
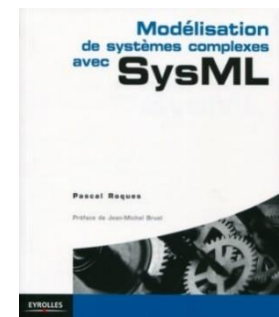




Clock Radio Example - 02/2016

Presentations

- Pascal Roques: senior consultant, 25 years of experience
 - SADT, OMT, UML, SysML, ARCADIA
- UML2 and SysML Certified by OMG
- Co-founder of the  association
- Trainer for Thales on ARCADIA / Melody
 - 90+ sessions, 1100+ trainees
 - Member of the Clarity consortium
- Author of the most widely read books in France on UML ... and of the first French book on SysML

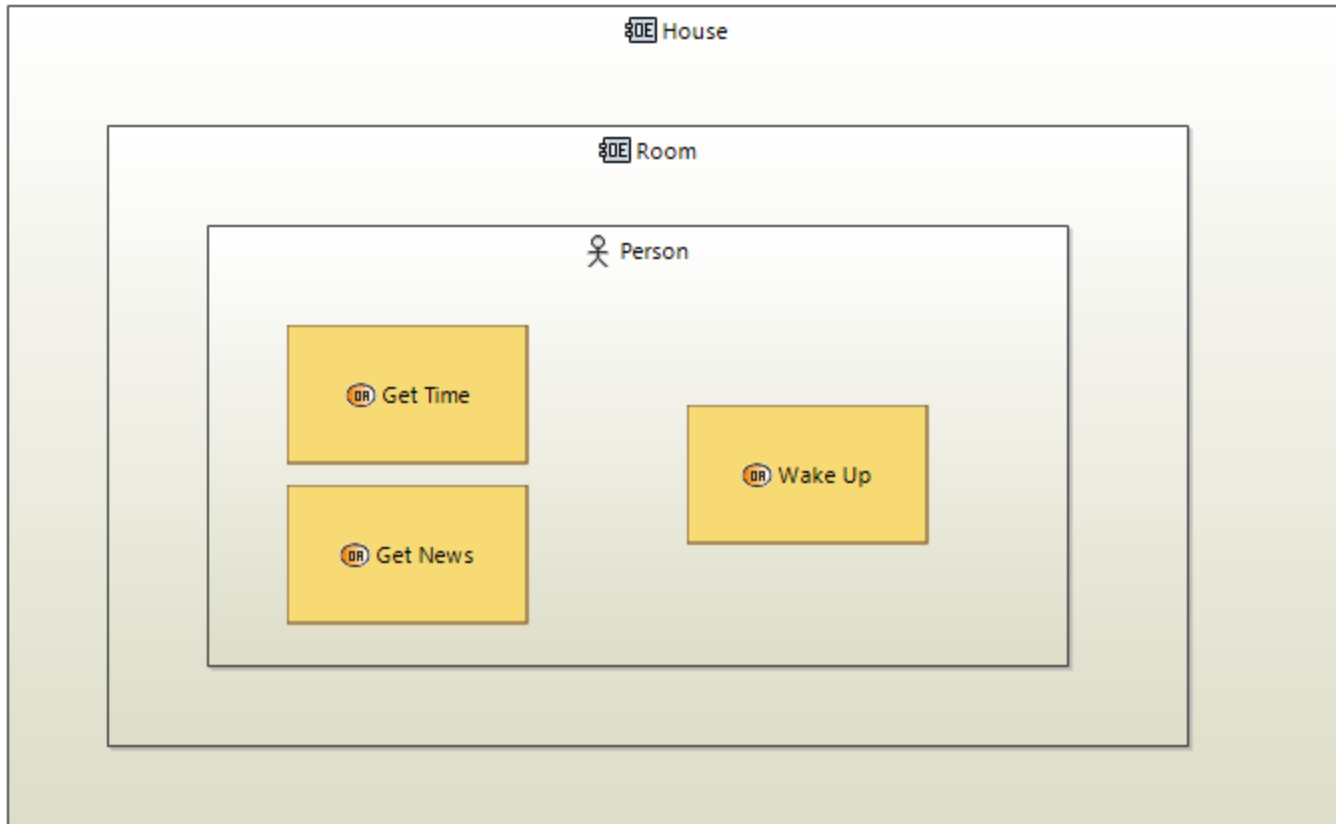


Operational Analysis (OA)

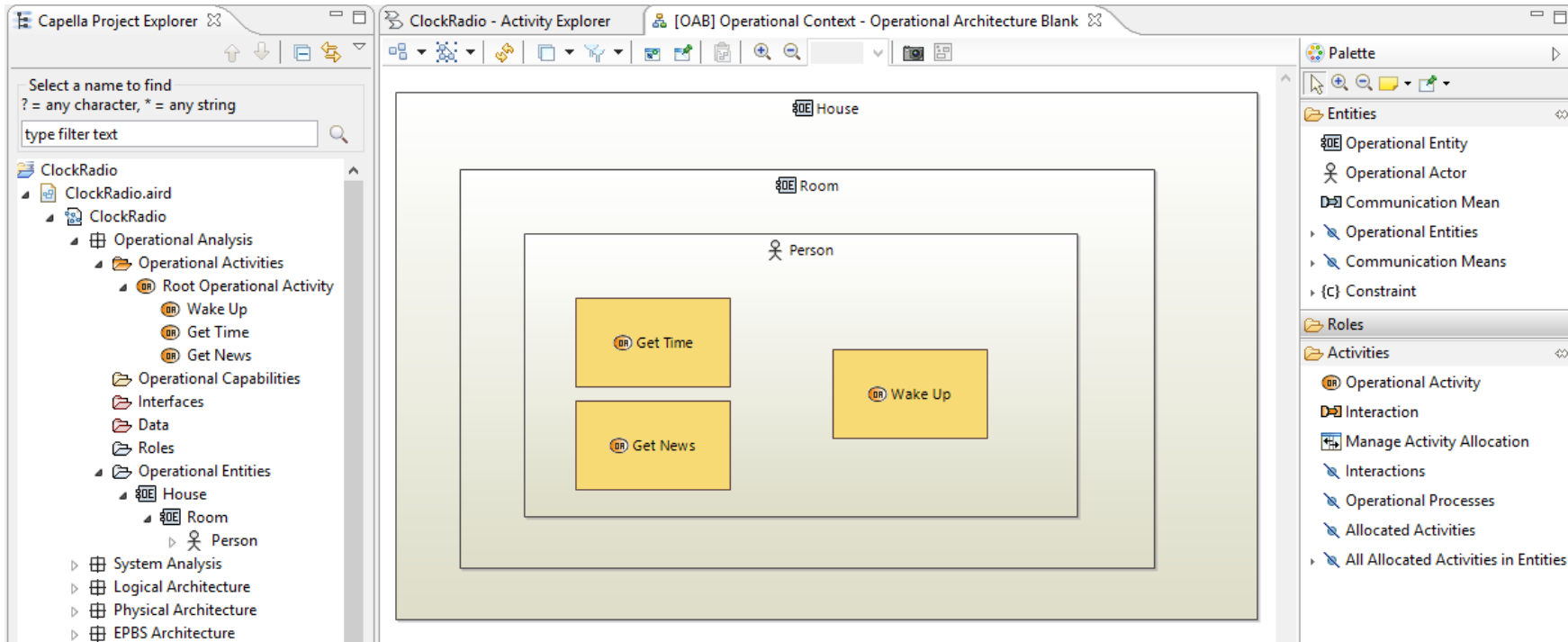
The screenshot shows the 'ClockRadio - Activity Explorer' window. The main title is 'Operational Analysis'. Below the title, there are two large chevron-shaped buttons: a yellow one labeled 'Operational Analysis' with the subtitle 'Define Stakeholders Needs', and a grey one labeled 'System Analysis'. Below these buttons is a list of tasks, each with a small icon and a menu icon:

- ▶ Define Operational Entities and Capabilities
- ▶ Define Operational Activities and describe Interactions
- ▼ Allocate Operational Activities to Operational Actors, Entities or Roles
 - [\[OAB\] Create a new Operational Architecture diagram](#)
 - [\[ORB\] Create a new Operational Role diagram](#)
 - [\[OES\] Create a new Operational Entity Scenario](#)
- ▶ Transverse Modeling

Operational Architecture Blank



OAB



OA: Diagrams Viewer

Operational Analysis ▾ ?

Operational Analysis
Define Stakeholders Needs

System Analysis

- Define Operational Entities and Capabilities ? ↕
- Define Operational Activities and describe Interactions ? ↕
- Allocate Operational Activities to Operational Actors, Entities or Roles ? ↕
- Transverse Modeling ? ↕

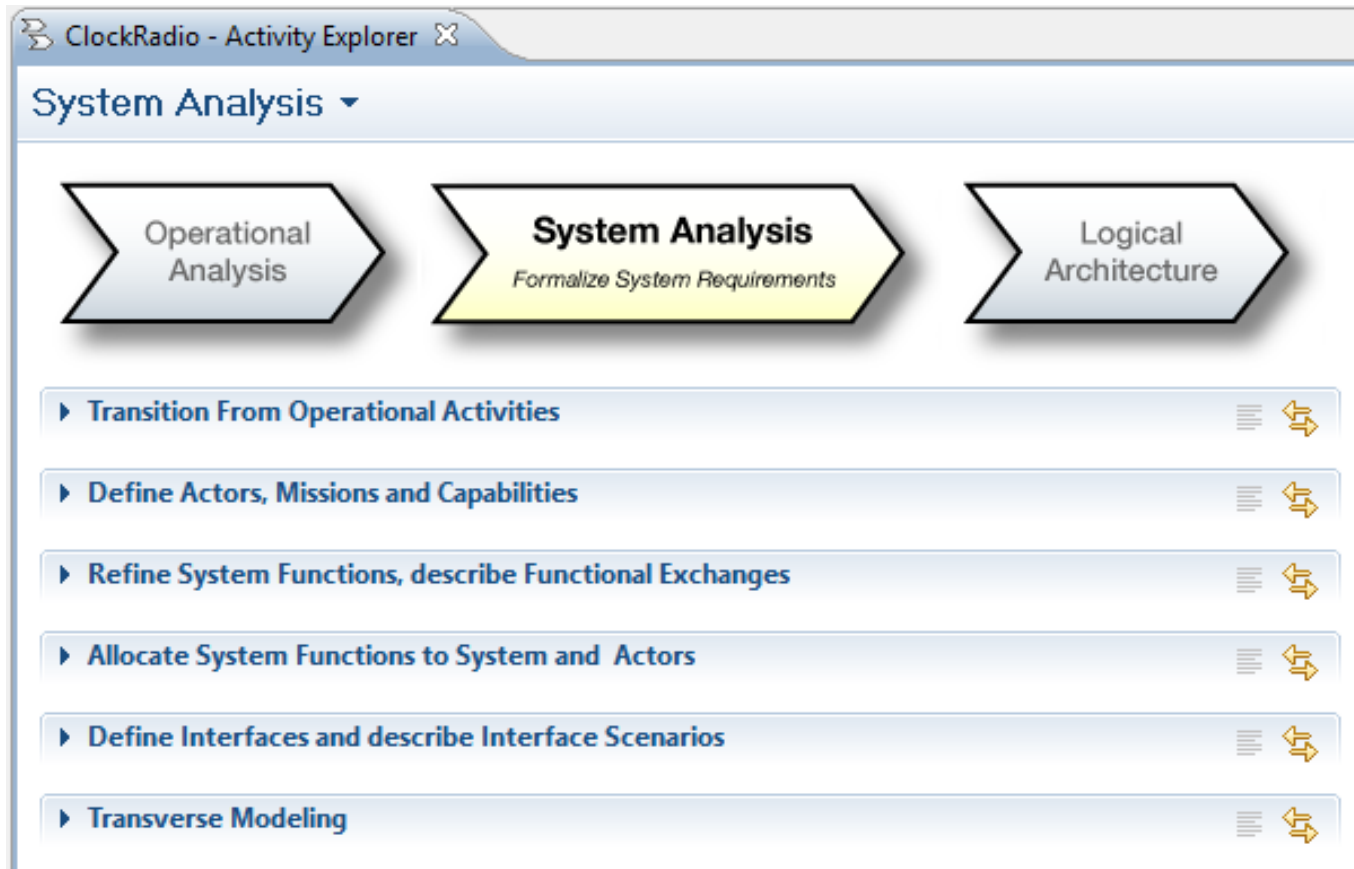
Diagrams Viewer ✕

Select a name to find
? = any character, * = any string

type filter text

- Common
- Operational Analysis
 - Operational Architecture Blank
 - [OAB] Operational Context - Operational Architecture Blank**
 - Operational Entity Breakdown
 - [OEBD] Operational Context - Operational Entity Breakdown

System Analysis (SA)



System Data Flow Blank

ClockRadio - Activity Explorer

Operational Analysis **System Analysis** *Formalize System Requirements* Logical Architecture

▸ Transition From Operational Activities

▸ Define Actors, Missions and Capabilities

▾ Refine System Functions, describe Functional Exchanges

- [SFBF] Create a new Functional Breakdown diagram
- [SDFB] Create a new Functional Dataflow Blank diagram**
- [FSI] Create a new Functional Scenario

