders and often needs to be analyzed from different process perspectives (e.g., process interactions and communication structures) [1, 2]. Supporting such collaborative and evolving BPM scenarios with existing modeling tools remains challenging. Building upon the previously introduced BPMNGen framework [7], this paper presents its latest extensions for collaborative and multi-perspective BPMN 2.0 modeling and interaction. Specifically, the presented extensions comprise collaborative brainstorming-based process elicitation with voice interaction, support for additional BPMN diagram types, conversational transformations between these diagram types, and BPMN-to-text generation. Moreover, BPMNGen combines conversational interaction, support for selectable LLMs, and traditional BPMN editing capabilities within a unified modeling environment.

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2. Overview and Demonstration Scenario

BPMNGen¹ is a web-based conversational BPMN environment for collaborative BPMN 2.0 process model generation and interaction. Fig. 1 provides an overview of the BPMNGen architecture and its main system components. The following subsections focus on the extended functionalities of BPMNGen that distinguish our tool from existing works.

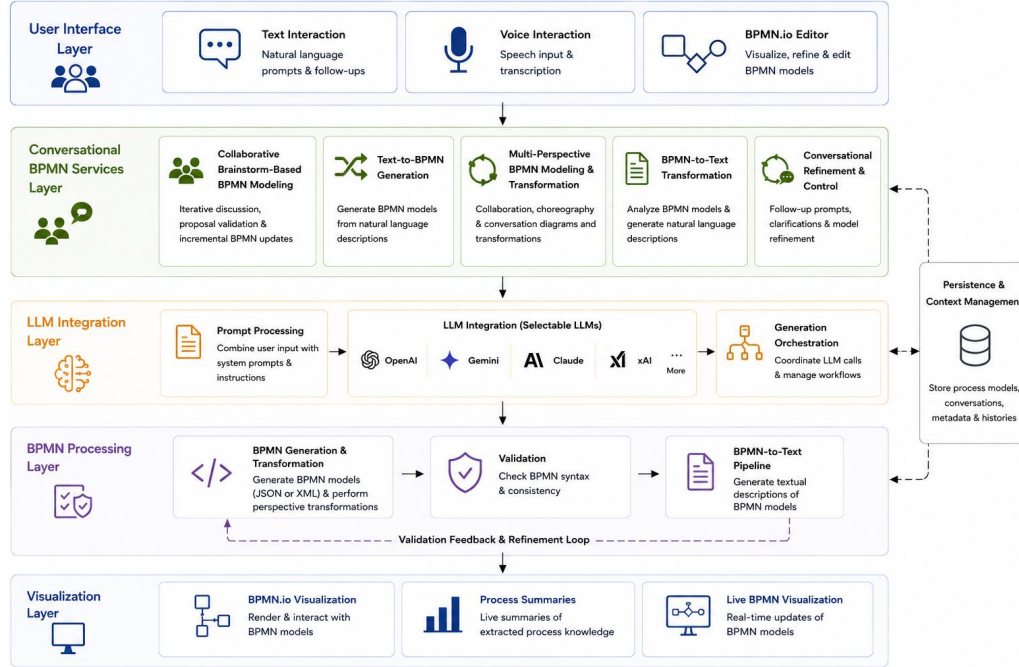


Figure 1: Architecture of the BPMNGen Conversational BPMN Environment

2.1. Collaborative Brainstorm-Based BPMN 2.0 Modeling

BPMNGen has extended its conversational BPMN 2.0 generation [7] by additionally supporting collaborative brainstorming-based process elicitation through multimodal interaction. In addition to traditional text-to-model approaches relying on a natural language process description, BPMNGen supports multiple stakeholders in iteratively discussing, refining, and constructing process models using voice-based interaction. This enables collaborative BPMN modeling scenarios in which process knowledge evolves incrementally during discussions and brainstorming sessions (see Fig. 2).

Technically, BPMNGen integrates a speaker-aware conversational processing pipeline within its modular client-server architecture. During brainstorming sessions, voice input is continuously transcribed and processed using speaker diarization to distinguish between participating stakeholders. The resulting conversational transcript is incrementally analyzed to extract process-relevant information such as actors, activities, decisions, events, and interaction relations. To facilitate efficient conversational refinement, BPMNGen applies memory-aware delta processing, where only newly exchanged process knowledge is analyzed while previously extracted information is maintained within an accumulated process memory. Newly extracted process elements are presented through interactive proposal-based validation mechanisms, where stakeholders may accept or reject extracted process knowledge before corresponding modifications are applied to the collaboratively generated BPMN 2.0 process model. Accepted changes are subsequently integrated through incremental refinement while preserving existing process structures. Before being rendered in the integrated BPMN.io editor environment, the generated BPMN 2.0 model is validated to ensure the correctness of its underlying BPMN XML representation.

¹Instructions for accessing and using BPMNGen, and an accompanying screencast are provided in the associated repository: <https://anonymous.4open.science/r/ER-Demo-BPMNGen>.

To foster collaborative process discovery and modeling, BPMNGen provides a live interaction environment consisting of speaker-aware conversational transcripts, continuously updated process summaries, and incremental BPMN 2.0 process model visualizations. This enables stakeholders to monitor, validate, and refine emerging process knowledge throughout the brainstorming and modeling session.

