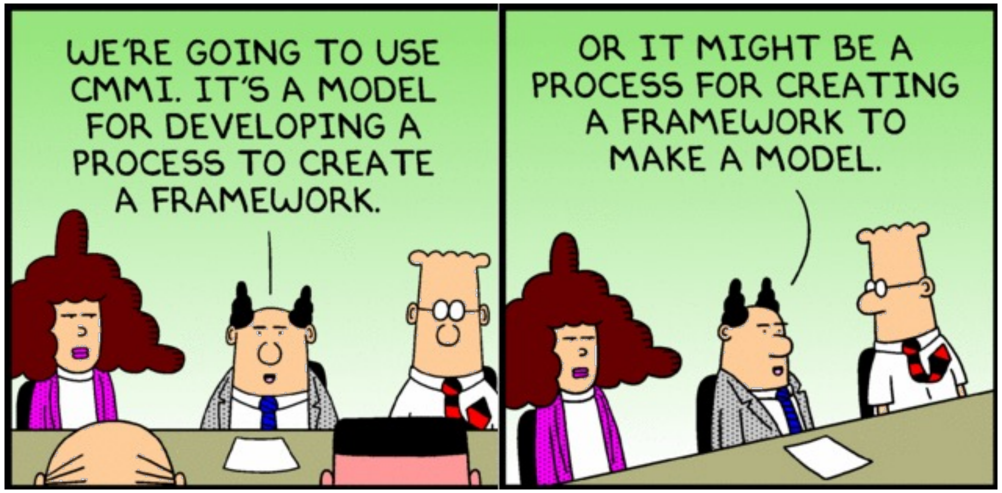

WE'RE GOING TO USE CMMI. IT'S A MODEL FOR DEVELOPING A PROCESS TO CREATE A FRAMEWORK.
OR IT MIGHT BE A PROCESS FOR CREATING A FRAMEWORK TO MAKE A MODEL.

System Diagrams

A VISUAL REPRESENTATION OF THE SYSTEM

Model

- A model is a description from which detail has been removed in a systematic manner and for a particular purpose
- A simplification of reality intended to promote understanding
- Models are the most important engineering tool, they allow us to understand and analyze large and complex problems
- A model can be:
  - A picture
  - A visual flow (sequence, flowchart, relationship)
  - A formula that approximates a metric related to an attribute of the system (performance, complexity, usability, …)

A model can describe different views of the system

Views and Models

User Model

- How a user interacts with the software
  - Flowcharts; process maps; …

Interface view

- How different APIs are used
  - Sequence diagrams;

System View

- How components interact with each other
  - Main components; connections; operations; …

Performance Model

- How you can calculate the performance of an operation or operations within certain scenarios
  - Spreadsheets; formulas; …

Types of Views

- **System Diagram** – Abstract description of the system whose requirements are being modeled
- **Module View** – Define the structure of the code base
- **Component and Connector Views** – Specify the structure and behavior of runtime elements in the system
- **Allocation Views** – The mapping of software units to elements of an environment
- **Quality Views** – A view created by extracting relevant pieces of structural views and packaging them together
- **Behavior Views** – Describe interactions between components while the system is a specific state

Which Views? The Ones You Need!

Different views support **different goals and uses**

The **views** you document **depend** on the **stakeholders** and **uses** of the documentation.

Each view has **a cost and a benefit**; the benefits of maintaining a view should outweigh its costs

At a minimum, at least on module view and one component and connector view

System Diagram

- Abstract Description of the system whose requirements are being modeled

Components of a System Diagram:

- Boundaries of the overall system
- Inputs to and outputs from the system
- Subsystems of the system
- Identification of the interfaces between the subsystems

A System Diagram is a high-level model of the system.
It also describes decisions make on the overall high level design

Why Create a System Diagram?

- To help explain the proposed requirements to other system stakeholders.
- To discuss design proposals with engineers and to document the system for implementation.
- To show the organization and architecture of the system.