▸ Allocate System Functions to System and Actors

▸ Define Interfaces and describe Interface Scenarios

Diagrams Viewer

type filter text

▾ Common

▾ System Analysis

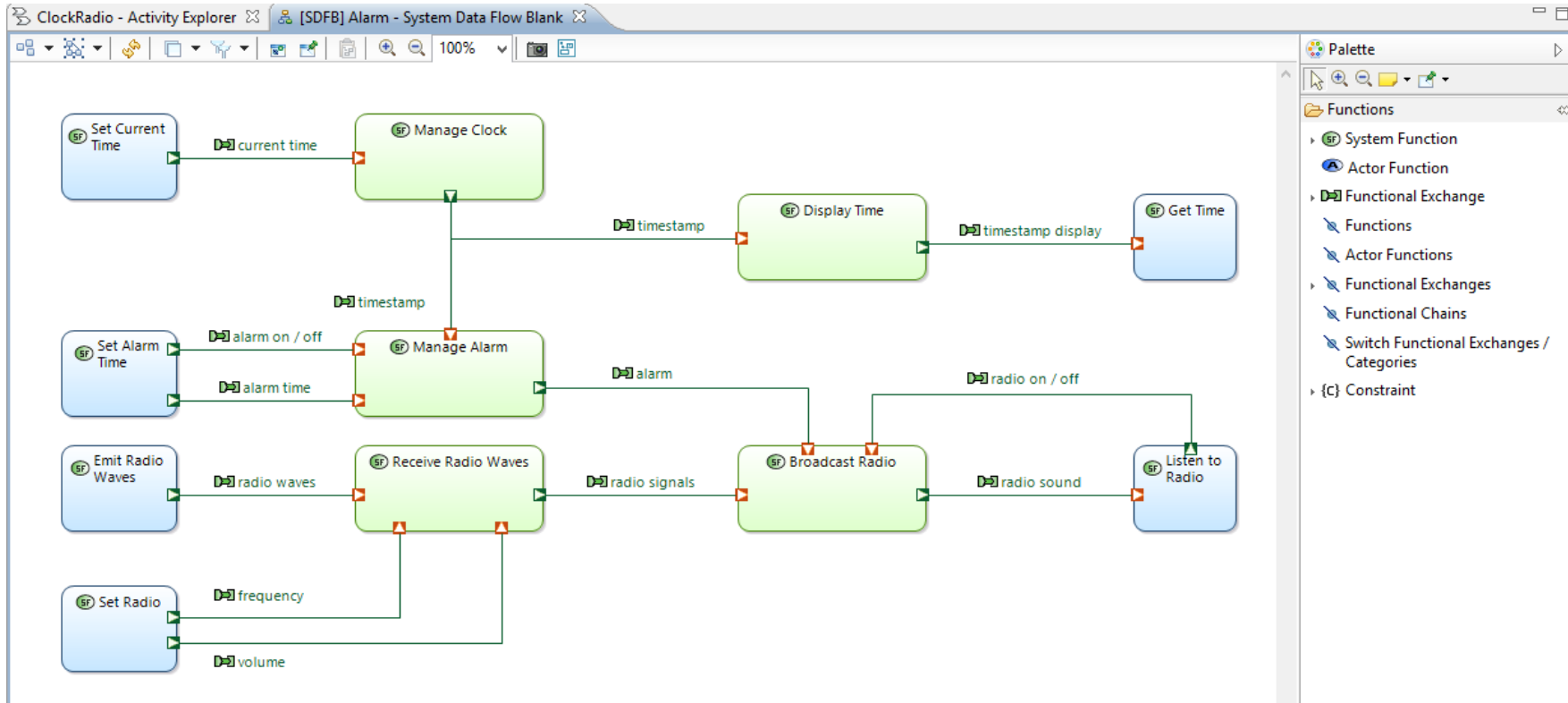
Type representation name

Type representation name

[SDFB] Alarm - System Data Flow Blank



OK Cancel

System Data Flow Blank (SDFB)

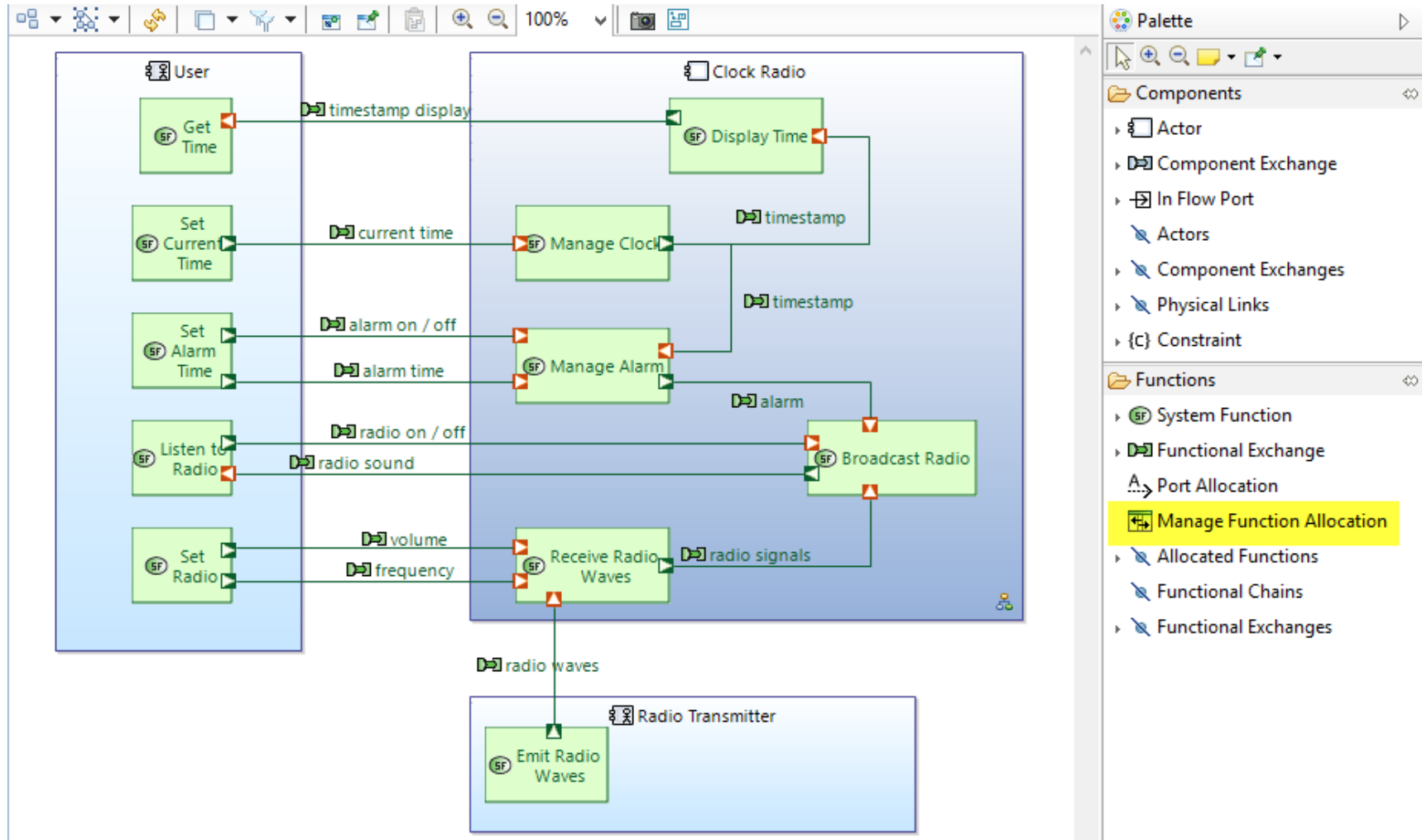


System Architecture Blank

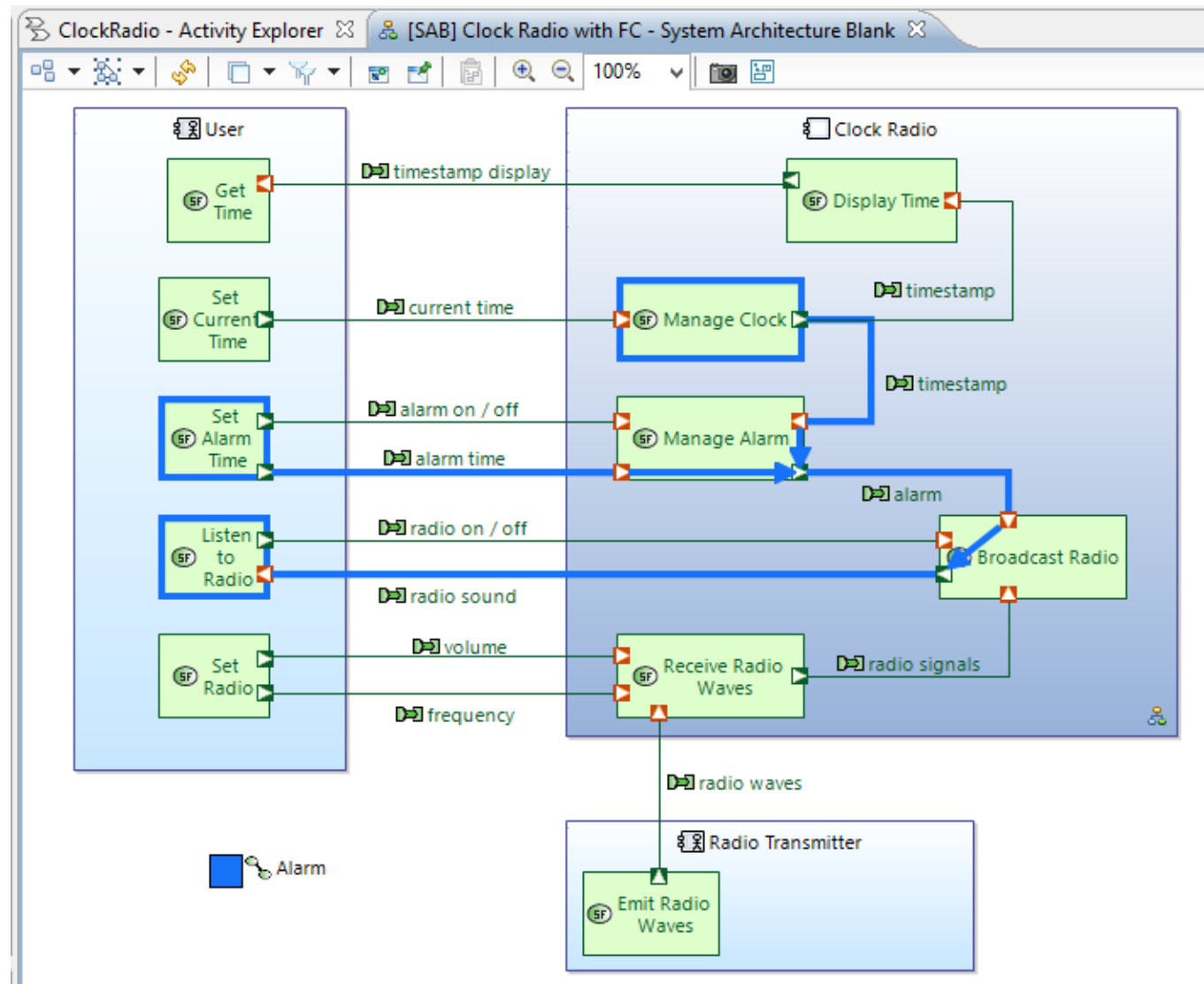
The screenshot shows the Clarity System Analysis interface. At the top, there are two tabs: "ClockRadio - Activity Explorer" and "[SDFB] Alarm - System Data Flow Blank". Below the tabs is a "System Analysis" section with a dropdown arrow. The main area contains three chevron-shaped buttons: "Operational Analysis", "System Analysis" (highlighted in yellow with the subtitle "Formalize System Requirements"), and "Logical Architecture". Below these buttons is a list of tasks, each with a right-pointing arrow and a double-headed arrow icon:

- ▶ Transition From Operational Activities
- ▶ Define Actors, Missions and Capabilities
- ▶ Refine System Functions, describe Functional Exchanges
- ▼ Allocate System Functions to System and Actors
 -  [\[SAB\] Create a new System Architecture diagram](#)
 -  [\[ES\] Create a new Exchange Scenario](#)
- ▶ Define Interfaces and describe Interface Scenarios
- ▶ Transverse Modeling

