

Modelagem para Sistemas Embarcados

Visão Geral

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Modelagem?

- Qualquer idiota pode escrever código [1].
- O que separa engenheiros de hackers?
- A sedução do teclado é a queda de muitos projetos de sistemas embarcados;

Profissionais encontram formas consistentes de criar software de alta qualidade dentro do prazo e orçamento.

Complexidade X Tamanho

- Uma regra simples: Complexidade não tem escala linear com o tamanho;

$$\text{Effort to create a project} = C \times \text{KLOC}^M.$$

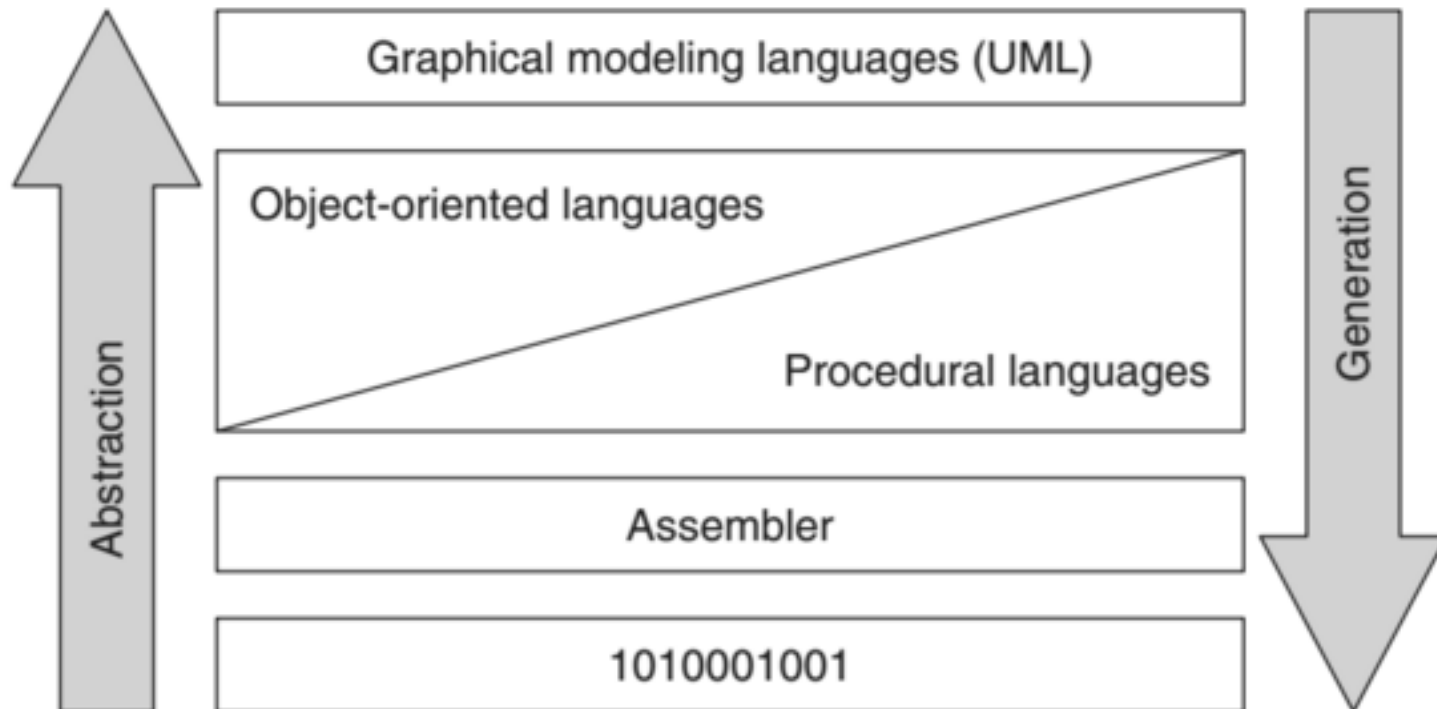
(KLOC means “thousands of lines of code.”)