Type of System Diagrams

System Diagrams are variable in their view of the system

A system diagram can show

- Components

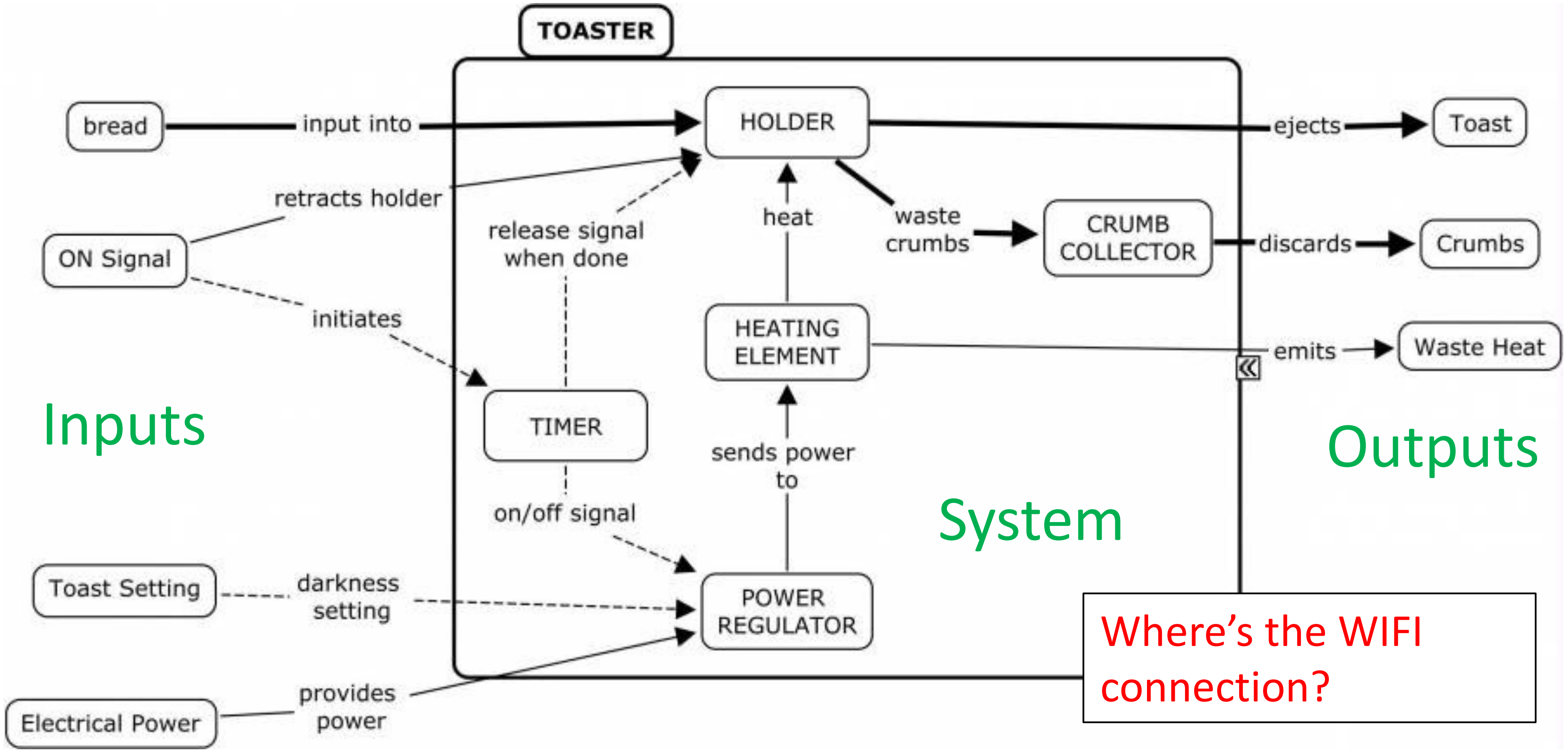
- Interactions

- Boundaries

- …

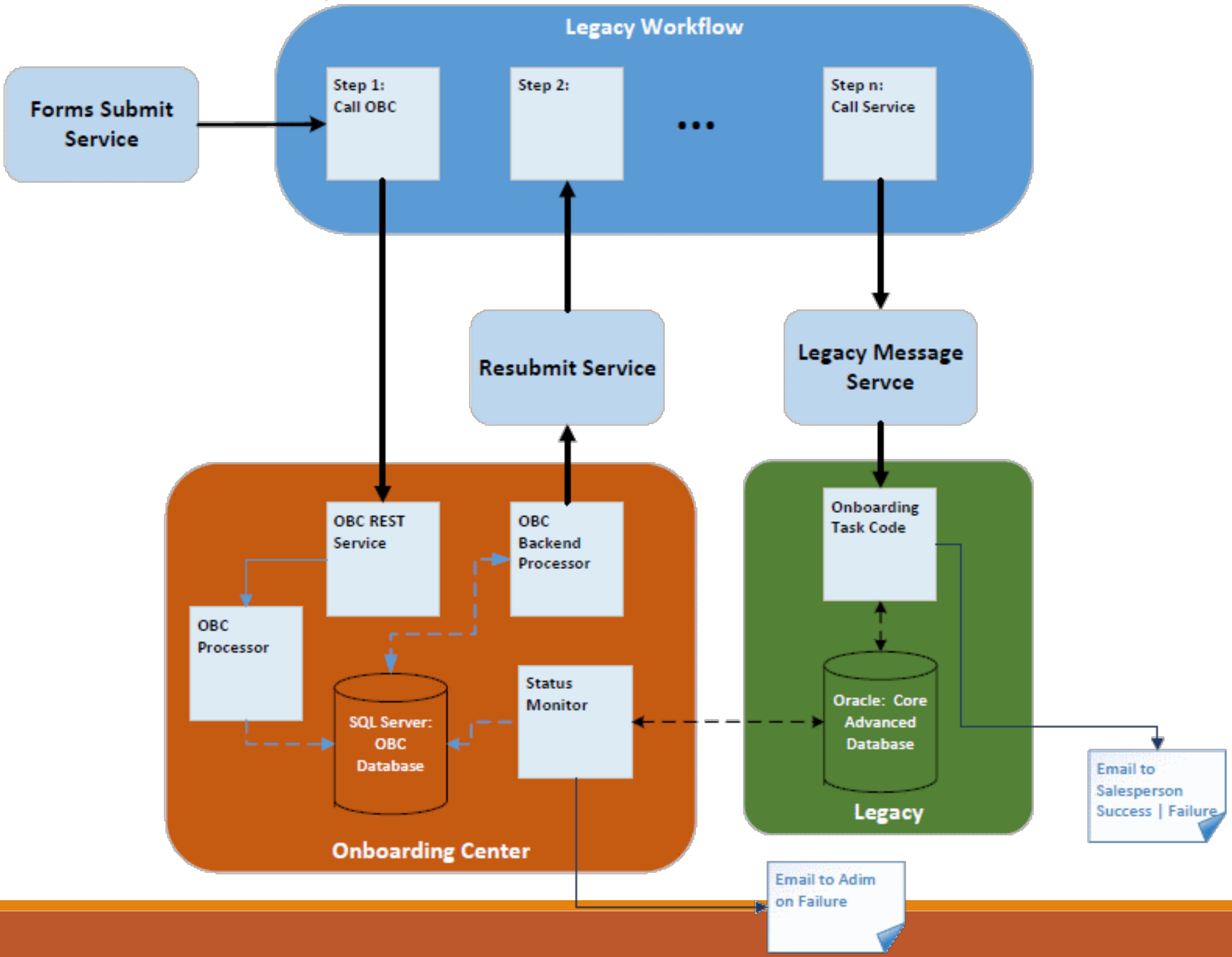
- Choose the type of information you want to convey AND what questions you are trying to answer
  - Big blocks
  - APIs
  - Physical assets
  - Data or communications
  - …
- Then select HOW you will show it
- Components & Interactions tend to be the most common

Toaster System Diagram:

