We connect STEAMS to your simulator and help configure STEAMS for your simulator tags.

Simulator Training Evaluation and Monitoring System – STEAMS

STEAMS is a software product to record and play back simulator sessions. It integrates video, audio, screen content, data logs, malfunctions, operator actions and plant responses into a combined stream for post-scenario replay and analysis.

STEAMS provides quick and easy means to search and find interesting sequences of a recorded session, and immediately synchronizes all data sources to the selected time. This makes STEAMS superior to traditional video-based recordings.

APPLICATIONS

STEAMS is applicable to simulator-based training in nuclear, petroleum, power and other industries. STEAMS supports tasks such as

- post-scenario debriefing
- performance assessments and qualification exams
- learning from recorded best-practice operations
- document compliancy during scenario-based simulator testing

PROJECTS

Together with Exitech Corporation, IFE installed STEAMS and connected it to customers' simulators at

- Comanche Peak nuclear power plant, Texas, USA
- Donald C Cook nuclear power plant, Michigan, USA

STEAMS is developed based on well-proven prototypes used by IFE's researchers to assess operating crew performance in HAMMLAB studies for the OECD Halden Reactor Project since 2011.

KEY FEATURES

During playback, STEAMS presents

- audio from selected devices, with individual control
- video from selected cameras
- searchable lists of operator actions, plant alarm & event responses, and instructor-initiated malfunctions and notes
- trend plots of searchable process parameter values
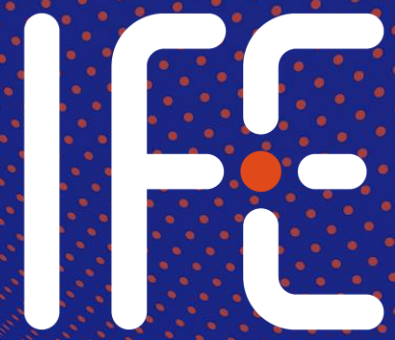- images captured from selected operator control screens and plant process computer screens

The user can play & pause, and easily select any specific time from a recorded scenario by dragging a slider, selecting from searchable lists of events, or clicking on trend plots. STEAMS immediately synchronizes all data sources to the selected time and is ready to play.

Image from recorded session during acceptance testing at Comanche Peak nuclear power plant

Operator using STEAMS during self-assessment after completing a simulator session

IFE has more than 30 years of experience in studying human behavior and performance in complex operating environments to ensure safe, reliable and efficient operation. We study human-machine interaction and crew collaboration, integrating the knowledge gained into methods for safety analysis, new designs and support systems. Read more about our simulator-based research facility at www.ife.no/hammlab

STEAMS is developed based on experiences and prototype tools from HAMMLAB.

SYSTEM OVERVIEW

STEAMS includes the following modules:

- **Player** is a desktop application performing the playback of recorded data. A multi-monitor PC is recommended to provide sufficient screen space for watching multiple camera- and screen recordings in parallel.
- **SimInterface** extracts variable values from the simulator and sends to the Data Collector. It accesses simulator variables through shared memory, TCP/IP, OPC or other means provided by the simulator vendor.
- **Data Collector** connects to SimInterface and subscribes for values for a selected set of simulator tags. Then, SimInterface pushes new values frequently at regular intervals. Data Collector stores the values for the trend plots and forwards the values to the ProcSee RTM.
- **ProcSee RTM** performs two main tasks:
    - It provides the HMI to monitor and control the recording of sessions. The instructor's commands to start and stop a recording is immediately forwarded to all other modules.
    - Each update-cycle it evaluates a set of conditions to determine if operator-, process- and instructor-events occurred. If an event condition is determined, the event text details are stored. The set of conditions and the corresponding event text details are configurable by the customer.
- **Audio Recorder** records from audio devices and stores individual audio files.
- **Camera Recorder** captures and stores images from cameras at regular intervals whenever changes are detected.
- **Screen Recorders** capture and store the contents of selected operator control screens and plant process computer screens at regular intervals whenever changes are detected.

DATA STORAGE

Recorded data is stored to a folder selected by the instructor at the start of the session. Folders are tagged by date, time and additional parameters selected by the instructor; such as operating crew and simulator scenario.