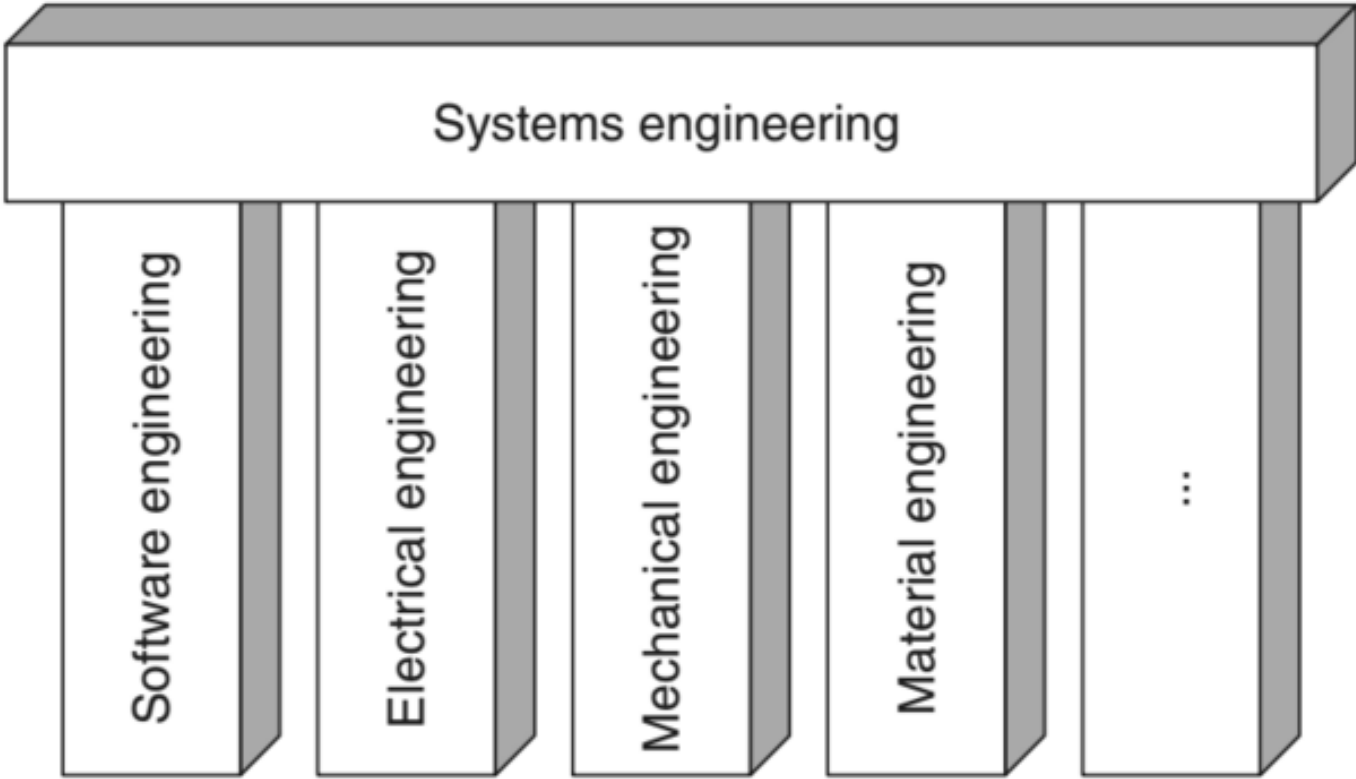
Lines of code	Effort	Comments
10,000	25.1	
20,000	66.3	Double size of code; effort goes up by 2.64
100,000	631	Size grows by