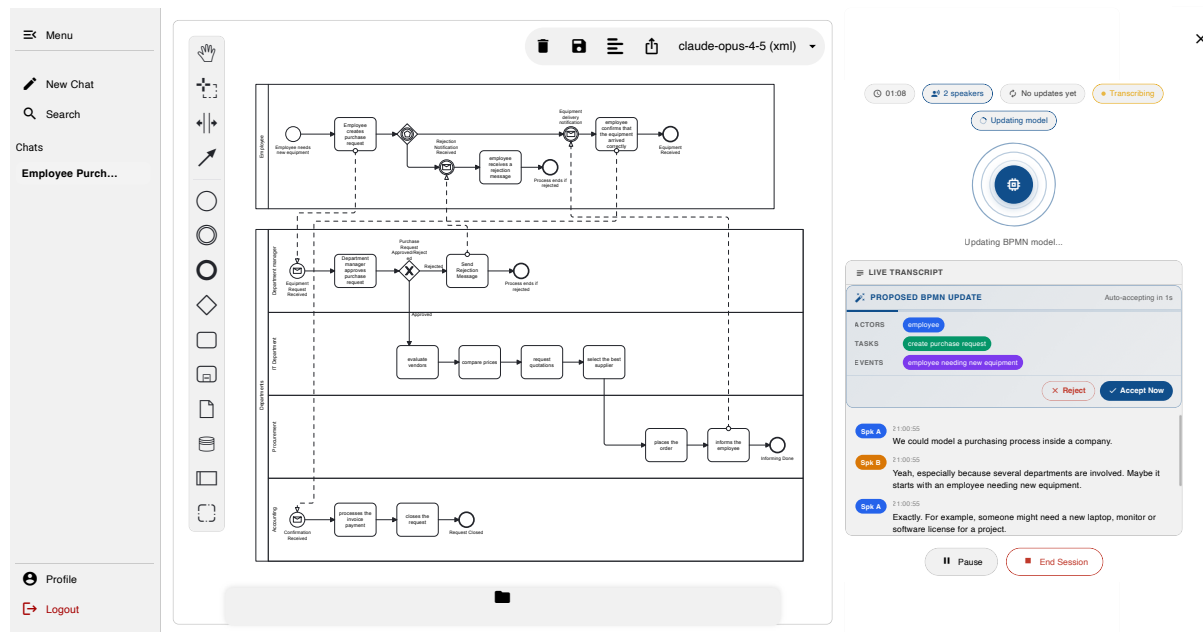


Figure 2: Collaborative Brainstorming-based BPMN 2.0 Modeling in BPMNGen

2.2. Multi-Perspective BPMN Modeling and Transformation

BPMNGen extends the generation of BPMN 2.0 collaboration diagrams by additionally supporting choreography and conversation diagrams as complementary BPMN diagram types. While collaboration diagrams primarily focus on internal process flows and message exchanges between participants, choreography diagrams provide interaction-centric representations between communicating parties (cf. Fig. 3). In turn, conversation diagrams focus on high-level communication structures between participants (cf. Fig. 4). This enables users to model business processes at different abstraction levels and from different BPMN perspectives depending on the respective modeling objectives and stakeholder requirements. BPMNGen therefore allows users not only to generate different BPMN diagram types directly from natural language descriptions, but also to transform existing BPMN 2.0 process models between different BPMN diagram types through conversational follow-up prompts.

Technically, BPMNGen has extended both its backend generation pipeline and its BPMN.io-based editor environment to support collaboration, choreography, and conversation diagrams within a unified modeling environment. Based on the selected BPMN diagram type, the backend applies diagram-specific instructions and example BPMN models to guide the selected LLM toward generating the corresponding BPMN 2.0 XML structures. Subsequently, the generated process models are validated by verifying the correctness of their BPMN XML representation and imported into the integrated editor environment, where dedicated frontend extensions provide diagram-specific visualization, interaction mechanisms, and editing capabilities for the respective BPMN diagram type.

2.3. BPMN-to-text Transformation

BPMNGen has further extended its conversational BPMN modeling by supporting the transformation of BPMN 2.0 process models into natural language process descriptions. Users may generate textual process descriptions directly from BPMN 2.0 process models created within the integrated editor