The data store may be a portable hard drive, a local disk on the recording computer or the company's central file server.
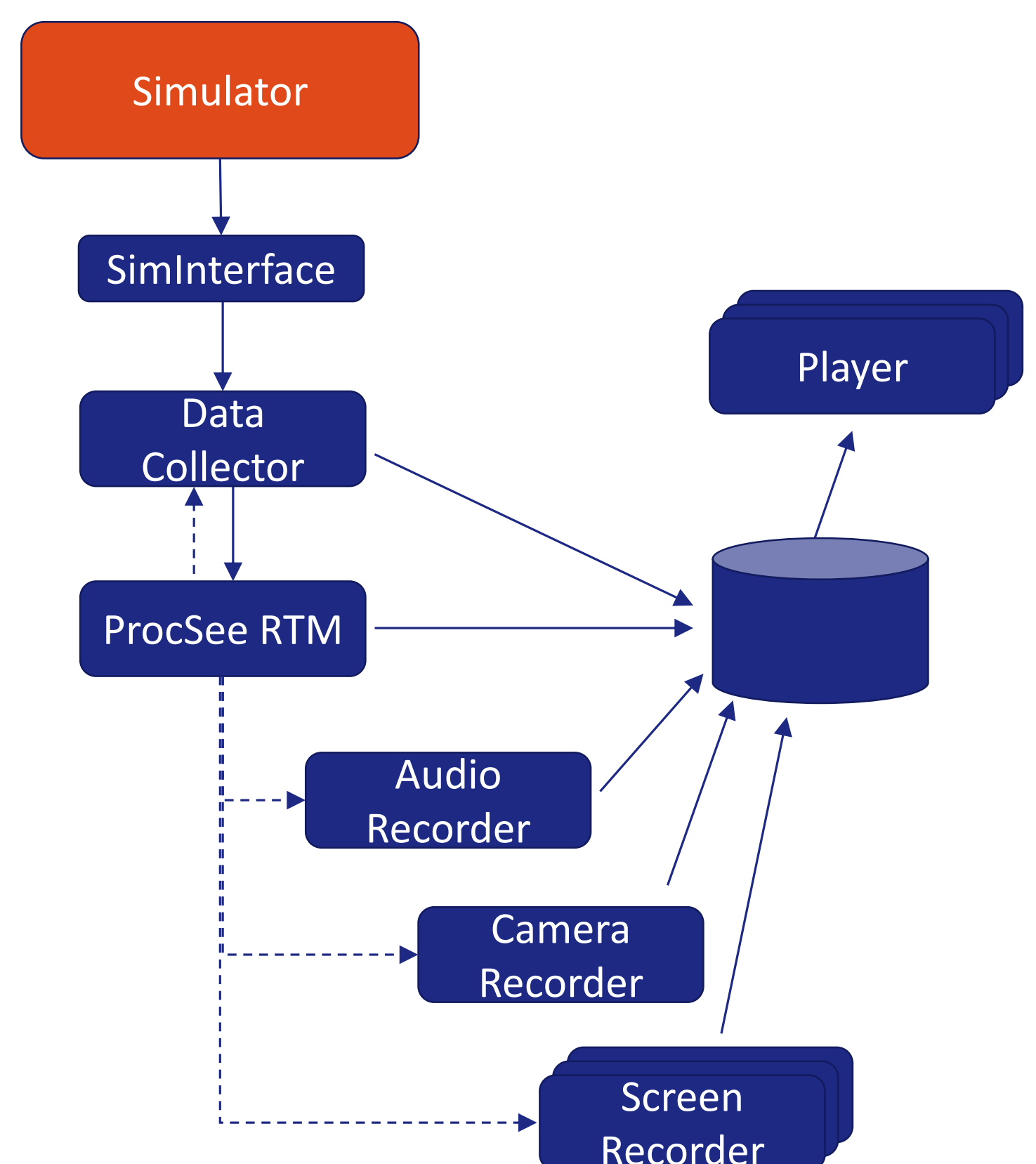
STEAMS modules and how they relate. Solid lines denote data flows; dashed lines denote control flows.