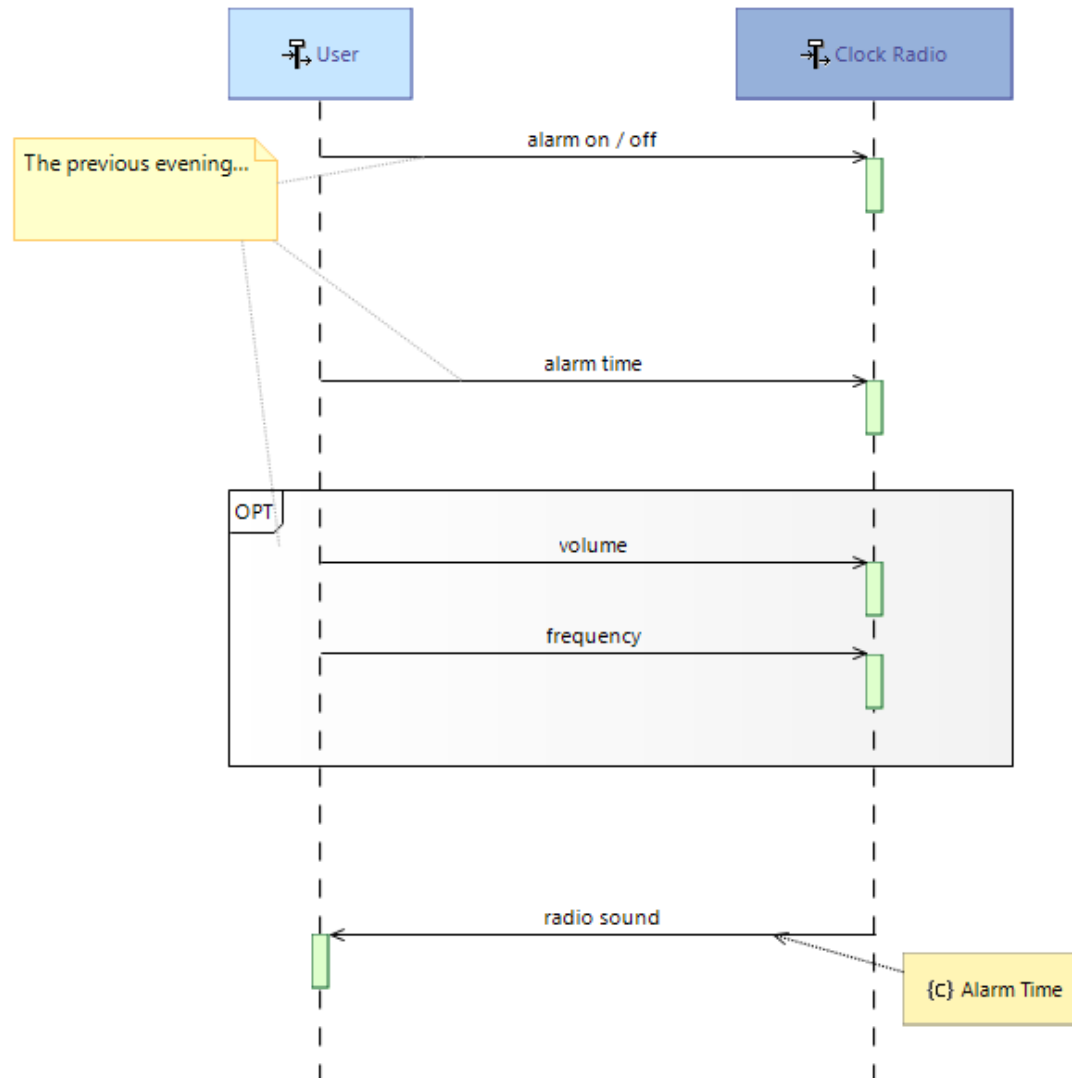
SAB: Functions Allocation



SAB + FC



System Exchange Scenario



SA – OA Matrices

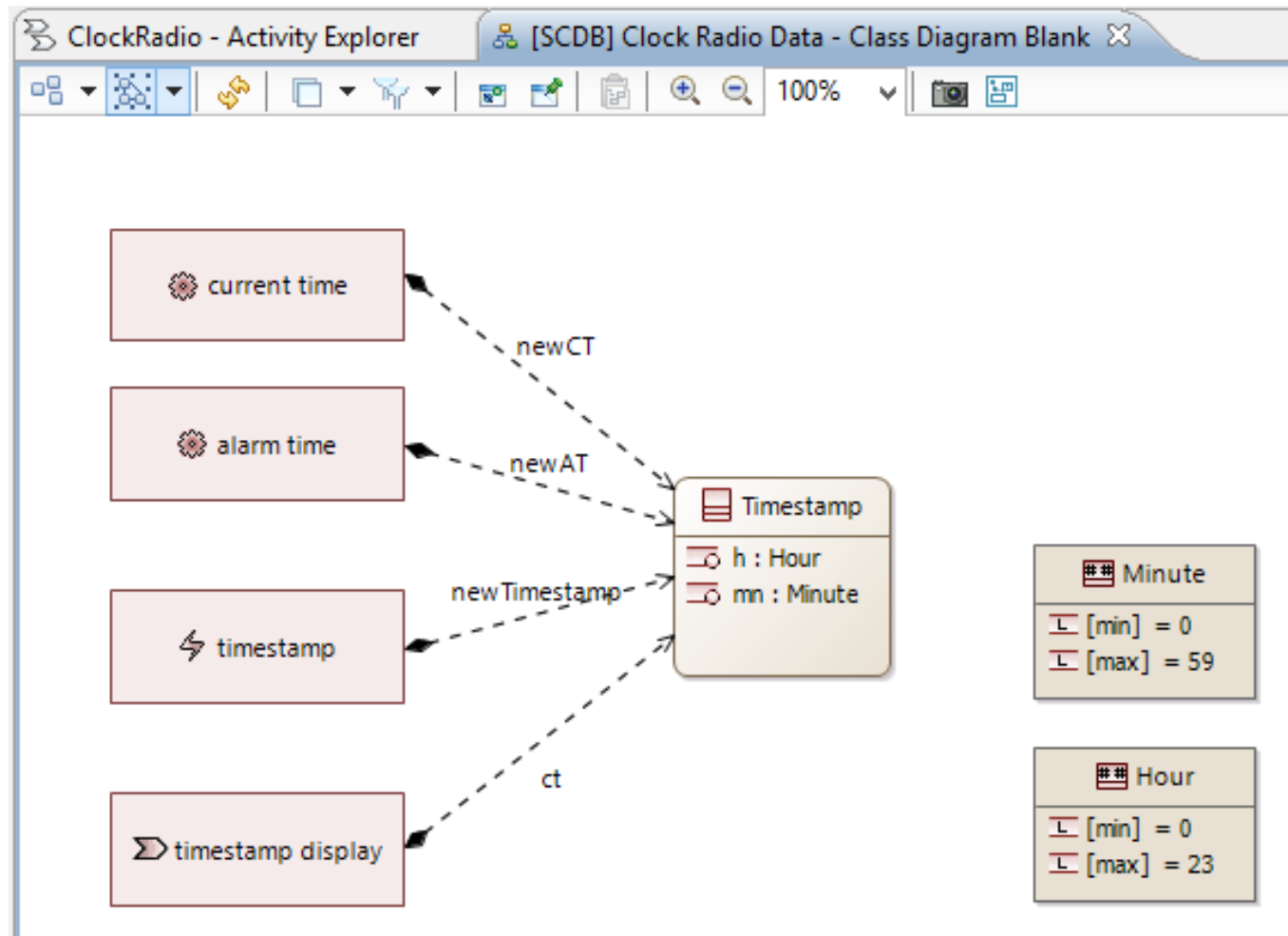
	Wake Up	Get Time	Get News
Manage Clock	X	X	
Manage Alarm	X		
Set Current Time		X	
Set Alarm Time	X		
Display Time		X	
Broadcast Radio	X		X
Emit Radio Waves			
Get Time		X	
Listen to Radio			X
Receive Radio Waves	X		X
Set Radio	X		X

	House	Room	Person
User			X
Radio Transmitter			

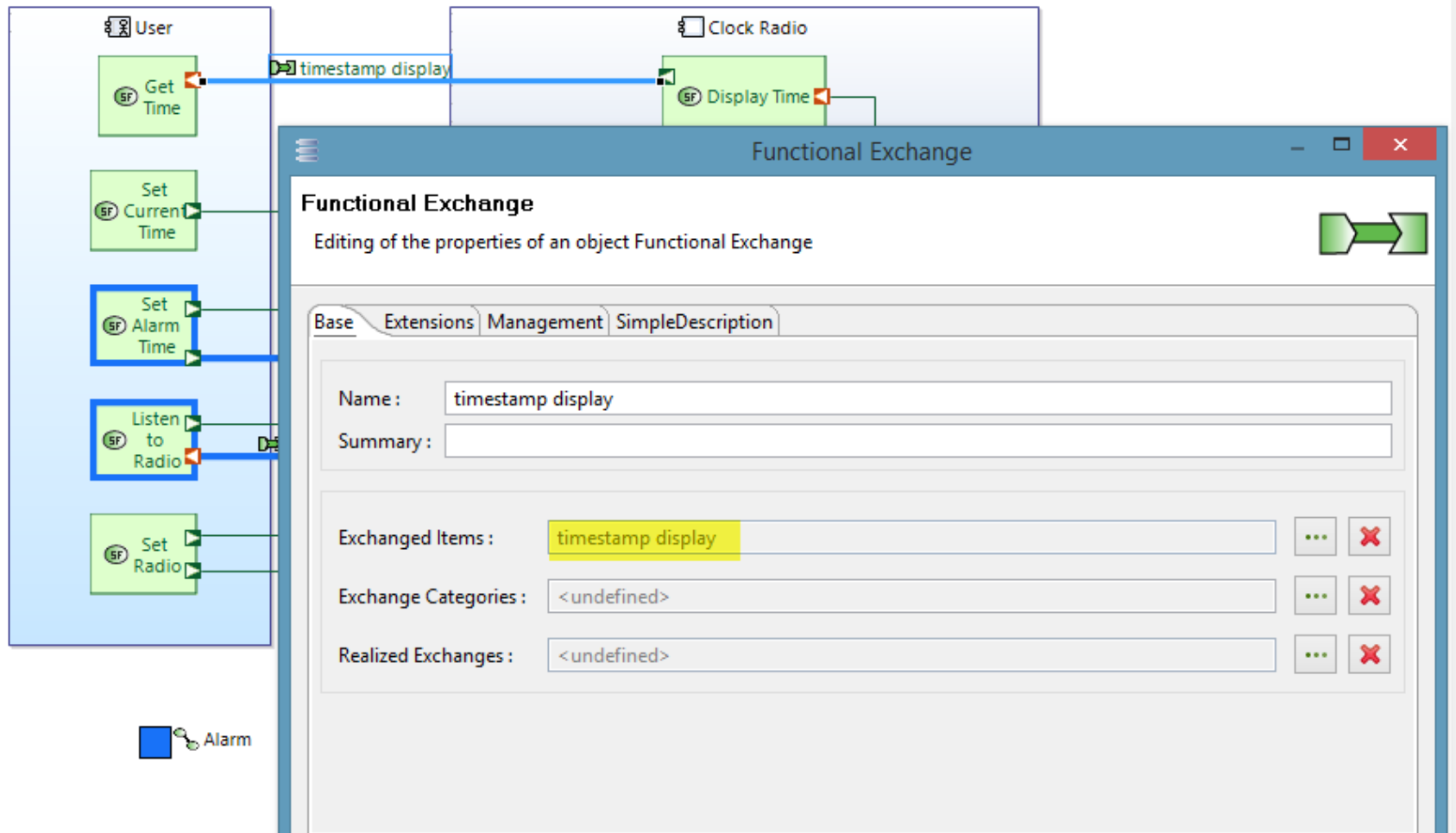
Class Diagram Blank

The screenshot shows the Clarity software interface. At the top, there's a tab labeled 'ClockRadio - Activity Explorer'. Below it, the 'System Analysis' phase is selected, highlighted in yellow. The interface is divided into three main sections: 'Operational Analysis', 'System Analysis' (active), and 'Logical Architecture'. Under 'System Analysis', there are several task cards: 'Transition From Operational Activities', 'Define Actors, Missions and Capabilities', 'Refine System Functions, describe Functional Exchanges', 'Allocate System Functions to System and Actors', and 'Define Interfaces and describe Interface Scenarios'. A 'Transverse Modeling' section is also visible, containing icons for '[CDB] Create a new Class Diagram', '[M&S] Create a new Modes & States Machine', and 'Create a new State & Mode / Functions matrix'. On the right, the 'Diagrams Viewer' shows a tree structure of diagrams, with 'Class Diagram Blank' selected. A dialog box titled 'Type representation name' is open in the foreground, with a red arrow pointing from the '[CDB] Create a new Class Diagram' icon to it. The dialog box contains a text input field with the text '[SCDB] Clock Radio Data - Class Diagram Blank' and 'OK' and 'Cancel' buttons.