factor of 10; effort grows by 25

Técnicas para Estimativas de Custo

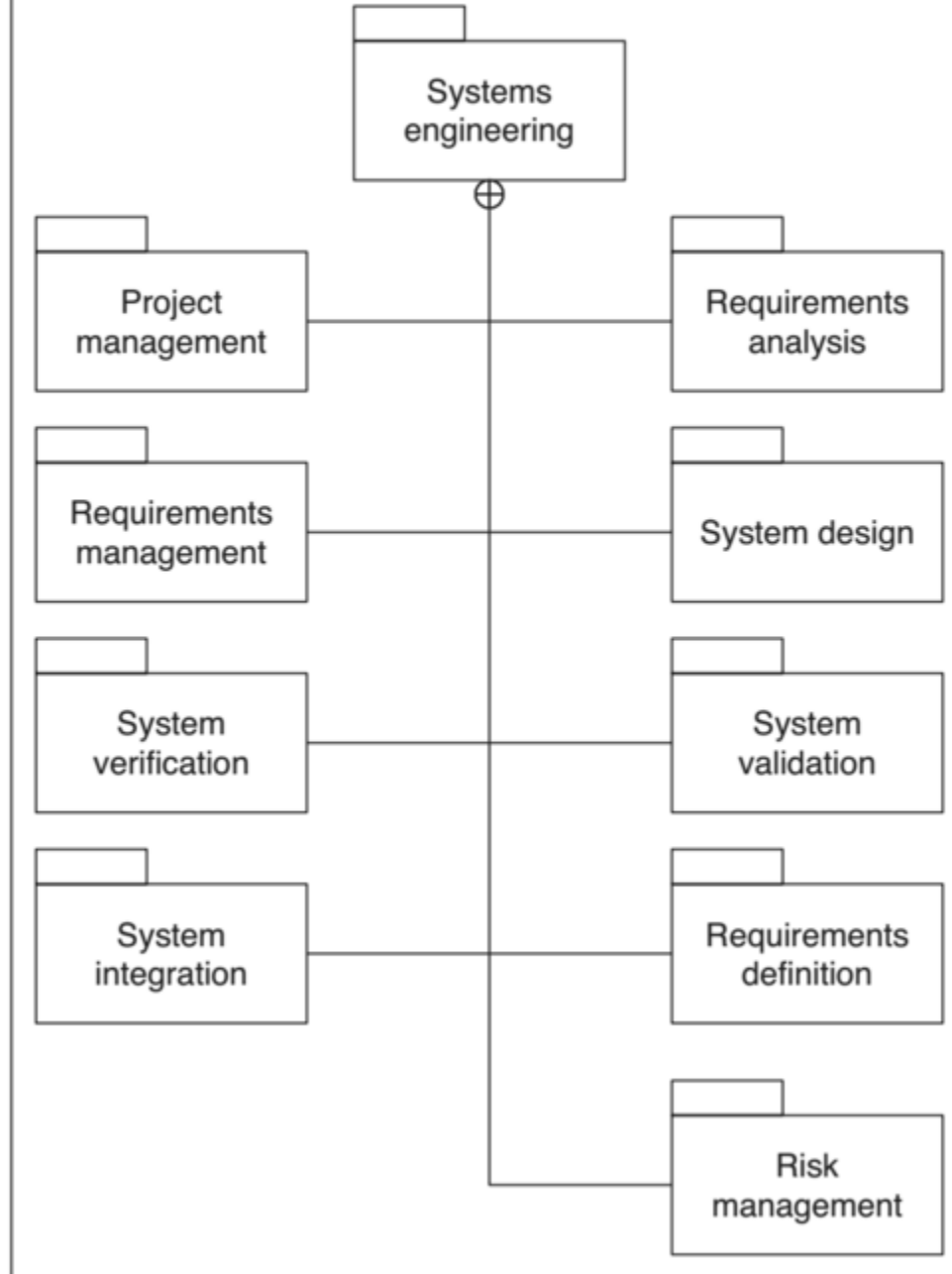
- COCOMO
- COSYSMO
- Function Point
- Há muitos outros...