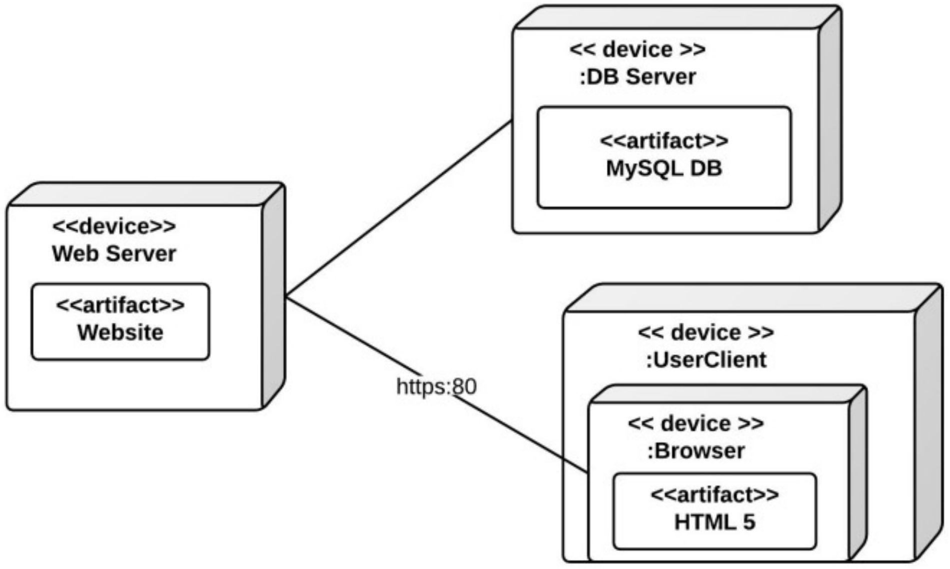


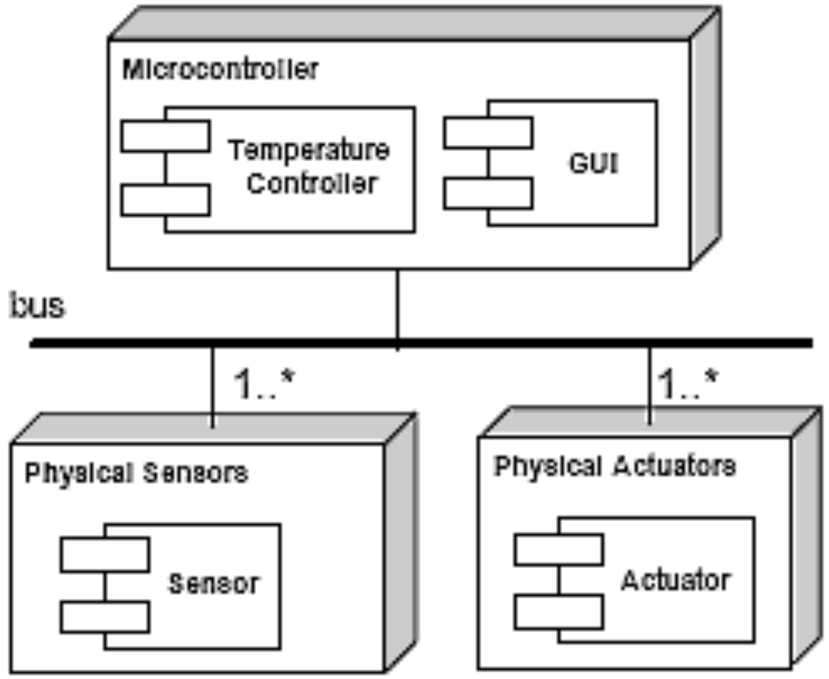
Where's the WIFI connection?