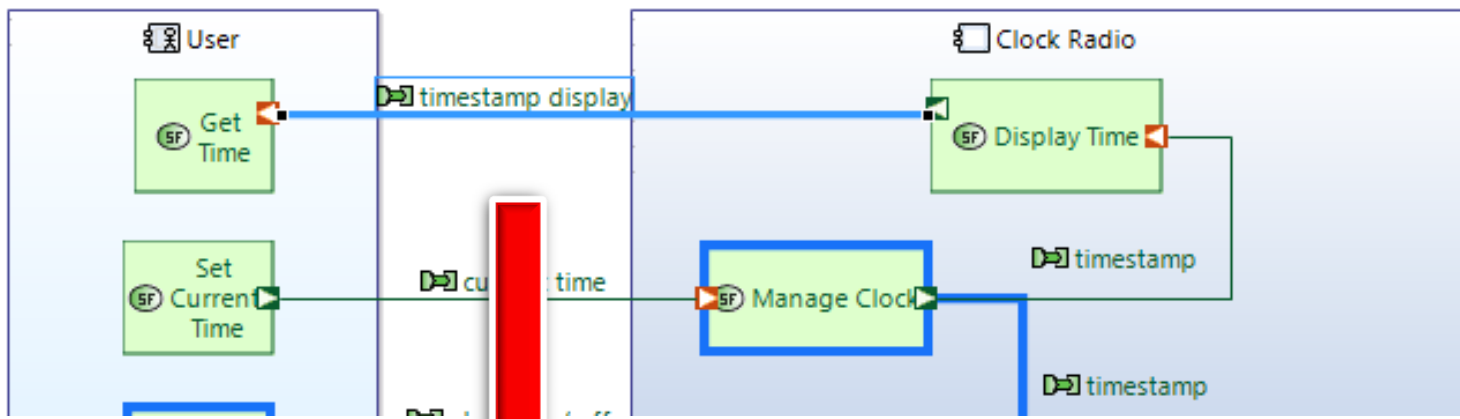
SCDB: Exchange Items and Types



SAB: Exchange Item and FE

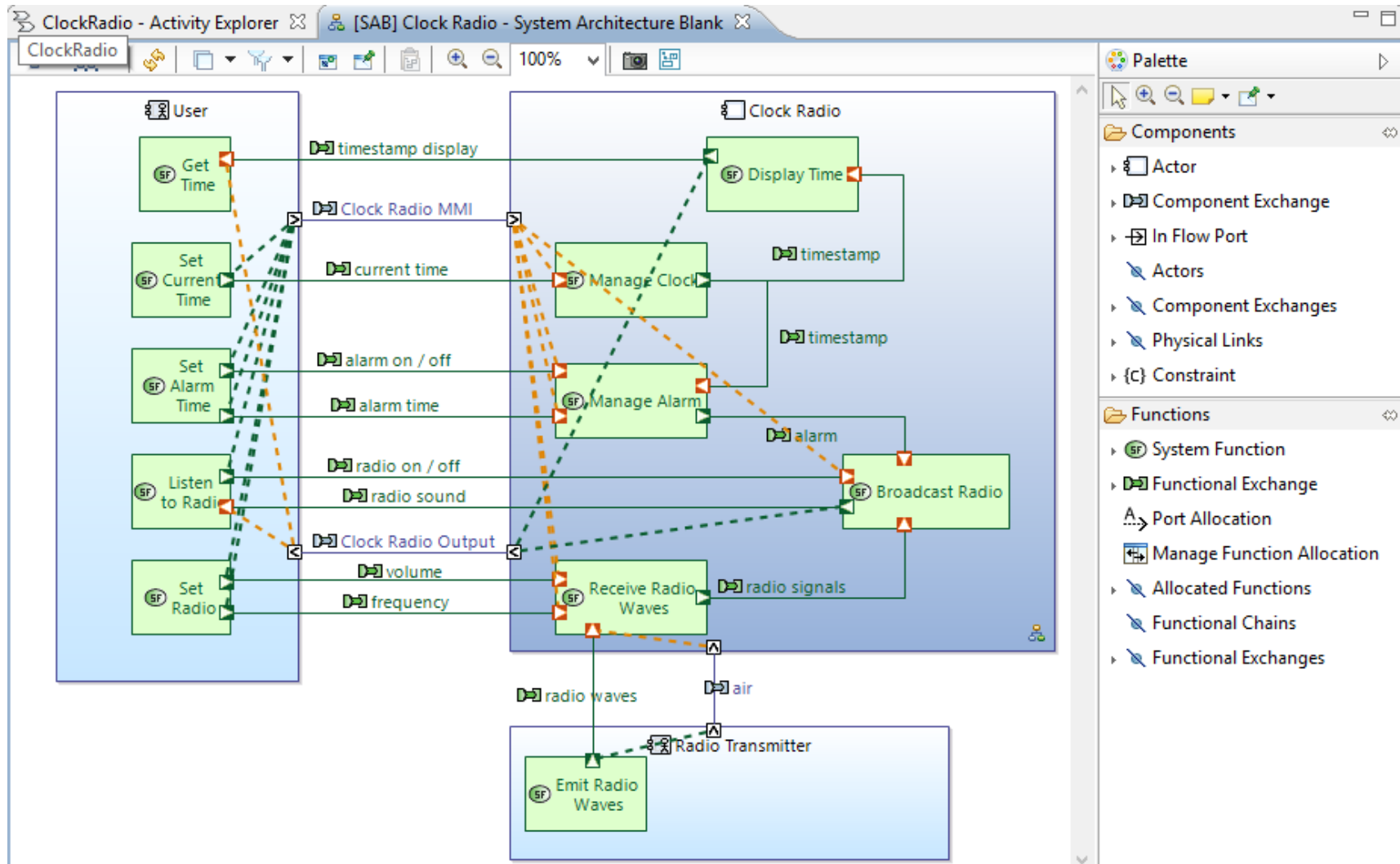


Semantic Browser

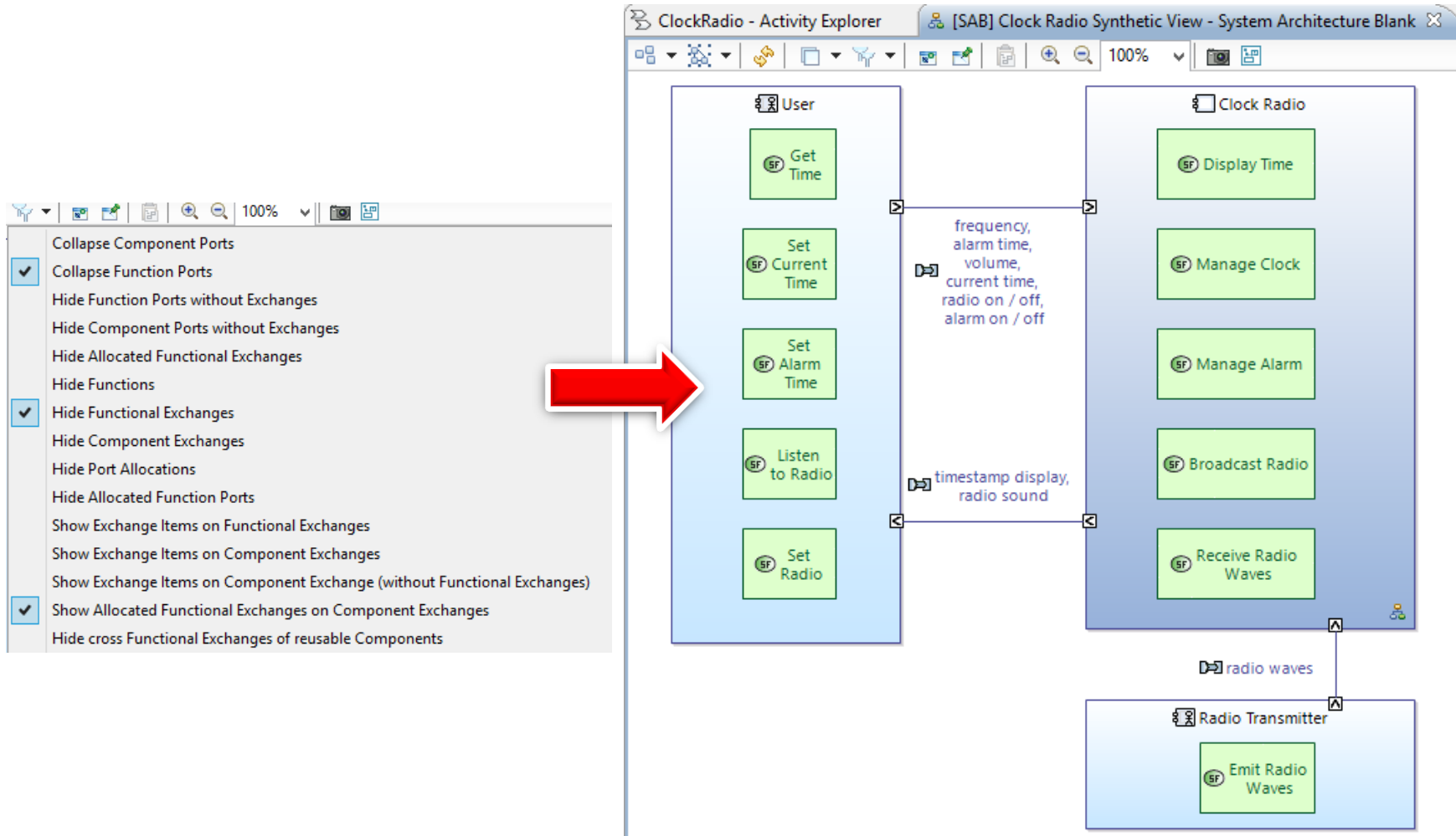


Current Element	Referenced Elements
<ul style="list-style-type: none"> ▾ timestamp display <ul style="list-style-type: none"> ▾ Owner <ul style="list-style-type: none"> ⊙ Root System Function ▾ Related Data <ul style="list-style-type: none"> ▭ Timestamp ▾ All Related Diagrams <ul style="list-style-type: none"> [SAB] Clock Radio Synthetic View - System Architecture Blank [SAB] Clock Radio - System Architecture Blank 	<ul style="list-style-type: none"> ▾ Exchange Items <ul style="list-style-type: none"> ▾ timestamp display <ul style="list-style-type: none"> ▭ ct: Timestamp ▾ Target <ul style="list-style-type: none"> ▾ FIP 1 <ul style="list-style-type: none"> ⊙ Get Time

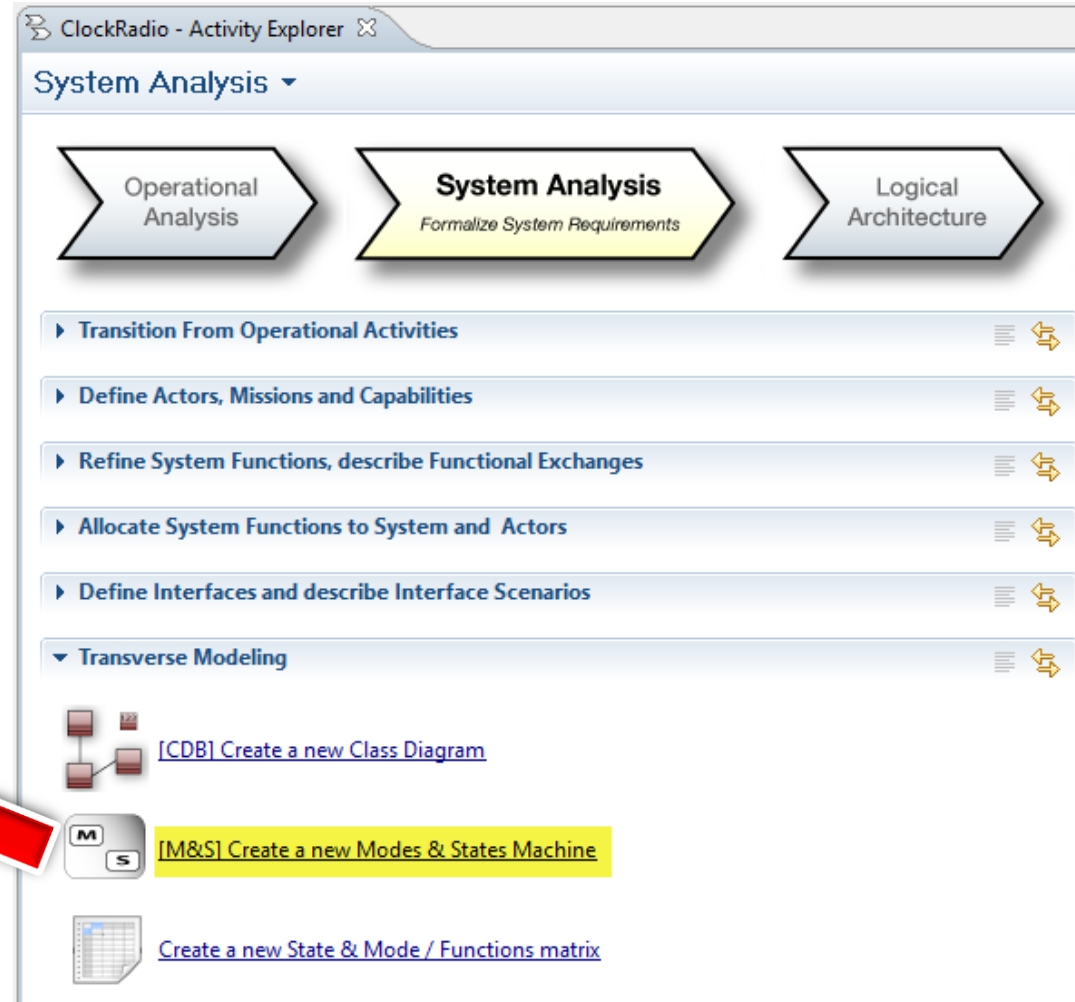
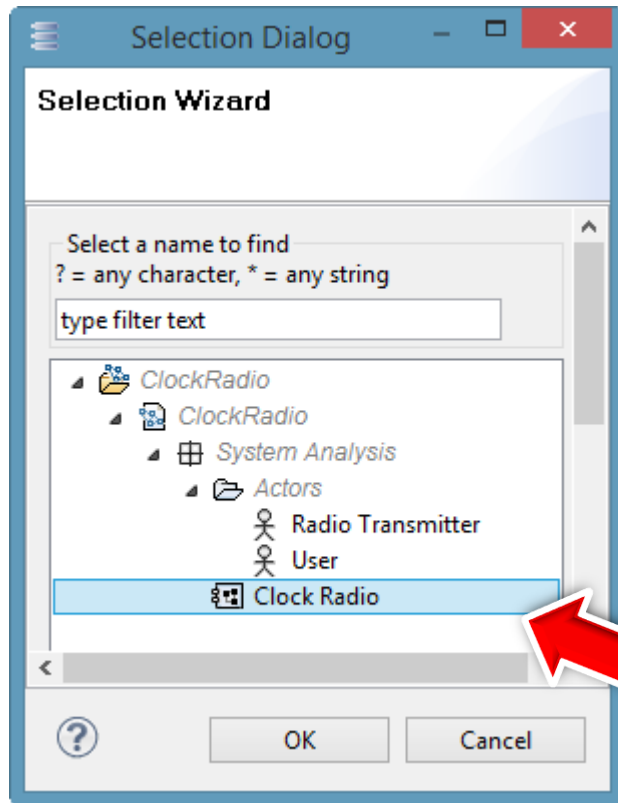
Completed SAB with CEs and Allocations



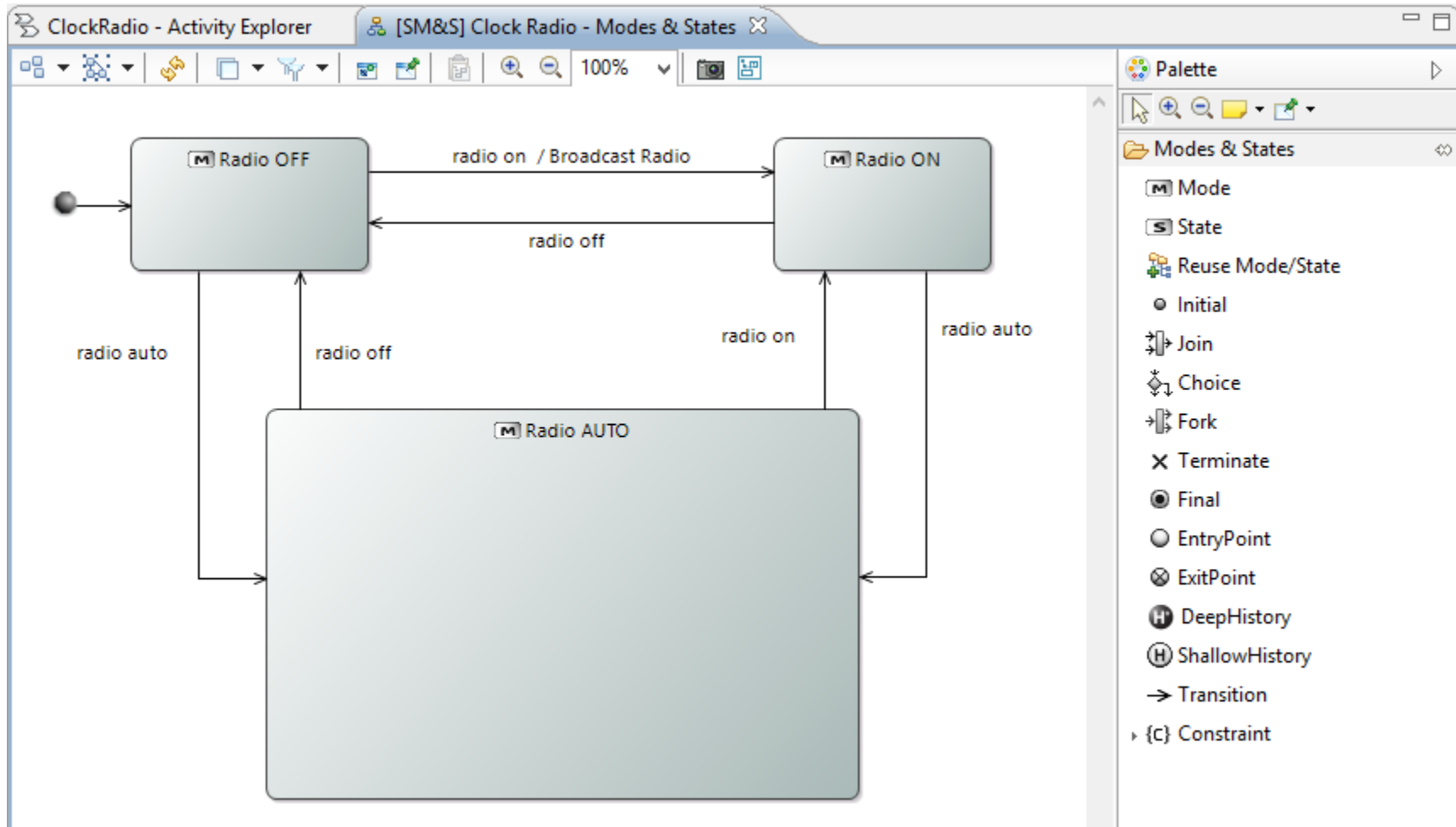
SAB: Filters Combination



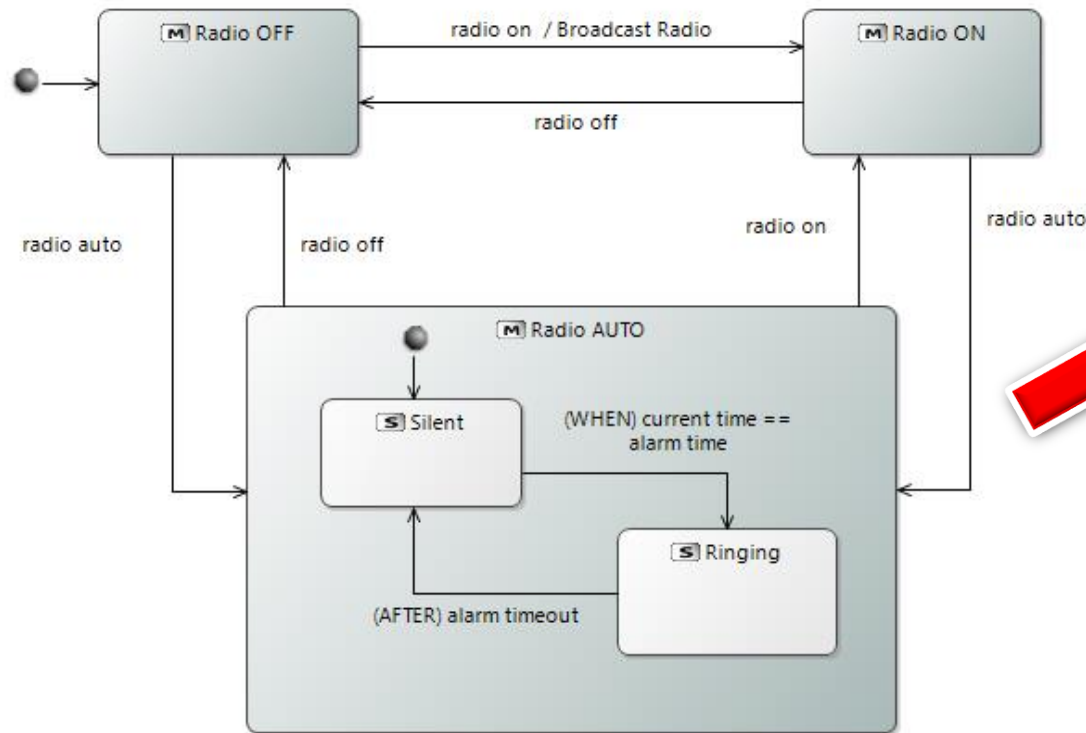
SA: Modes & States Machine



SA: S&M Diagram (Start)



