

# Reliable Internet-of-Things Architecture Modeling Essentials (RIOT-E)

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**Using Sparx Systems EA software and SysML**

Document Reference: RIOT-E-2017-v1

## Learning Outcomes

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This course covers the essential analytical and modelling techniques to develop Software Architecture for IOT systems or systems in general using the universal modelling standards such as SysML and the Sparx Systems Enterprise Architect modeling software.

Upon completion of this course, trainees will have the competencies to:

- **Understand** what is a model, the process and benefits of modelling, universal modelling standards such as SysML, the challenges in modelling and how to incorporate modeling practices into existing practices
- **Analyse** information be it in document, diagram, models or verbal form to develop the software functional architecture and technical design architecture
- **Develop** the functional and technical design models based on SysML Requirements Diagram, Use Case model, Block Definition Diagram, Internal Block Diagram and Package Diagram using Sparx Systems Enterprise Architect modeling software
- **Review** the models to ensure correctness and completeness
- **Manage** models such as model baseline, traceability, transformations and specification document generation

## Curriculum Structure

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The consultative-centric training curriculum is designed in such a way to take advantage of the benefits of different learning and teaching methodologies such as:

- **Lecture** by trainer on key concepts of Software Architecture modeling
- **Demo** of the modeling tool by trainer on how to develop the SysML and other related models
- **Hands-on Workshops** for trainees to have in-depth practice to apply what they have learnt
- **Presentation** of workshop solutions by trainees for feedback
- **Reflection** on how to apply lessons learnt into a live project

## Target Audience

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This course is suitable for anyone who needs to architect a system that comprises of both software and hardware components such as embedded systems, automation systems, and internet-of-things (IOTs). Note that this course does not cover hardware design (example circuit design) – it will only focus on software architecture using off-the-shelf micro-controllers & components.

## Pre-requisites

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Trainees should have

- Working experience in developing embedded systems and some knowledge of hardware and electronics.
- Attended 80Twenty RIOT-B training or equivalent.

## Duration

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3-days

## Venue Options

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### Public training

- 80Twenty venue.
- Trainees will be from various organizations in the same class.

### Exclusive training

- 80Twenty or customer or any customer preferred venue.
- Class exclusive to only your own company's trainees.

## Suggested Topics

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Lessons will run daily from 9am to 5pm inclusive of 1-hour lunch break and two 15-minute breaks.

### 1. Introduction

- General
- Modelling
- Software Architecture Modelling
- Modeling Language: SysML

#### Workshop 1: Getting Started with Sparx Systems EA

- Install and configure EA
- Start a new EA project
- User Interface: Menus, Windows, Drag-and-drop and many more
- Modeling Basics using SysML Package Diagram

### 2. Requirements Modeling

- Introduction to system requirements modeling
- Techniques to specify systems requirements using SysML Requirements diagram
- Baseline Requirements diagram

#### Workshop 2: Analyse, identify, model, review & baseline System Requirements Diagram

### 3. Model Systems Behavior: Part 1

- Introduction to Systems Behavior modeling
- Techniques to identify systems behavior such as functions, users and interfaces
- Best practices in specifying the systems behaviors using the SysML Use Case diagram

- Trace System Behavior Models to Requirements Model
- Baseline System Behavior Models

Workshop 3: Analyse, identify, model, review & trace system behavior models using SysML Use Case diagram

#### 4. Model Systems Behavior: Part 2

- Techniques to identify systems behavior such as system states and transitions
- Best practices in specifying the systems behaviors using the SysML State Machine Diagram
- Trace System Behavior Models to Requirements Model
- Baseline System Behavior Models

Workshop 4: Analyse, identify, model, review & trace system behavior models using SysML State Machine diagram

#### 5. Model Systems Structure: Part 1

- Introduction to Systems Structure Modeling
- Techniques to identify systems structures using SysML Block Definition Diagram (BDD)
- Trace System Structure Models to System Behavior models

Workshop 5: Analyse, identify, model, review and trace Systems Structure models using SysML Block Definition Diagram

#### 6. Model Systems Structure: Part 2

- Techniques to identify systems structures using SysML Internal Block Diagram (IBD)

Workshop 6: Analyse, identify, model, review and trace Systems Structure models using Internal Block Diagram

## Systems Requirements

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Trainees are responsible to bring the following hardware and software for the training:

1. Hardware
  - PC/Notebook running on MS-Windows 7 Professional Edition or better 4GB RAM, with Admin access rights to install software.
2. Software
  - Sparx Systems EA Systems Engineering Standard/Floating License Edition (1 license key per trainee)
  - 30-day software evaluation license is available and can be used during the training