Modelagem, Abstrações

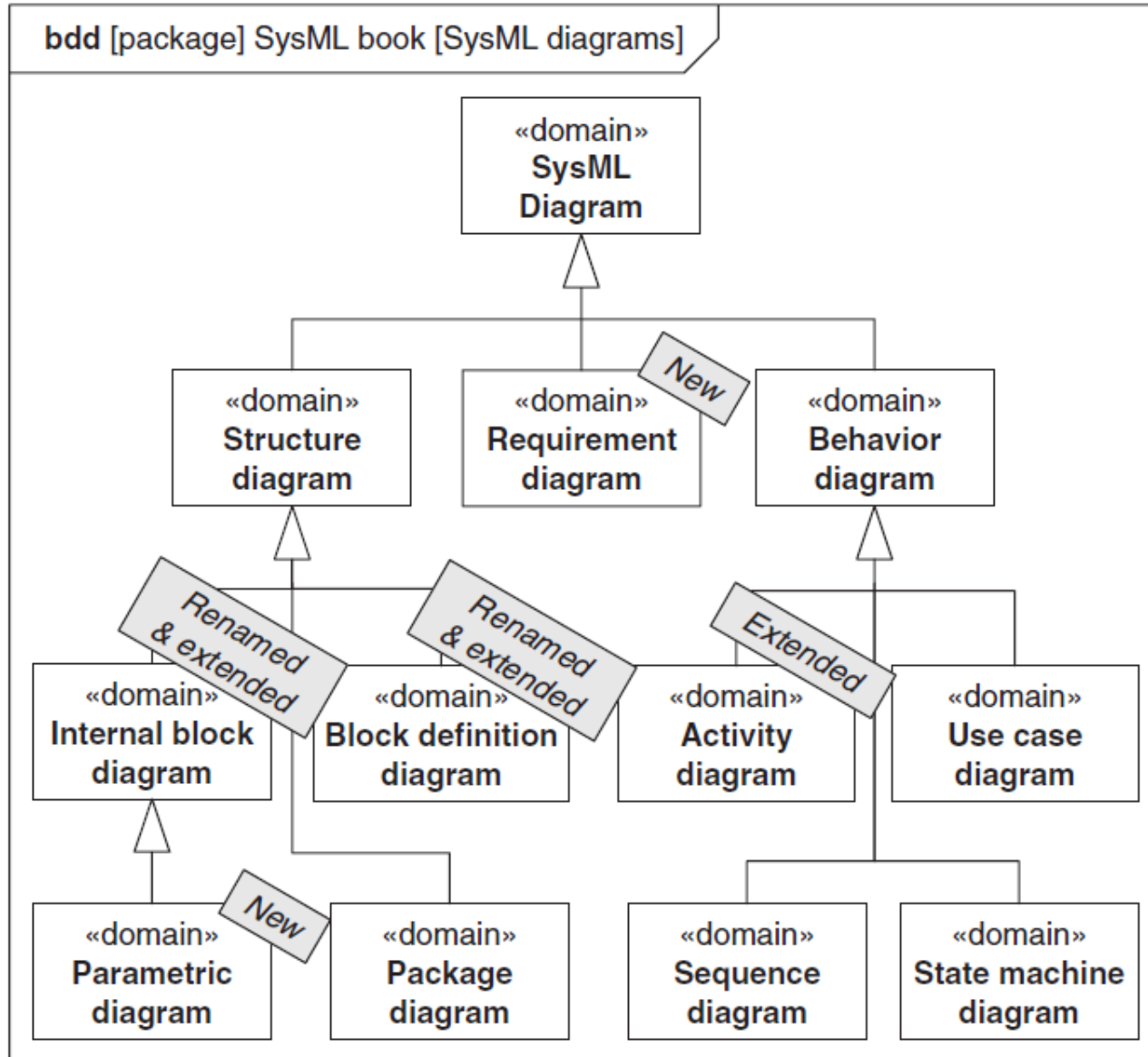




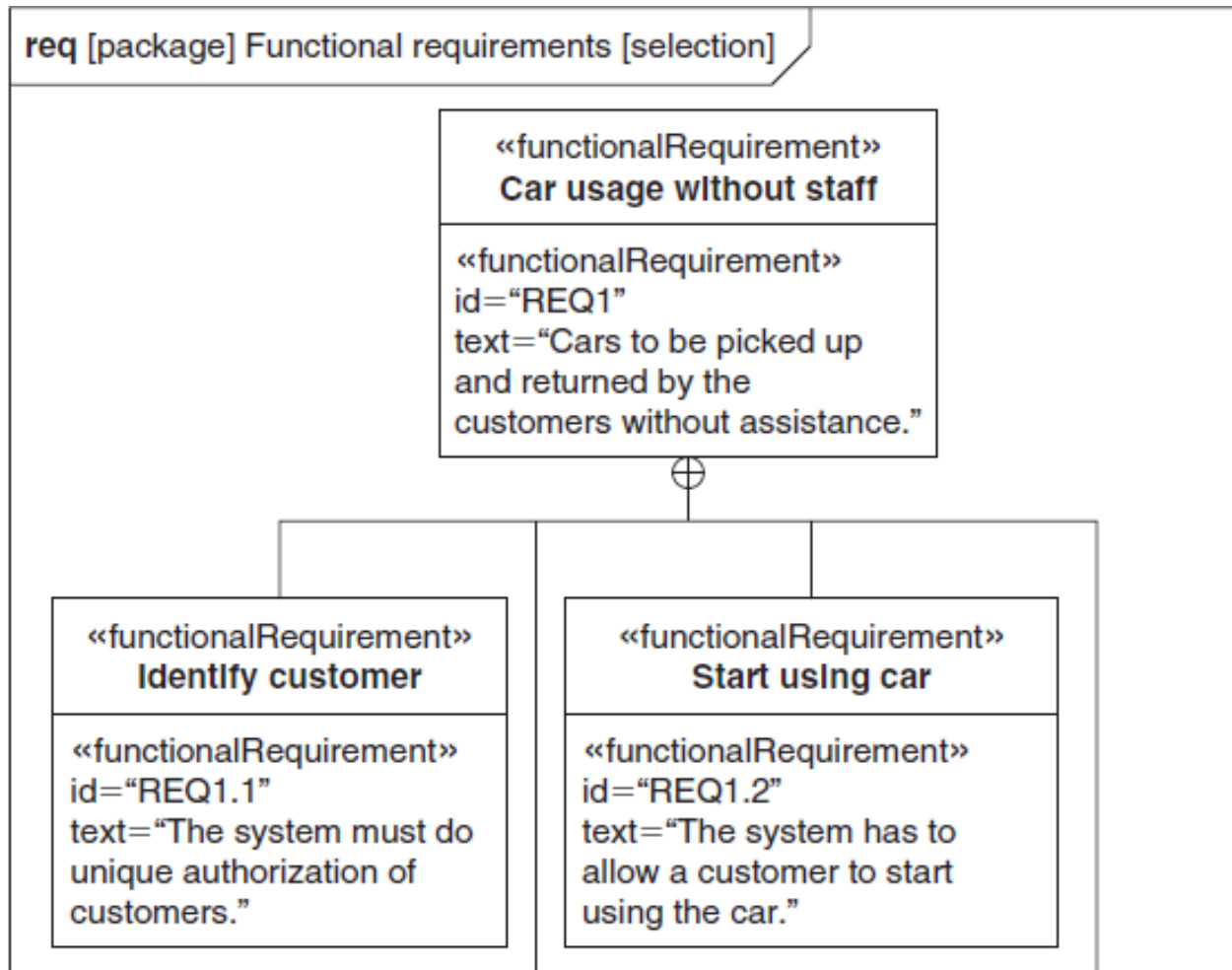
pkg Systems engineering tasks



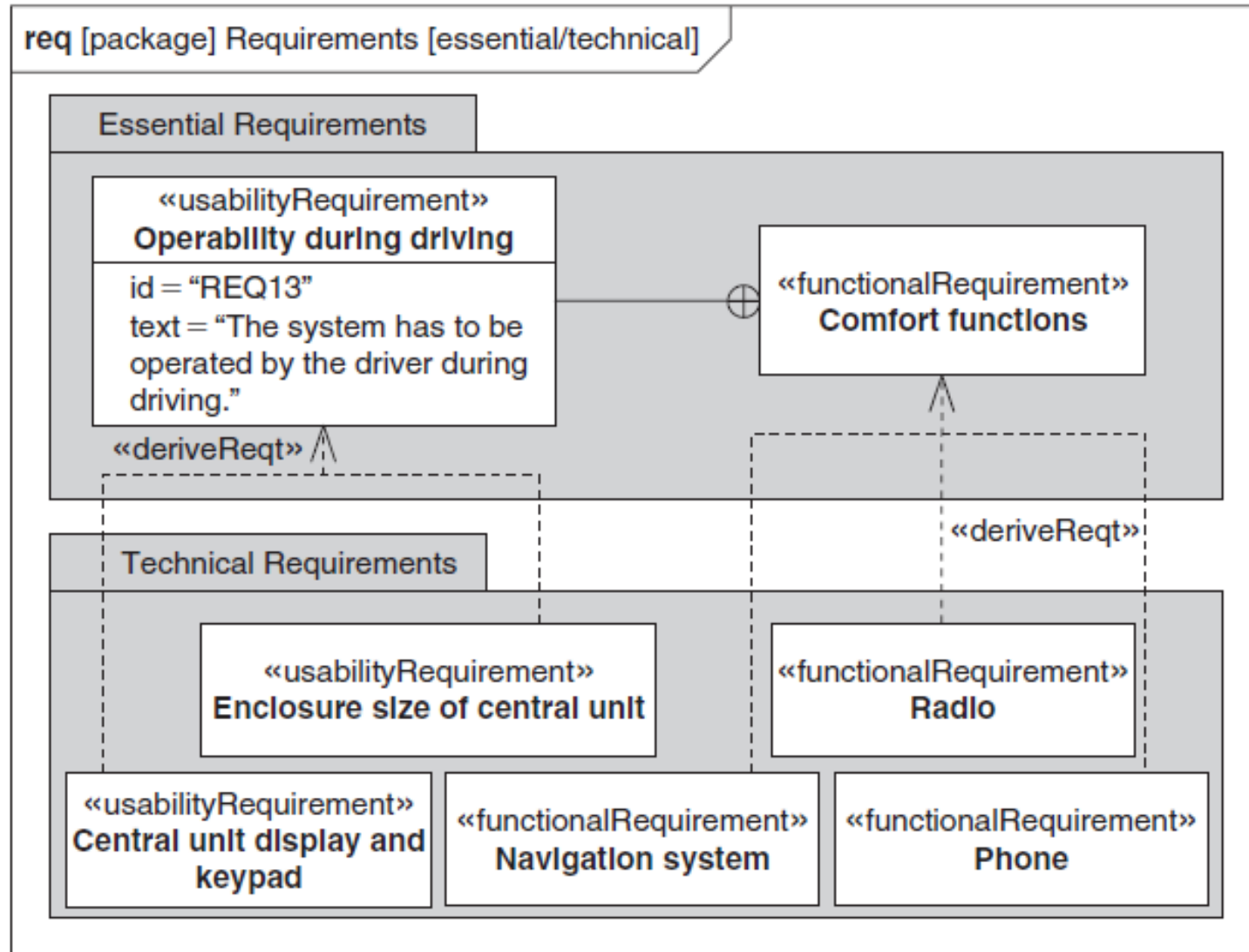