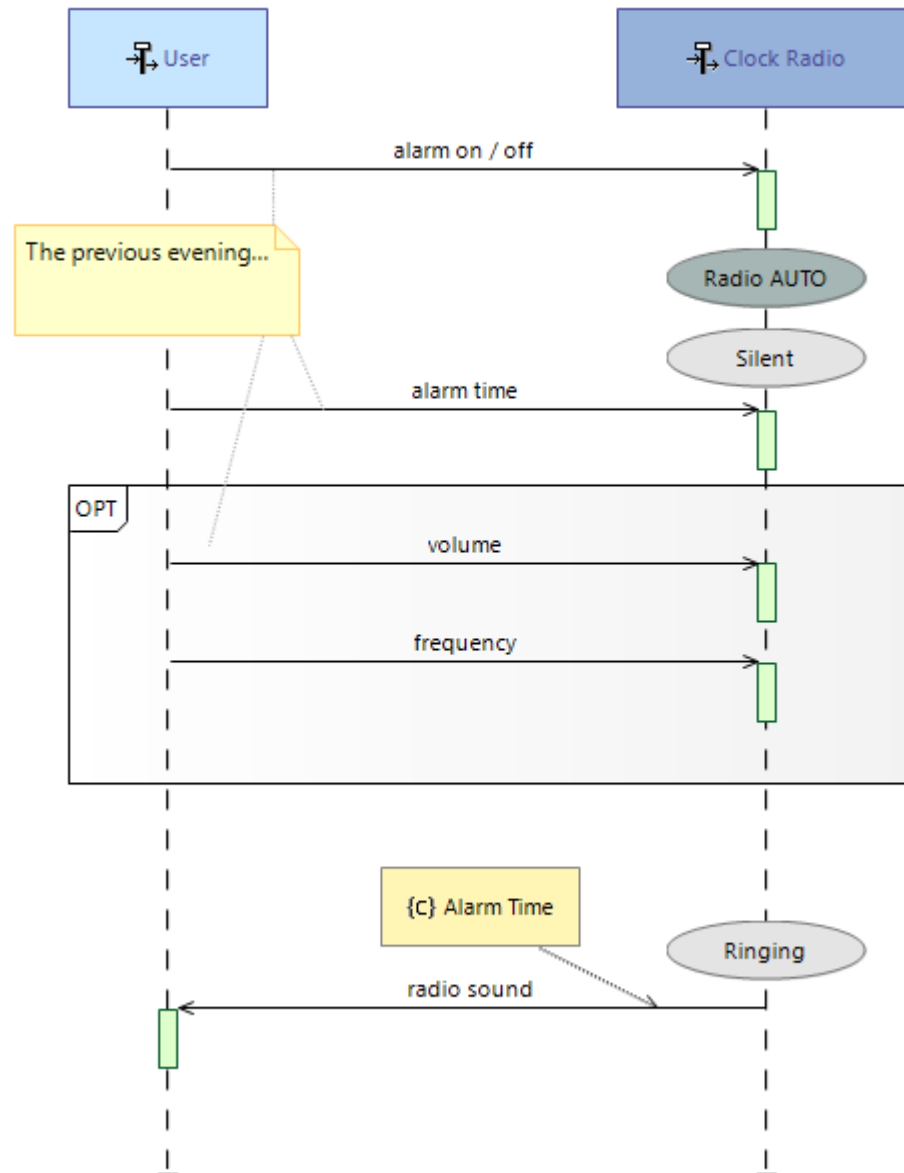
SA: S&M Diagram (with Substates)



- ▲ [M] Clock Radio
 - ▲ [M] System State Machine
 - ▲ [M] Default Region
 - ▶ [M] Radio ON
 - ▶ [M] Radio OFF
 - ▲ [M] Radio AUTO
 - ▲ [M] region
 - ▶ [S] Silent
 - ▶ [S] Ringing
 - Initial
 - [State Transition]
 - [State Transition]
 - [State Transition]
 - Initial
 - [State Transition]
 - [State Transition]
 - [State Transition]
 - [State Transition]
 - [State Transition]
 - [State Transition]
 - [State Transition]
 - [State Transition]
- 🔗 [SM&S] Clock Radio - Modes & States



SA: Enhanced Scenario (with States)



SA: S&M Matrix



- ▶ Transition From Operational Activities
- ▶ Define Actors, Missions and Capabilities
- ▶ Refine System Functions, describe Functional Exchanges
- ▶ Allocate System Functions to System and Actors
- ▶ Define Interfaces and describe Interface Scenarios
- ▼ Transverse Modeling
 -  [\[CDB\] Create a new Class Diagram](#)
 -  [\[M&S\] Create a new Modes & States Machine](#)
 -  [Create a new State & Mode / Functions matrix](#)

Describe the State

SA : S&M Matrix

	Alarm	Receive Radio Waves	Manage Alarm	Manage Clock	Display Time	Broadcast Radio
Clock Radio						
System State Machine						
Radio ON		X		X	X	X
Radio OFF				X	X	
Radio AUTO	X		X	X	X	
Silent						
Ringing		X				X



Name:

Summary:

State Realizations: ... ✖

Do activity: ... ✖

Entry: ... ✖

Exit: ... ✖

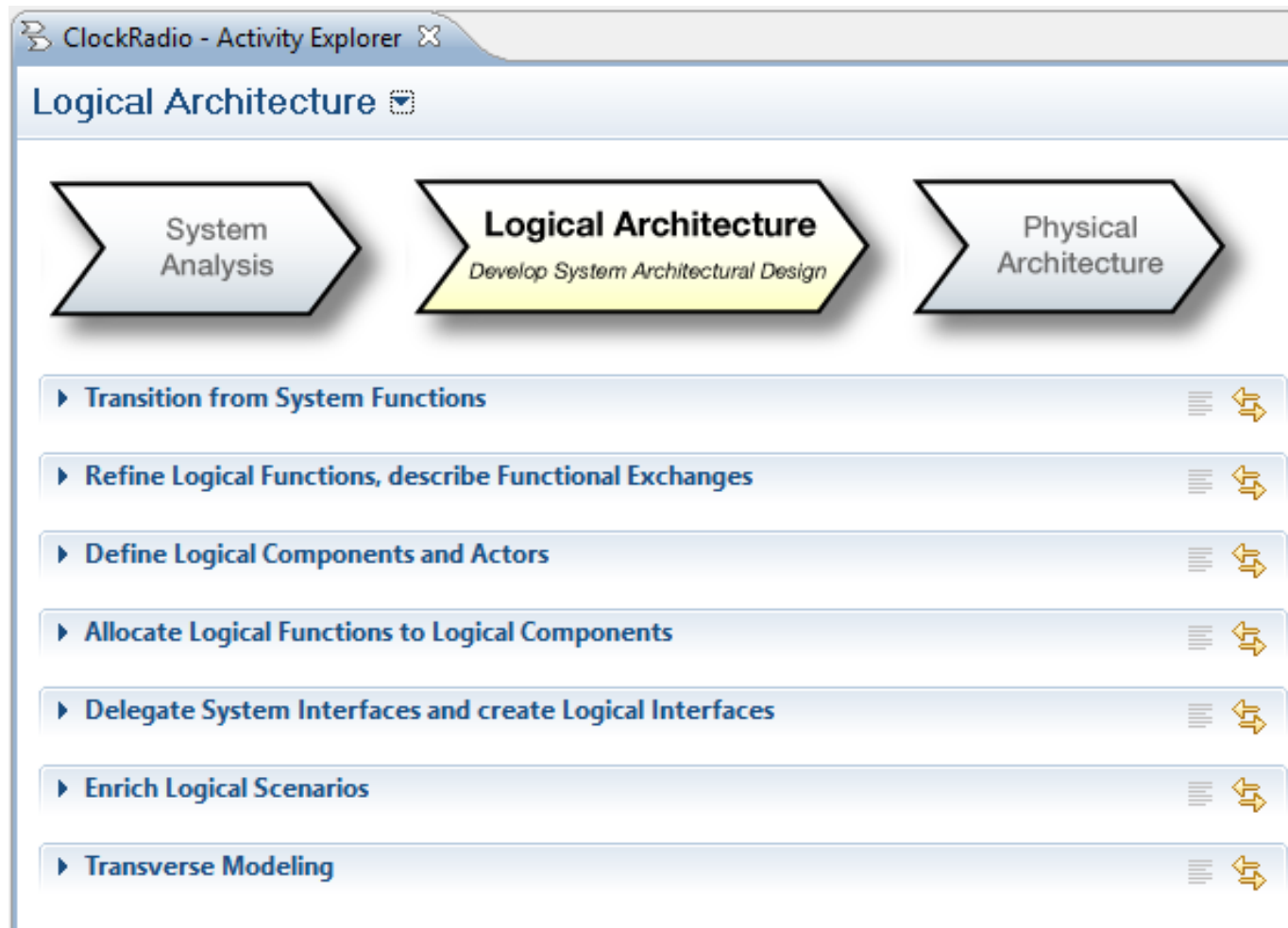
Operational Activities / Functions: ... ✖

System Analysis: Diagrams Viewer

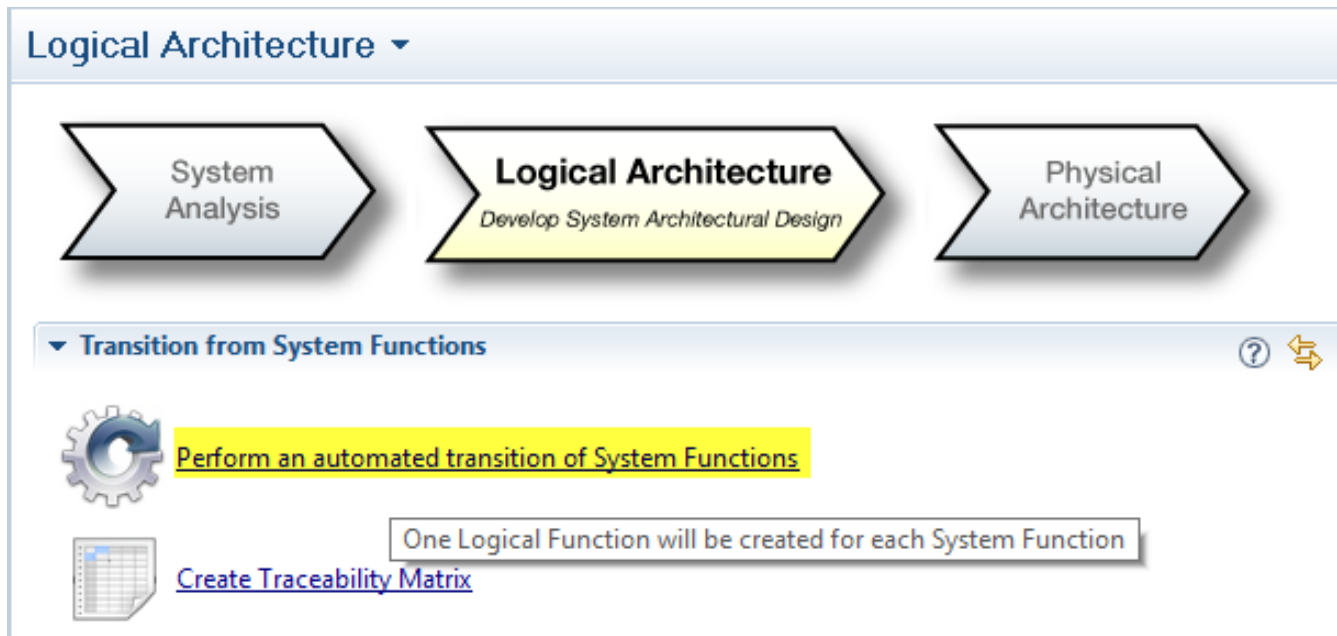
The screenshot shows a window titled "Diagrams Viewer" with a search filter "type filter text". The tree view is organized as follows:

- Common
 - Class Diagram Blank
 - [SCDB] Clock Radio Data - Class Diagram Blank
 - Exchange Scenario
 - [SES] Alarm - Exchange Scenario
 - Functional Chain Description
 - [SFCD] Alarm - System Functional Chain Description
 - Modes and States
 - [SM&S] Clock Radio - Modes & States
 - State Machine and Capability Function Matrix
 - System State Machine and Function Matrix
- System Analysis
 - System Actors - Operational Actors/Operational Entities
 - System Actors - Operational Actors/Operational Entities
 - System Architecture Blank
 - [SAB] Clock Radio - System Architecture Blank
 - [SAB] Clock Radio Synthetic View - System Architecture Blank
 - [SAB] Clock Radio with FC - System Architecture Blank
 - System Data Flow Blank
 - [SDFB] Alarm - System Data Flow Blank
 - [SDFB] Radio Parameters - System Data Flow Blank
 - System Functions - Operational Activities
 - Clock Radio System Functions - Operational Activities

Logical Architecture (LA)



SA -> LA Transition



SA -> LA Transition

- └─ System Analysis
 - └─ System Functions
 - └─ radio parameters
 - └─ Root System Function
 - ▷ Alarm
 - ▷ Manage Clock
 - ▷ Manage Alarm
 - ▷ Set Current Time
 - ▷ Set Alarm Time
 - ▷ Display Time
 - ▷ Broadcast Radio
 - ▷ Emit Radio Waves
 - ▷ Get Time
 - ▷ Listen to Radio
 - ▷ Receive Radio Waves
 - ▷ Set Radio
 - ▷ alarm time
 - ▷ current time
 - ▷ alarm
 - ▷ timestamp
 - ▷ timestamp
 - ▷ timestamp display
 - ▷ radio sound
 - ▷ radio waves
 - ▷ radio signals
 - ▷ frequency
 - ▷ volume
 - ▷ radio on / off
 - ▷ alarm on / off



- └─ Logical Architecture
 - └─ Logical Functions
 - └─ radio parameters
 - └─ Root Logical Function
 - ▷ Alarm
 - ▷ Manage Clock
 - ▷ Manage Alarm
 - ▷ Set Current Time
 - ▷ Set Alarm Time
 - ▷ Display Time
 - ▷ Broadcast Radio
 - ▷ Emit Radio Waves
 - ▷ Get Time
 - ▷ Listen to Radio
 - ▷ Receive Radio Waves
 - ▷ Set Radio
 - ▷ alarm time
 - ▷ current time
 - ▷ alarm
 - ▷ timestamp
 - ▷ timestamp
 - ▷ timestamp display
 - ▷ radio sound
 - ▷ radio waves
 - ▷ radio signals
 - ▷ frequency
 - ▷ volume
 - ▷ radio on / off
 - ▷ alarm on / off