Onboarding System



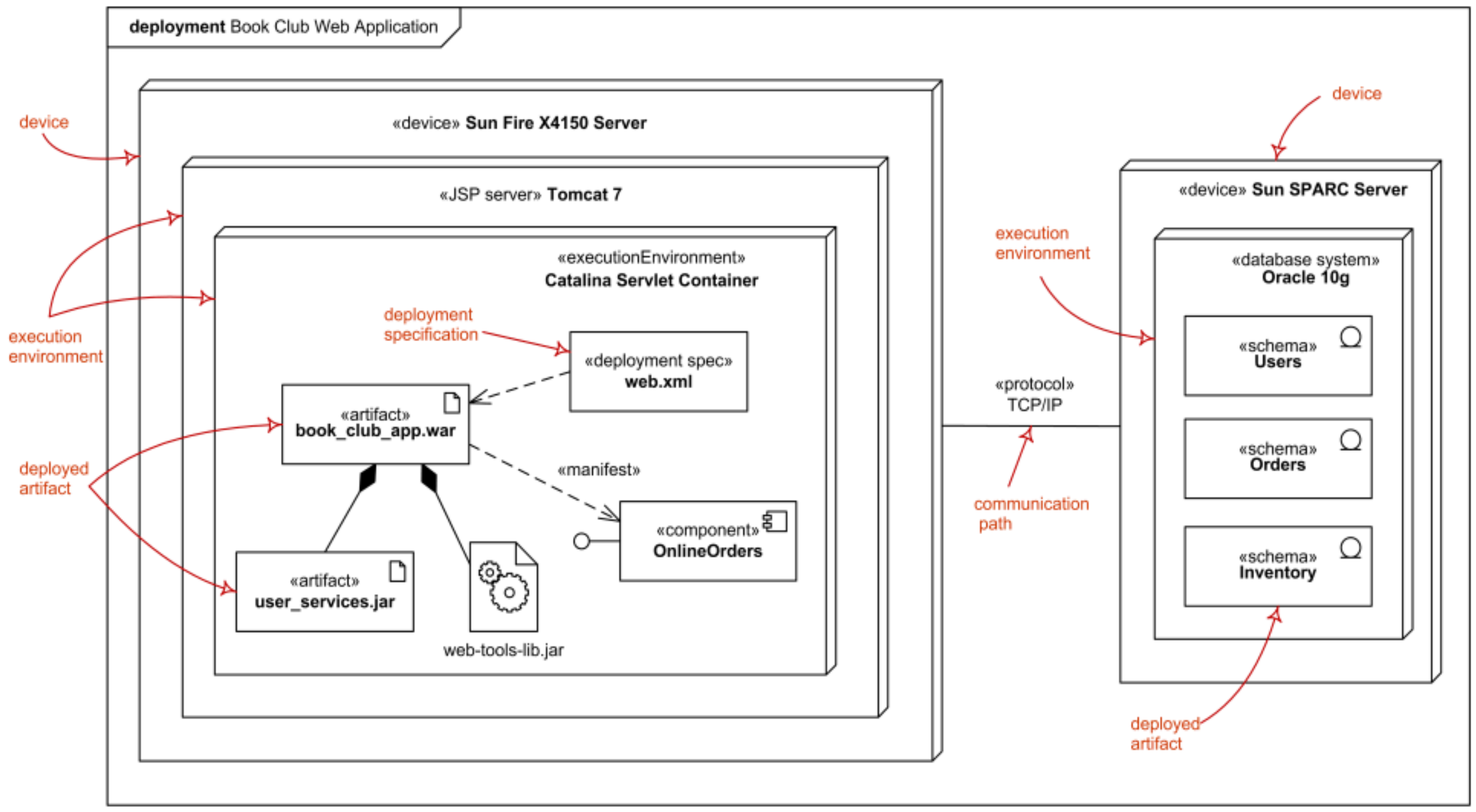
Allocation View Example





Allocation View

UML Deployment Diagram Example



Usage of Allocation Views

Specify **structure and behavior of runtime elements** such as processes, objects, servers, data stores

Reasoning and decisions about …
- What hardware and software is needed
- Distributed development and allocation of work to teams.
- Builds, integration testing, version control
- System installation
- Deployment

Elements
- **Software element**
  - Some runtime packaging of logical modules and components (e.g., processes)
- **Environmental element** - **execution** (hardware, runtime operation) or **development** (file structure, deployment, development organization)
  - Properties that are provided to the software; e.g., bandwidth

Relations
- **Allocated to** - a **software element** is mapped (allocated to) an **environmental element**
- Static or dynamic (e.g., resource allocation)

Metrics & Performance: Allocation to the system

Database usage:

- Average query: 2Kbytes
  - Queries/ Day: 20,000
  - Transactional load: Queries/ Day x Query size
- Retail
  - Size of item: 1k
  - # of items: 5000
  - Size of DB Storage: 5000 x 1,000 = 5MB
- Performance:
  - Image recognition system
    - 10 seconds per operation
    - 10,000 request per minute
    - 100,000 seconds CPU time required per minute**

** Will that work?