SysML



SysML: Requisitos

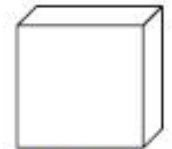


SysML: Requisitos

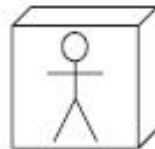


SysML: Contexto do Sistema

- Identificar os Atores



Customer card

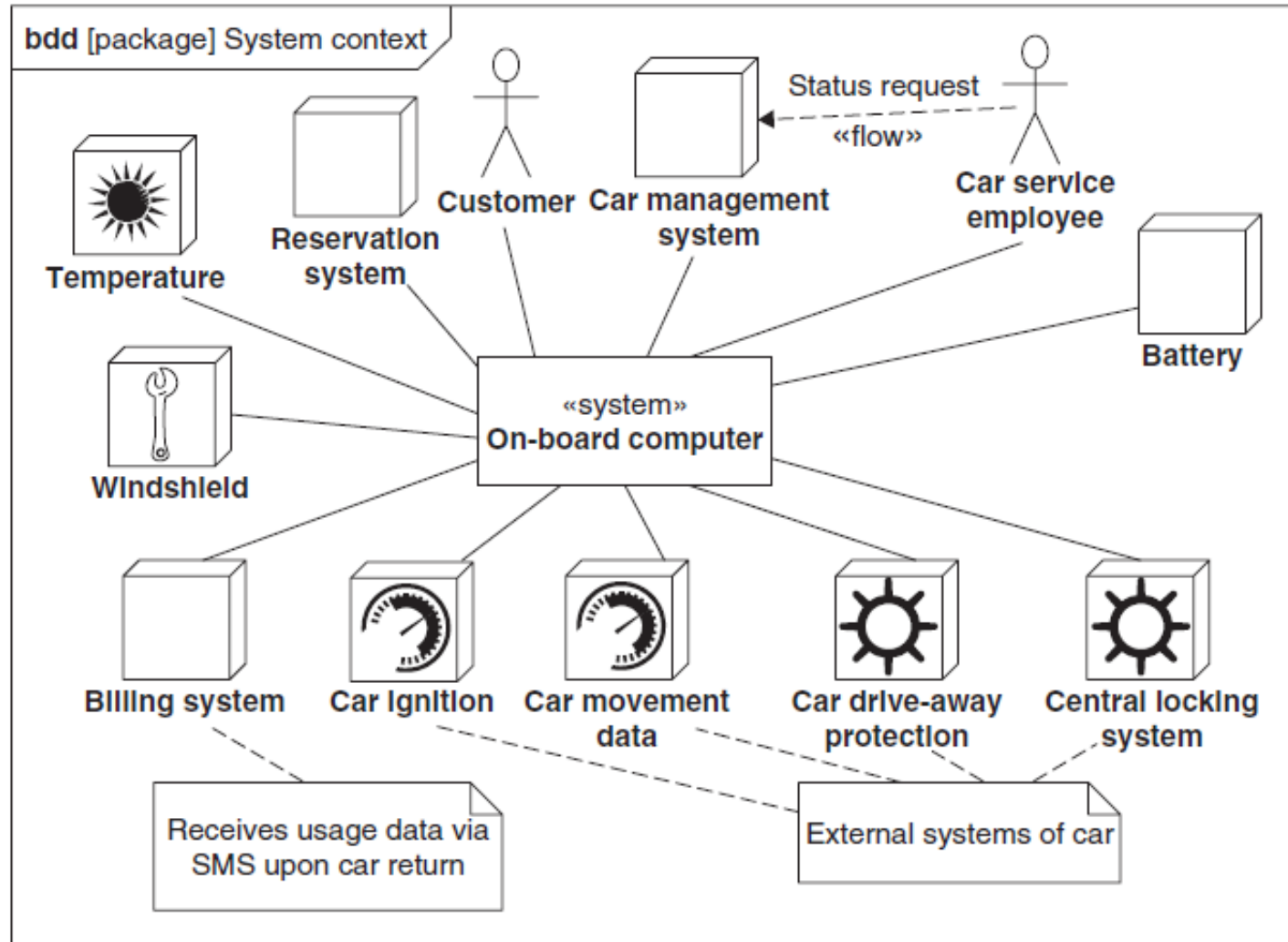


Card reader



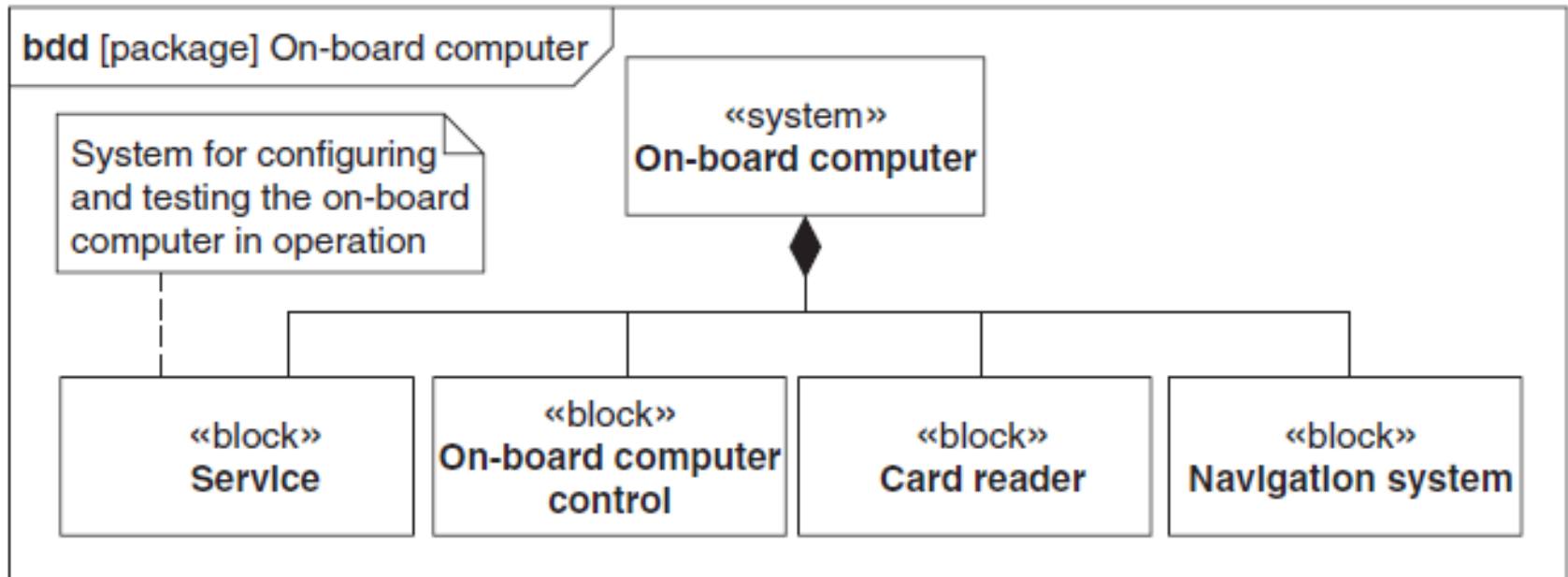
Customer