SA -> LA Transition



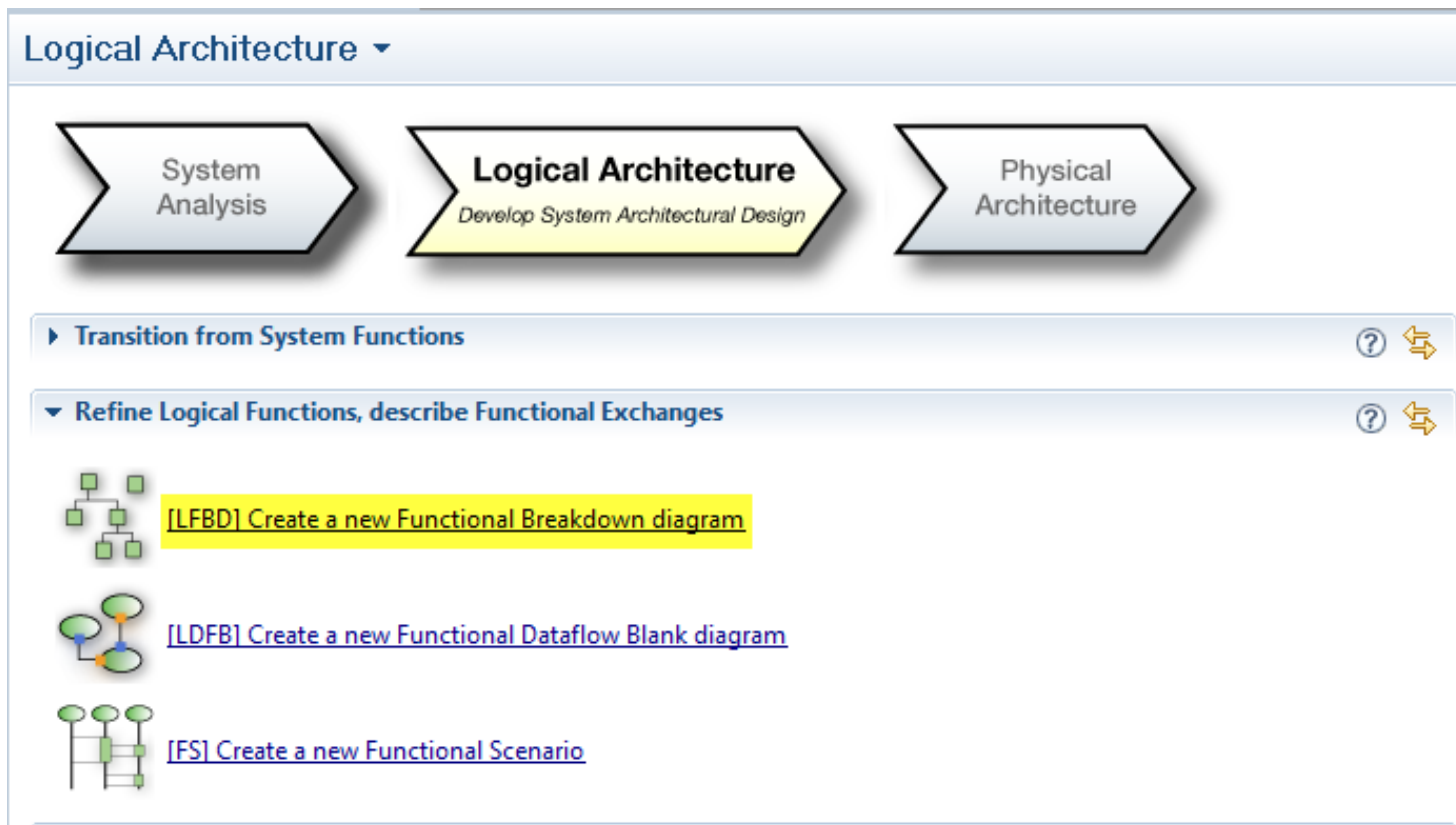
SA -> LA Transition

- System Analysis
 - System Functions
 - Capabilities
 - Interfaces
 - Data
 - System Context
 - air
 - Clock Radio MMI
 - Clock Radio Output
 - Clock Radio
 - Actors
 - User
 - Radio Transmitter

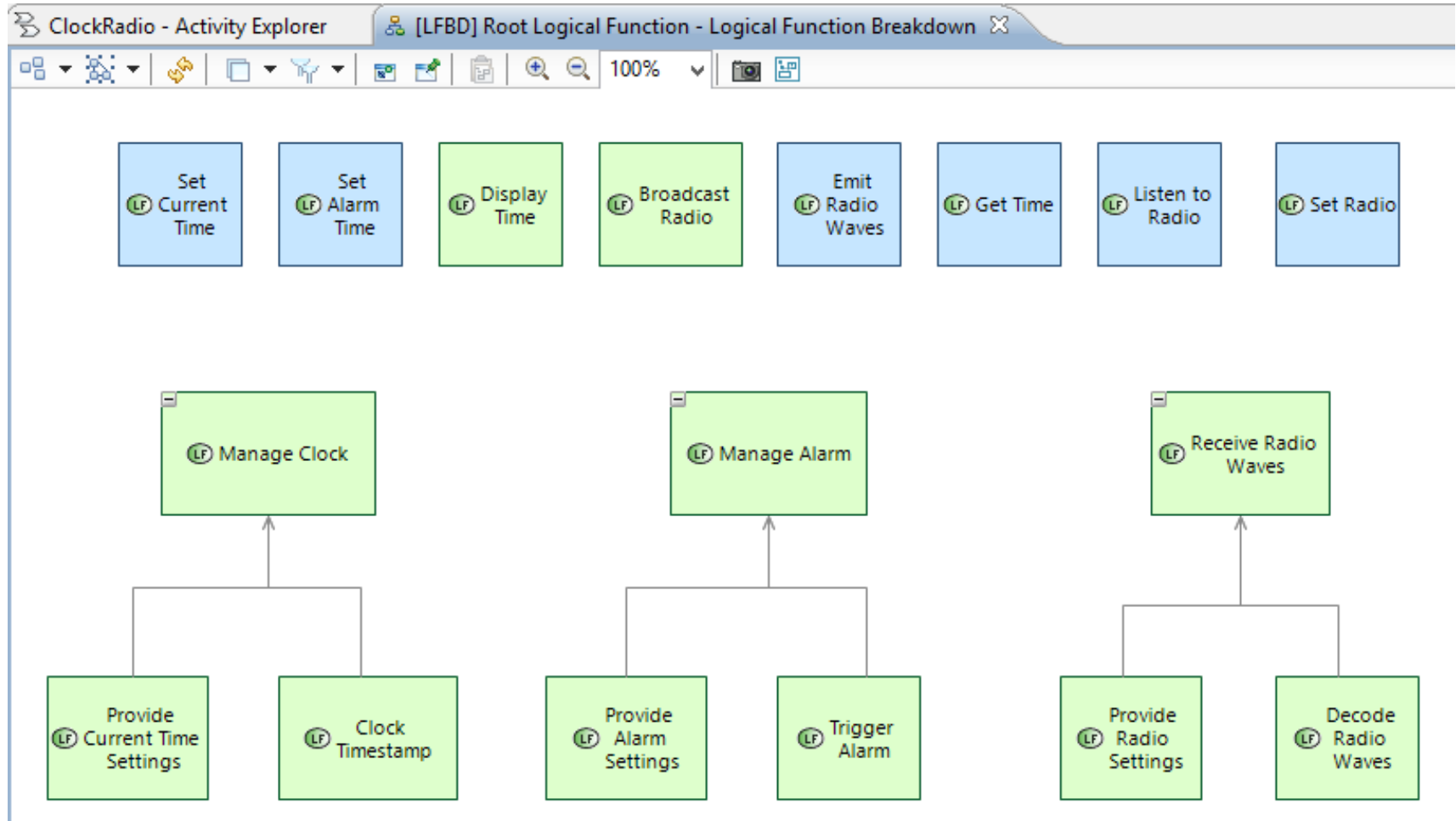


- Logical Architecture
 - Logical Functions
 - Capabilities
 - Interfaces
 - Data
 - Logical Context
 - air
 - Clock Radio MMI
 - Clock Radio Output
 - Clock Radio (LA)
 - Logical Actors
 - User
 - Radio Transmitter

LFBD: Logical Functions Breakdown



LFBD: Logical Functions Breakdown



LDFB: Logical Data Flow Blank

Logical Architecture ▾



▶ Transition from System Functions



▾ Refine Logical Functions, describe Functional Exchanges



[\[LFB\] Create a new Functional Breakdown diagram](#)

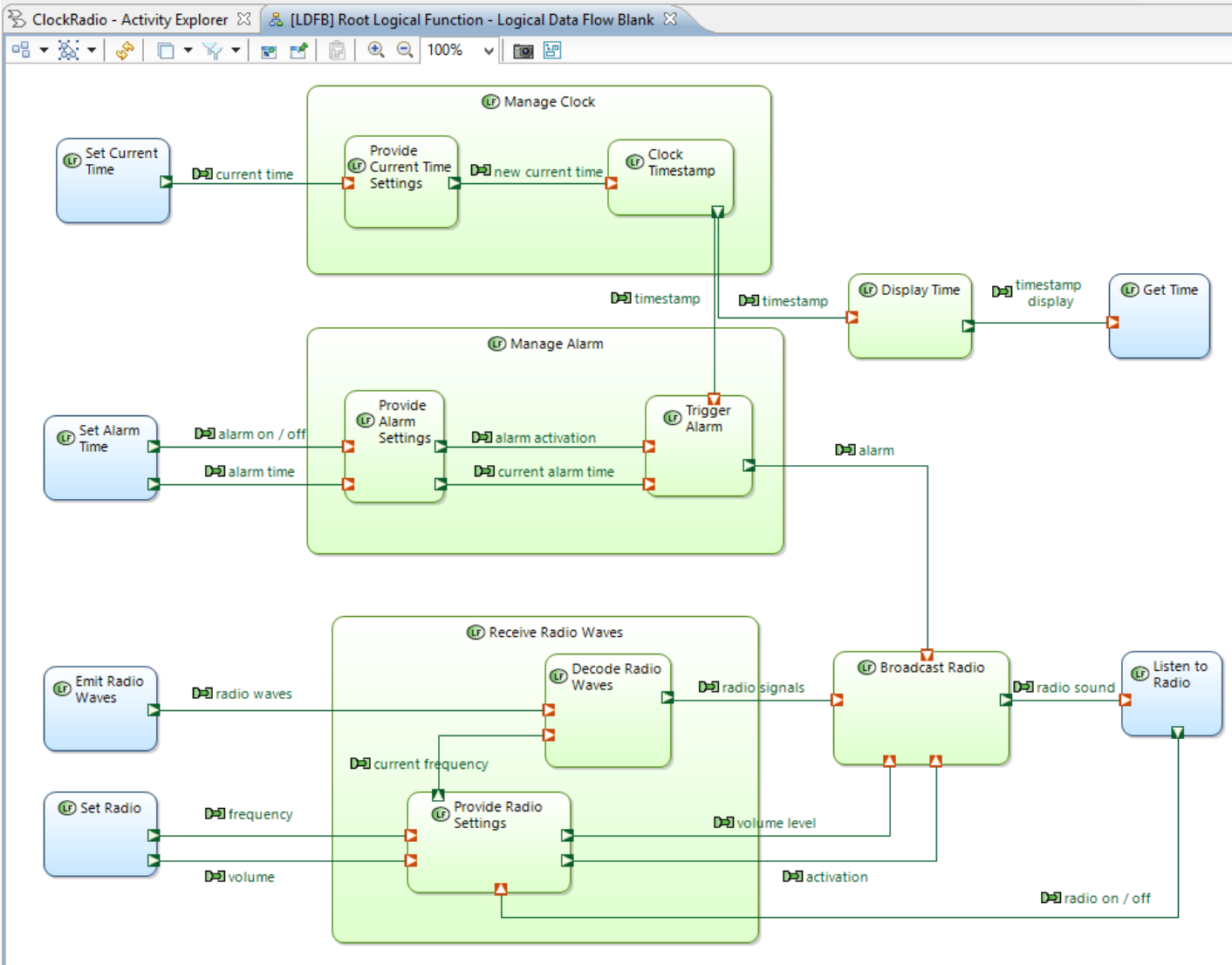


[\[LDFB\] Create a new Functional Dataflow Blank diagram](#)

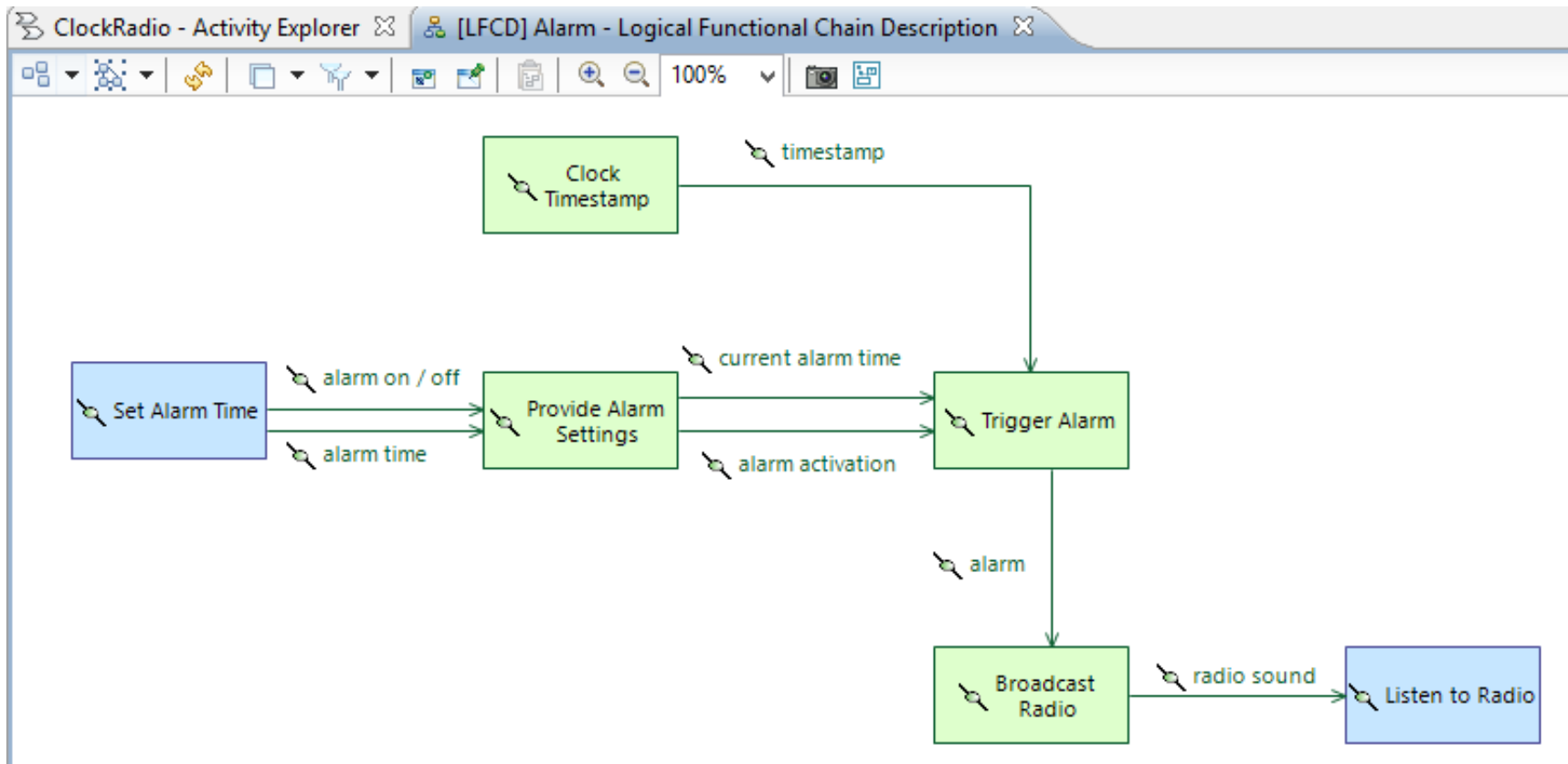


[\[FS\] Create a new Functional Scenario](#)