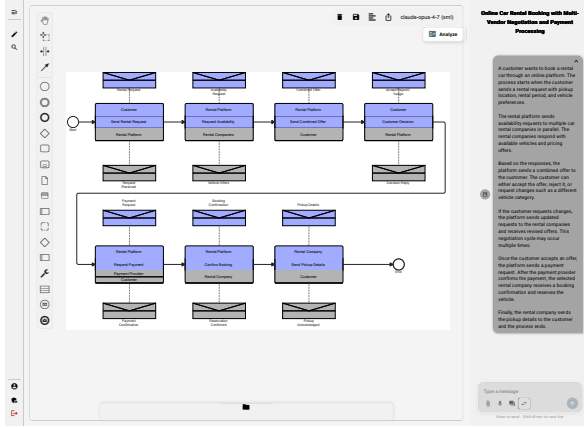


Figure 3: Generated Choreography Diagram

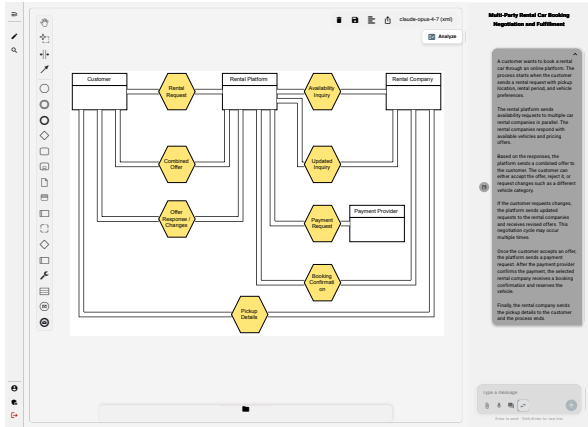


Figure 4: Generated Conversation Diagram

or provided via BPMN-XML uploads. The generated process descriptions complement graphical BPMN 2.0 representations and facilitate process communication, documentation, and understanding across different stakeholder groups, including both BPM experts and non-experts.

Technically, BPMNGen integrates a BPMN-to-text pipeline within its modular client-server architecture. The corresponding BPMN 2.0 XML representation is transmitted to the backend, where it is first validated before being transformed into a compact intermediate JSON representation. During this transformation step, semantically relevant BPMN 2.0 elements are extracted, while visualization-specific metadata and diagram layout information are omitted. Note that this reduces prompt complexity and token consumption. The resulting structured representation is then embedded into a BPMN-to-text prompt and processed by the selected LLM to generate a coherent natural language process description, which is finally returned to the frontend for visualization, documentation, and process communication.

2.4. BPMNGen Demonstration Scenario

A typical BPMNGen usage scenario starts with multiple stakeholders collaboratively brainstorming and discussing a business process using voice input. During the discussion, BPMNGen continuously analyzes the exchanged information, identifies relevant process-related knowledge, and incrementally generates a BPMN 2.0 collaboration diagram. This allows participants to iteratively construct and refine process models without requiring complete or formally structured process descriptions in advance.

After this session, BPMNGen generates and visualizes a final BPMN 2.0 process model based on the collaboratively collected process information. Users may subsequently refine the generated process model either conversationally through follow-up prompts or manually using traditional BPMN 2.0 modeling components provided by the integrated BPMN.io editor. This combination of conversational interaction and manual modeling enables flexible process elicitation and fine-grained process model refinement within a unified modeling environment.

To support multiple modeling perspectives, the generated collaboration diagrams may additionally be transformed into choreography and conversation diagrams. This enables users to switch between different BPMN perspectives and abstraction levels. In scenarios where non-expert stakeholders participate in the modeling process or where process documentation is required, BPMNGen additionally provides BPMN-to-text transformations that automatically generate textual process descriptions from BPMN 2.0 process models. This facilitates process understanding, communication, documentation, and accessibility across different stakeholder groups, including both BPM experts and non-experts. Finally, the generated process models can be validated and exported as BPMN 2.0 XML files for further refinement and integration into existing BPM environments.

3. Maturity of the Tool

BPMNGen is a mature web-based conversational modeling environment that is publicly accessible at www.bpmngen.de. It is currently used by several hundred students in BPM courses at Ulm University to explore conversational BPMN modeling and process modeling concepts. The initial text-to-model functionality of BPMNGen has previously been evaluated with respect to the semantic quality, comprehensibility, usability, and acceptability of automatically generated BPMN 2.0 process models [7]. The results demonstrated the feasibility of conversational LLM-based process model generation. Furthermore, the BPMN-to-text functionality has been investigated in our paper accepted for the ER 2026 main research track. The collaborative brainstorming, multi-perspective modeling, conversational transformations between BPMN diagram types, and BPMN-to-text capabilities presented in this demonstration have been fully integrated into the current BPMNGen implementation and are routinely used in internal teaching and demonstration scenarios. These functionalities constitute the latest extension of BPMNGen and represent the focus of this demonstration, showcasing how conversational AI can support collaborative and multi-perspective conceptual modeling in business process management.

4. Conclusion and Future Works

This paper presented BPMNGen, a conversational environment for collaborative and multi-perspective BPMN 2.0 modeling. We demonstrated how BPMNGen supports collaborative process discovery through brainstorming-based process elicitation, multi-perspective BPMN modeling across collaboration, choreography, and conversation diagrams, as well as BPMN-to-text transformations for process communication and documentation. By combining these capabilities within a unified modeling environment, BPMNGen demonstrates the potential of LLMs to facilitate conceptual modeling and make business process modeling more interactive, iterative, and accessible for researchers and practitioners. Future work may address the modularization of large-scale process models, retrieval-augmented generation, and the integration of structured organizational knowledge sources, such as decision and constraint tables to support organization-specific and compliance-aware conceptual modeling workflows.

Declaration on Generative AI

The author(s) have not employed any Generative AI tools.

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