SysML: Contexto do Sistema

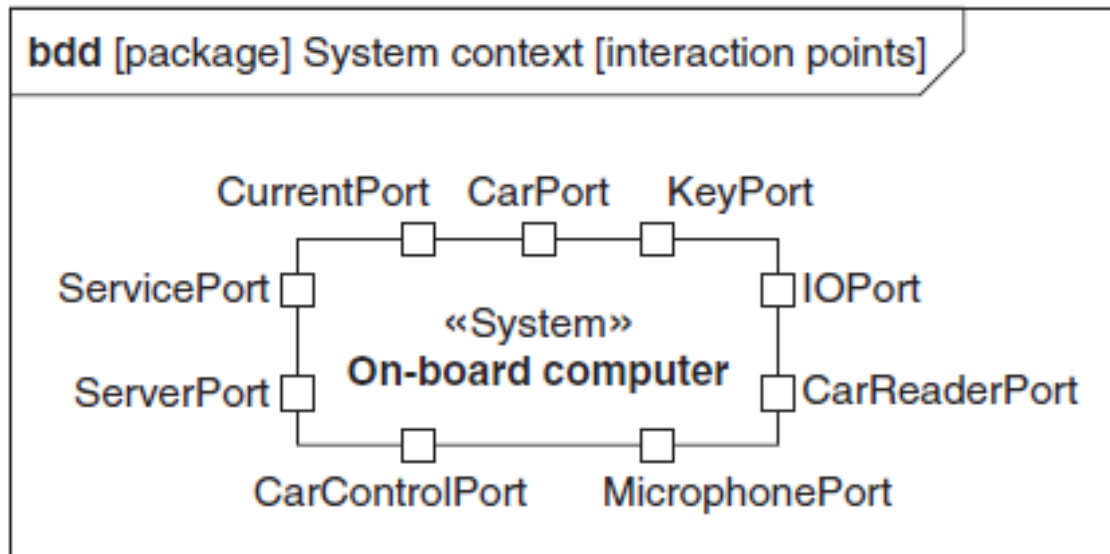


SysML: Contexto do Sistema

- Extrai-se a estrutura do sistema em blocos;
- Blocos são um conceito de SysML;