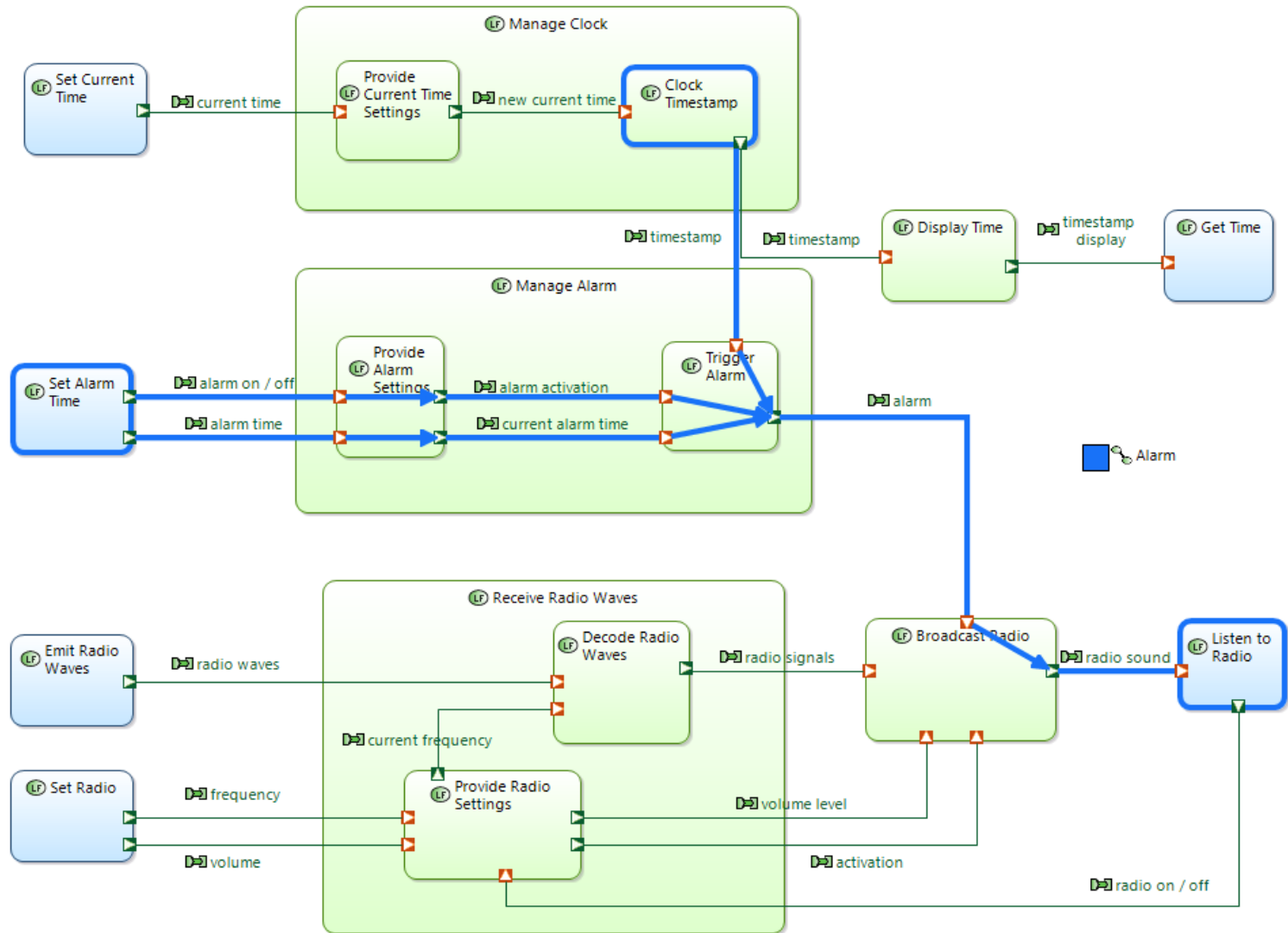
LDFB: After Modifications



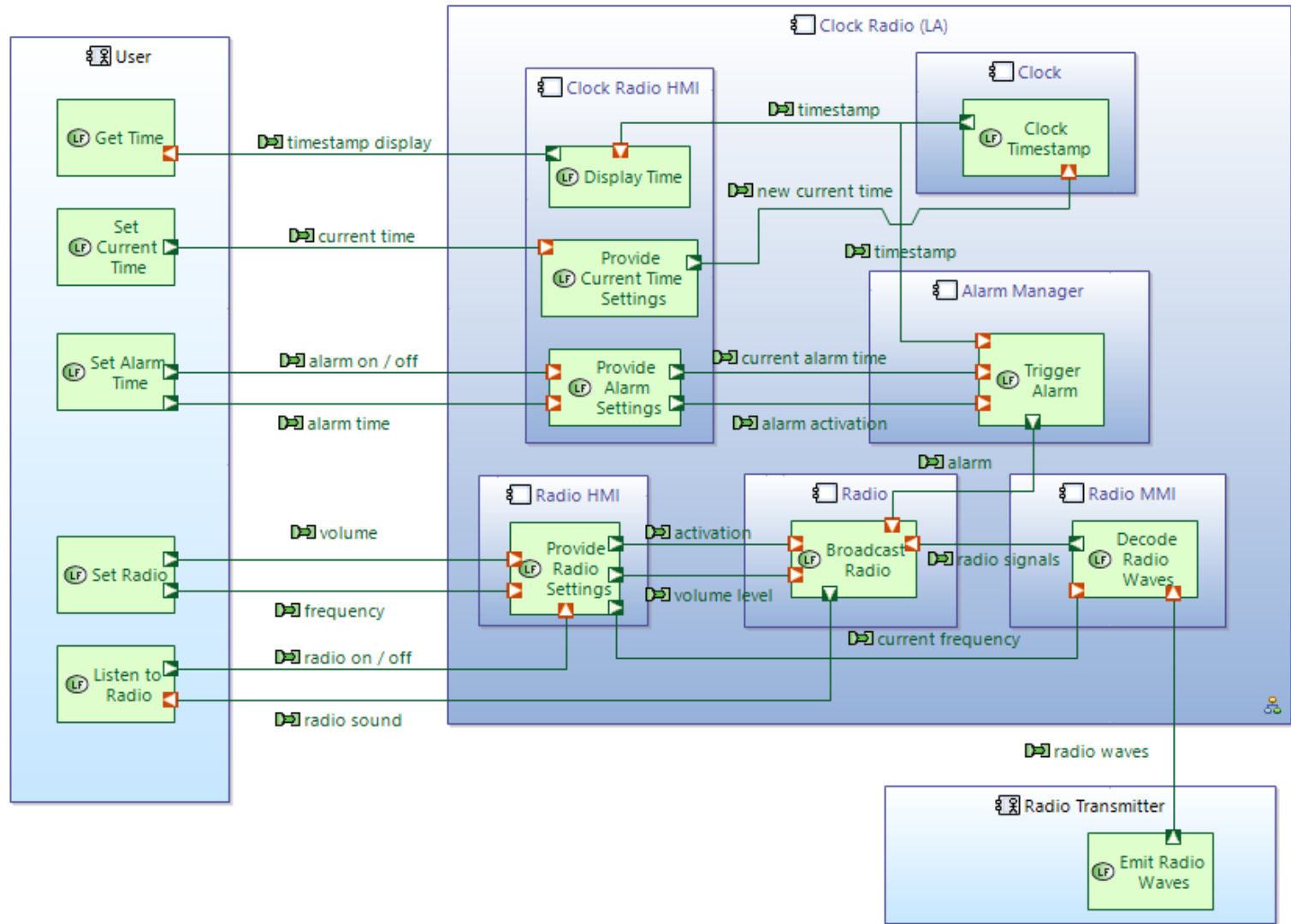
LFCD: Modified FC



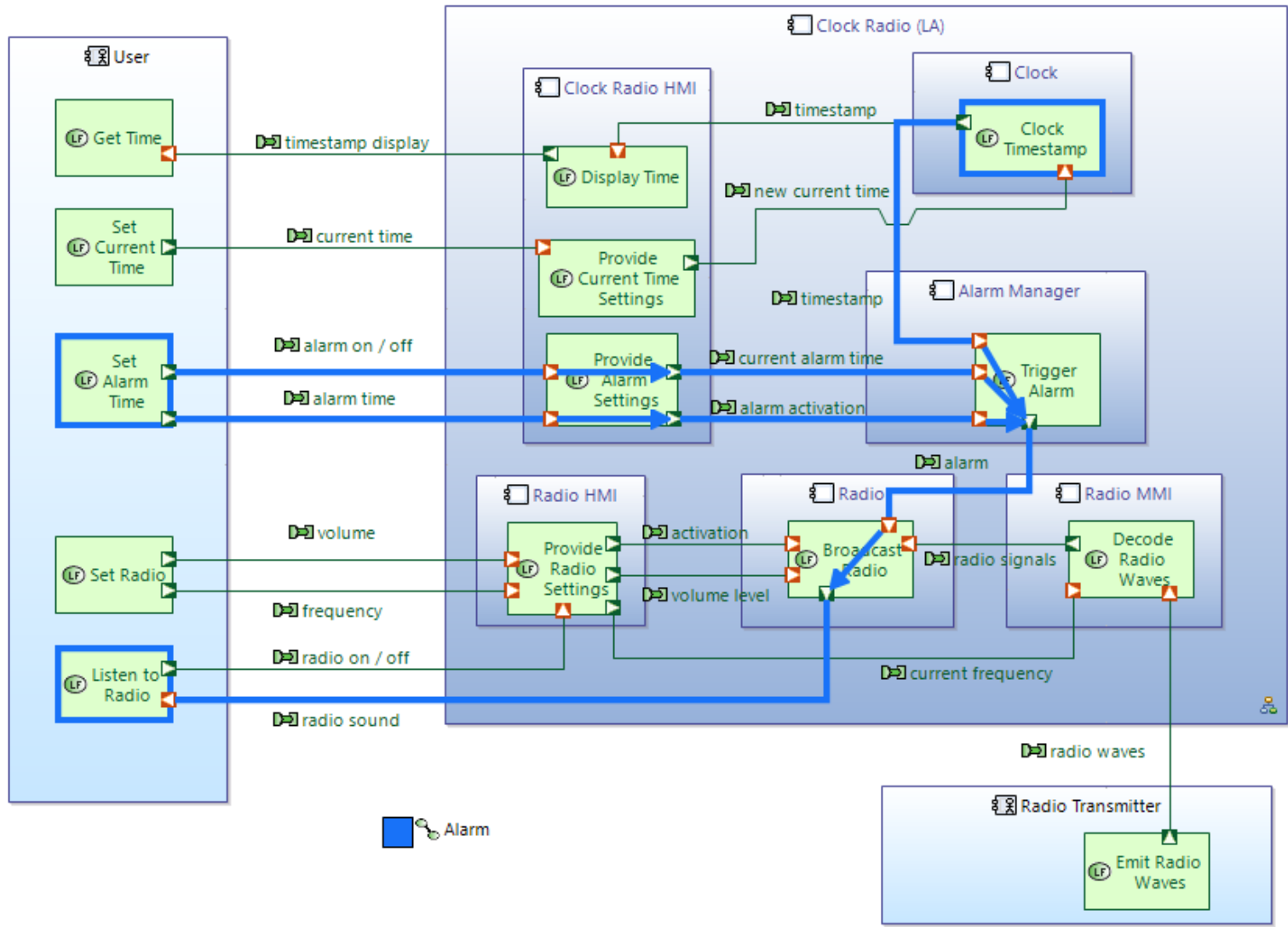
LDFB: Valid FC After Correction



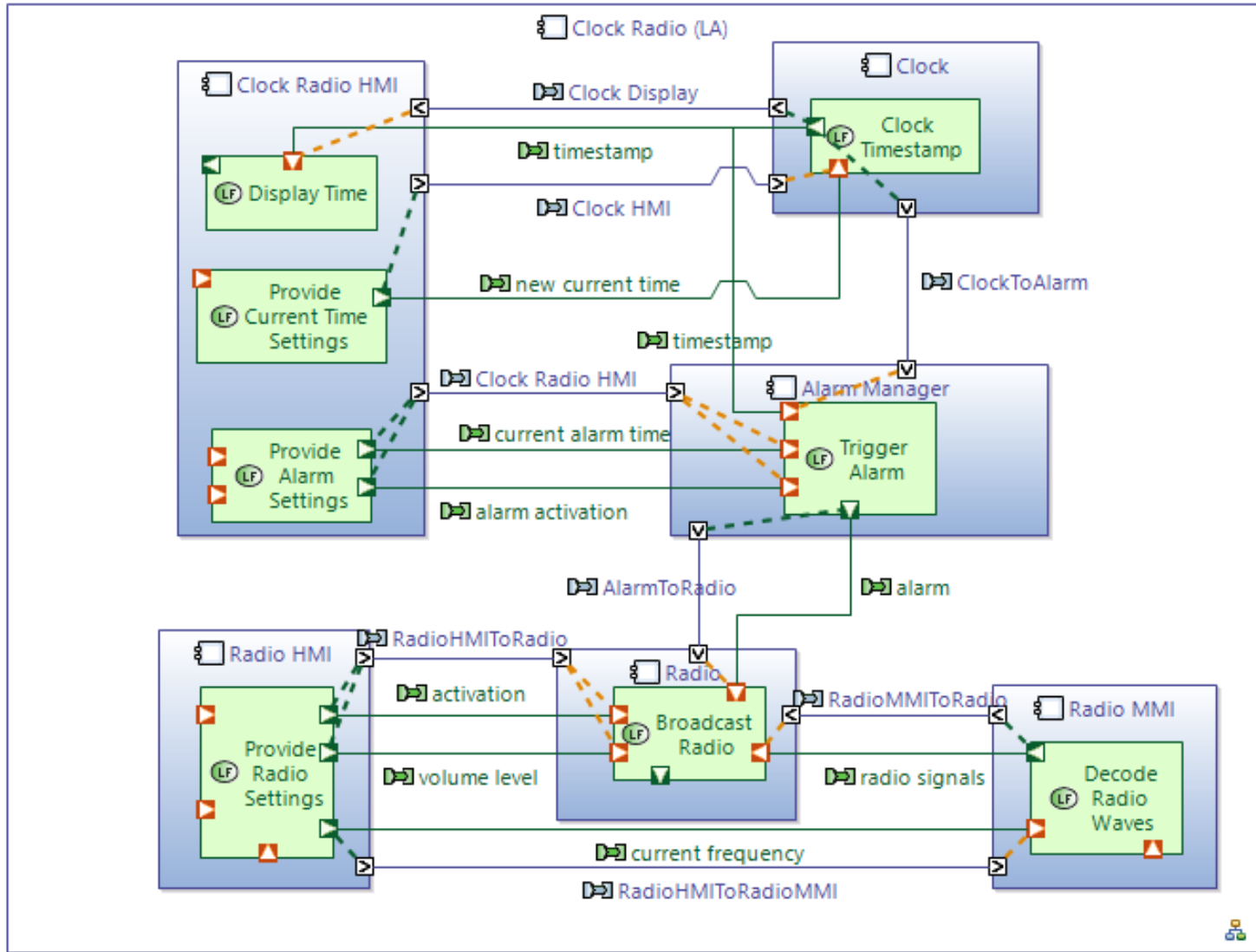
LAB: Functions Allocation



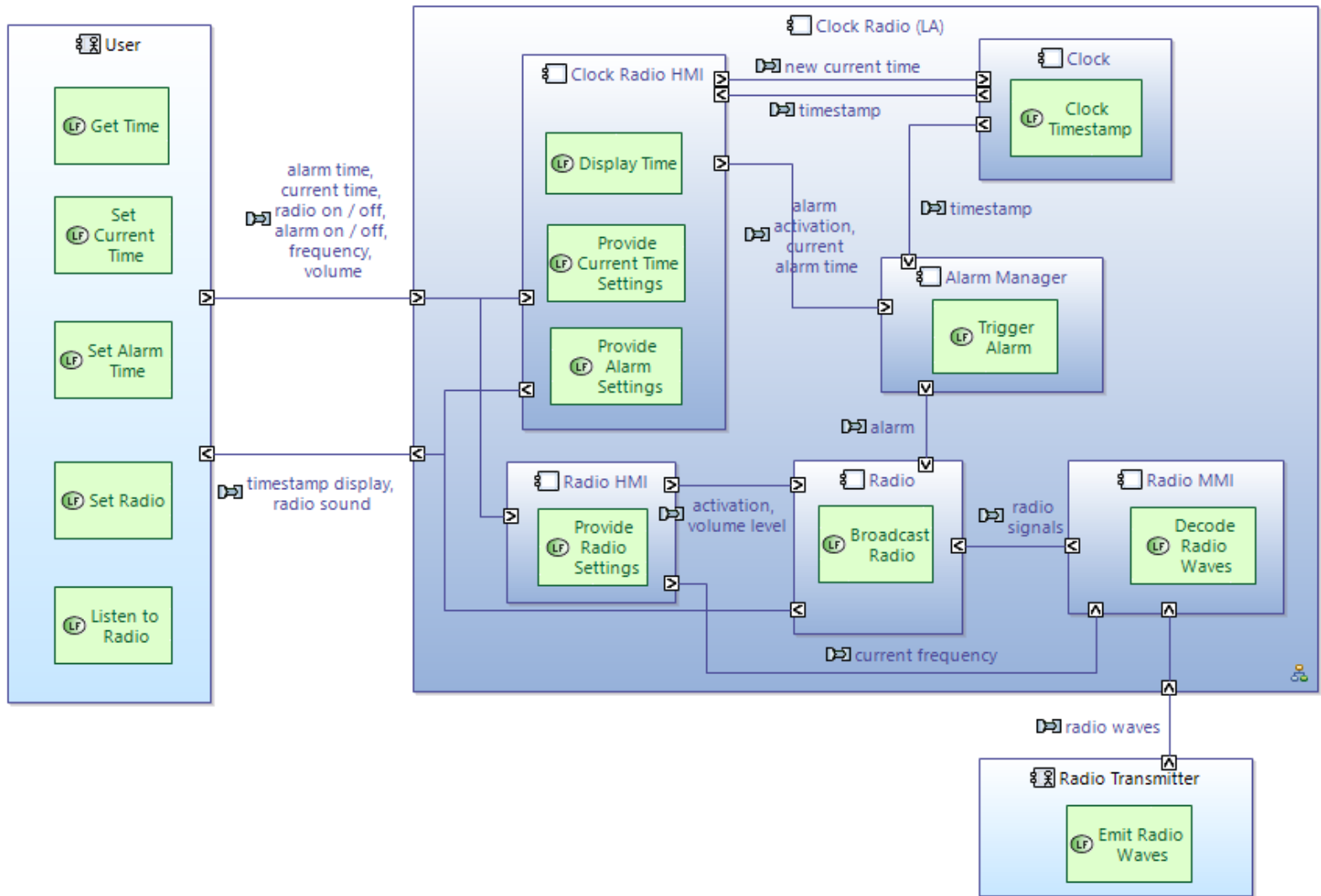
LAB: Functions Allocation + FC



LAB: Internal CE Between LCs



LAB Simplified View

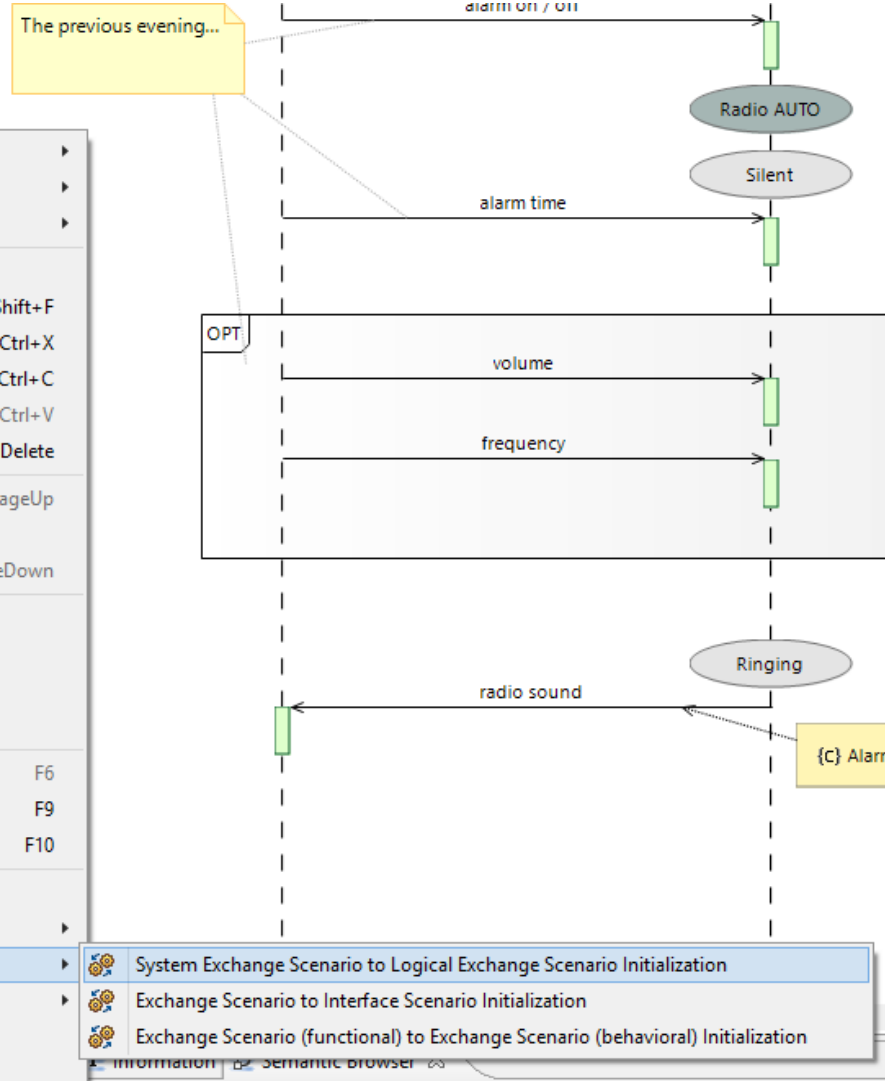


Transition from SES

- System Analysis
 - System Functions
 - Capabilities
 - Trigger an Alarm
 - [SES] Alarm - Ex...
 - {c} Alarm Time
 - User
 - Clock Radio
 - alarm on / o
 - alarm time
 - volume
 - frequency
 - radio sound
 - [State Fragn
 - [State Fragn
 - [State Fragn
 - [SES] Alarm

- Interfaces
- Data
- System Context
- Clock Radio
- Actors
- Missions
- Clock Radio System Fu
- System Actors - Operat
- System State Machine
- Logical Architecture
- Physical Architecture
- EPBS Architecture
- Representations per category

- Add Capella Element
- New Diagram / Table...
- Open Diagram / Table...
- Copy Qualified Name
- Search and replace Ctrl+Shift+F
- Cut Ctrl+X
- Copy Ctrl+C
- Paste Ctrl+V
- Delete Delete
- Move Up Ctrl+PageUp
- Sort Content
- Move Down Ctrl+PageDown
- Undo Refresh graphical layout
- Redo
