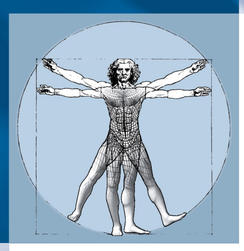

Human Users in Simulation Workflows

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Integrate, Register & Communicate

Project Motivation

- There is lack of integration of human users in scientific workflows
- Little use of current communication methods and devices is made

Main Goals of the Project

- An architecture for integration of human users in scientific workflows
- Flexible communication services for lightweight tasks of human users
- Efficient management of simulation-related tasks provided by human users
- Guidance for user-driven workflow repair and data manipulation steps

Current State

SimTech Interactive Scientific Workflows Infrastructure

- Scientific Workflow Modeling Environment: A human user models and monitors a workflow for a scientific experiment
- Scientific Workflow Execution Environment: The workflow is carried out as an orchestration of different experiment functions exposed as services
- Service Bus: Communication with these services is enabled via a unified communication channel

Recent Advances to Support Human Users

- Process Views: Views on scientific workflows enable the scientist to get fast insight into the structure and performance of complex scientific workflows [1]
- Web-based Monitoring: Abstract graphical representations of the scientific workflow provide the scientist with an insight into the current status of execution over the web [2]
- Process Fragment Repository: The environment is integrated with a repository of reusable artifacts which are called process fragments [3]

Identified Classes of Human Interaction

- Decisions: approval, multiple choice, parameter selection, data checking, data correction, data selection, fault handling directive selection
- Notifications: status reports, fault reports, simulation completeness updates
- Control: pause, resume, abort, retry, iterate, skip, jump, modify variable

Towards an End-to-end Integration

Integration Architecture

- Human Interaction Activity: A complex process structure that is pre-modeled as process fragment, configurable to enable interaction with a human user
- Human Interaction Activity Execution: All information required for the interaction is sent to the human communication manager
- Human Communication Manager: It manages all human tasks and enacts “communication flows” to route them; Communication flows envisioned to be based on task classification and presence information [4]
- Integrated Task List: A list of human-related tasks that guide the human user through tasks to be performed, e.g. for specifying complex parameters
- Communication services: Services enable communication between workflow and human user based on registered devices, e.g. for simple decisions

Scenarios for Involvement of Human Users

- Heavyweight: Tight integration of the workflow and human task management
  - Repair of workflows in case of failure in model-as-you-go fashion
  - Collaborative problem-solving through task forwarding
  - Dynamic parameter adjustment, e.g. reducing the problem size
- Lightweight: Pluggable integration of the workflow and communication services
  - Human user registers communication devices and sets preferences
  - Advanced configurations for communication through presence models
  - Ad-hoc Integration of services and devices

Connection to SimTech Visions

The hybrid approach for heavyweight and lightweight integration of human users in scientific workflows is a generic approach and leverages the benefits of the existing workflow technology and provides for an intuitive and straightforward simulation workflow usage. The approach can be considered as an enabler for integrative science on the user level for all visions in SimTech.

References

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