- Refresh all sub Representations
- Remove hidden elements
- Send to Fast Linker View F6
- Show in Semantic Browser F9
- Show in Diagram Editor F10
- Validate Model
- REC / RPL
- Transitions
 - System Exchange Scenario to Logical Exchange Scenario Initialization
 - Exchange Scenario to Interface Scenario Initialization
 - Exchange Scenario (functional) to Exchange Scenario (behavioral) Initialization
- Wizards
- Allocation Management
- Show Impact Analysis...



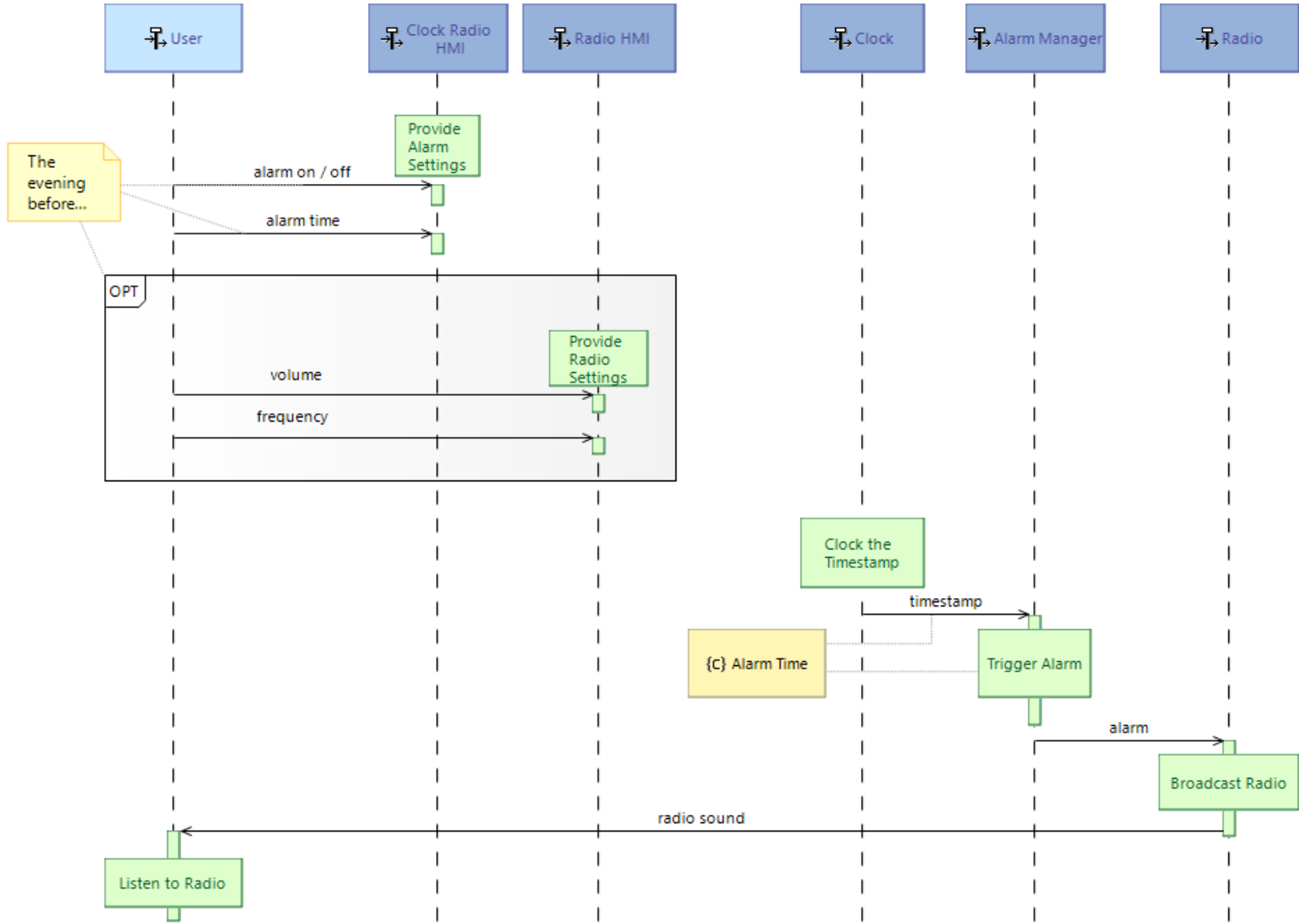
Transition from SES

- ▲ [System Analysis]
 - ▷ [System Functions]
 - ▲ [Capabilities]
 - ▲ [Trigger an Alarm]
 - ▲ [SES] Alarm - Exchange Scenario
 - ▷ {c} Alarm Time
 - User
 - Clock Radio
 - ↔ alarm on / off
 - ↔ alarm time
 - ↔ volume
 - ↔ frequency
 - ↔ radio sound
 - ◆ [State Fragment]
 - ◆ [State Fragment]
 - ◆ [State Fragment]
 - [SES] Alarm - Exchange Scenario



- ▲ [Logical Architecture]
 - ▷ [Logical Functions]
 - ▲ [Capabilities]
 - ▲ [Trigger an Alarm]
 - ▲ [LES] Alarm - Exchange Scenario
 - ▷ {c} Alarm Time
 - User
 - Clock Radio HMI
 - Radio HMI
 - Clock
 - Alarm Manager
 - Radio
 - ↔ alarm on / off
 - ↔ alarm time
 - ↔ volume
 - ↔ frequency

Enhanced LES



To Learn More...

www.polarsys.org/capella/index.html

- www.prfc.fr
- www.incose.org/
- www.afis.fr