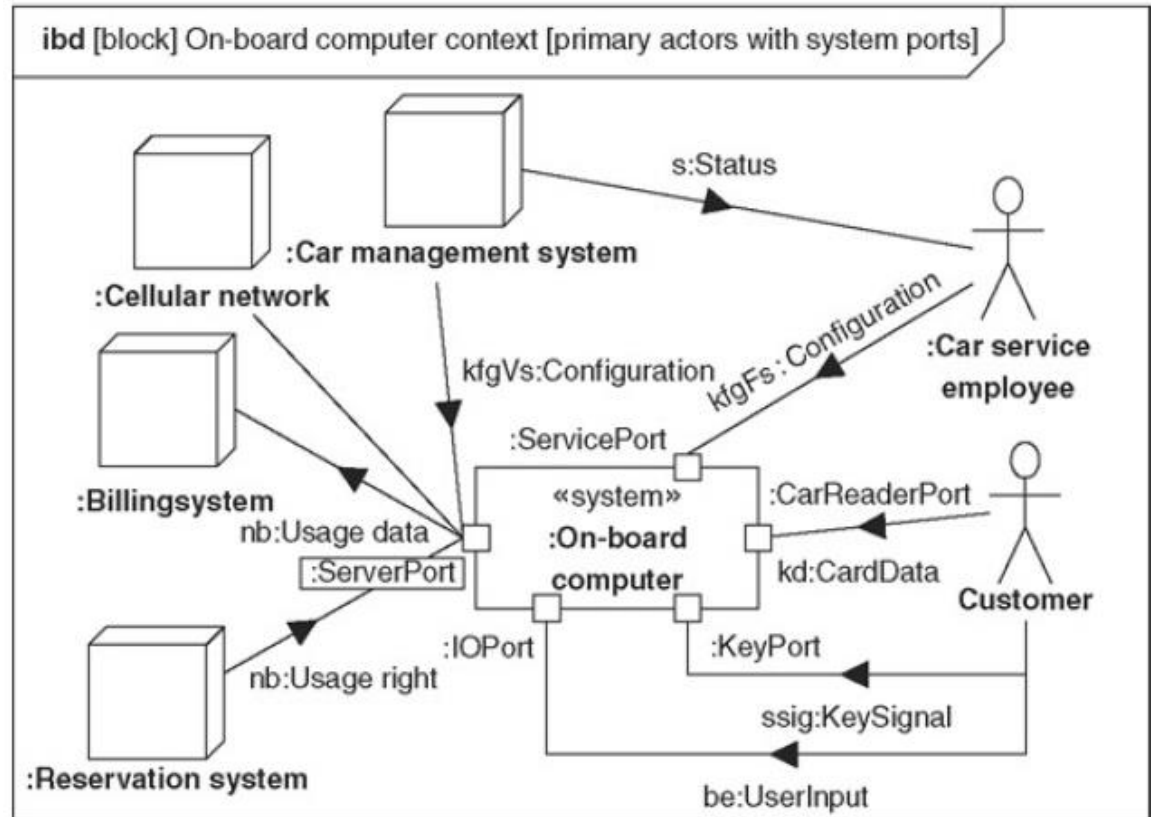


SysML: Pontos de Interação

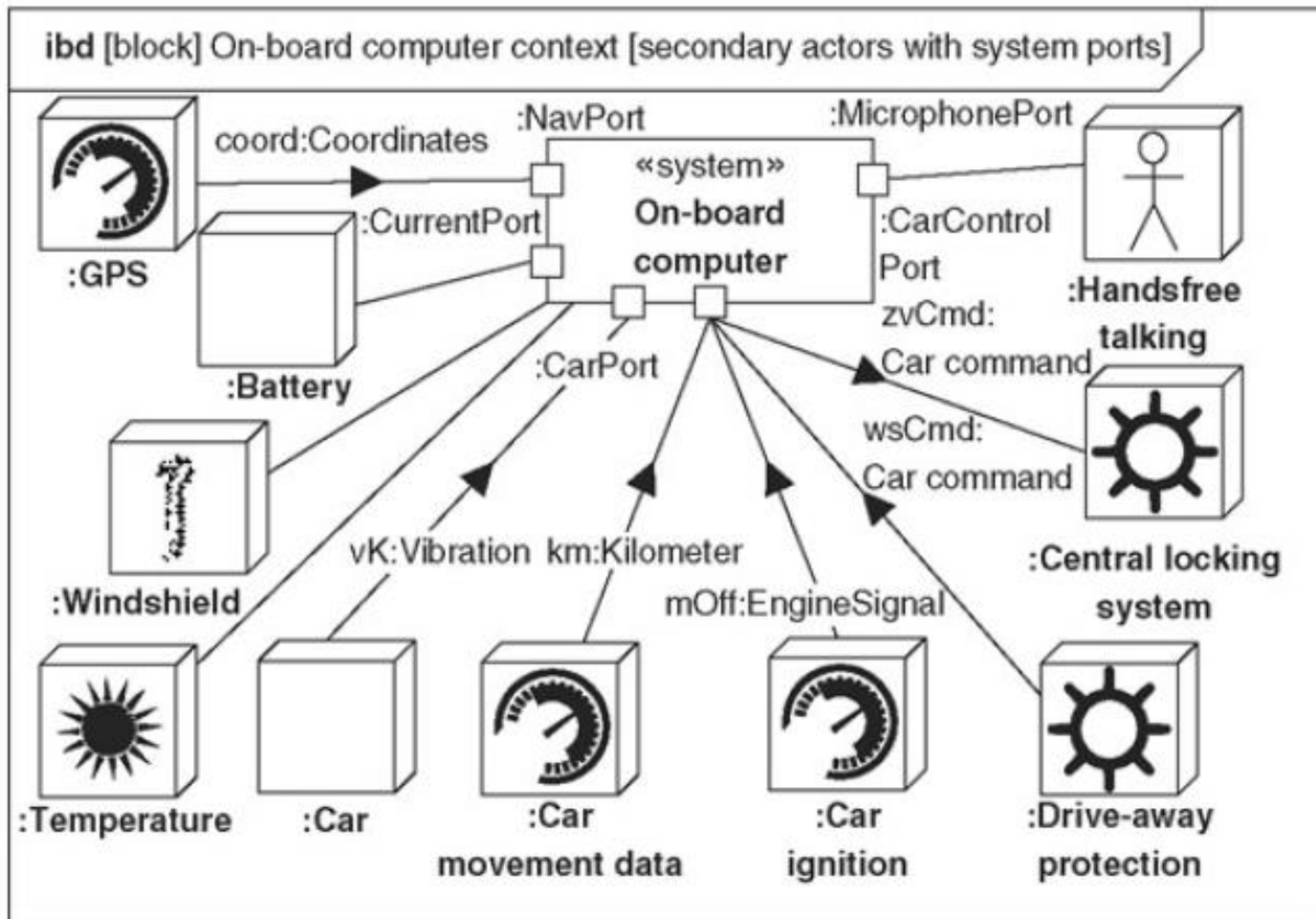


SysML: Pontos de Interação

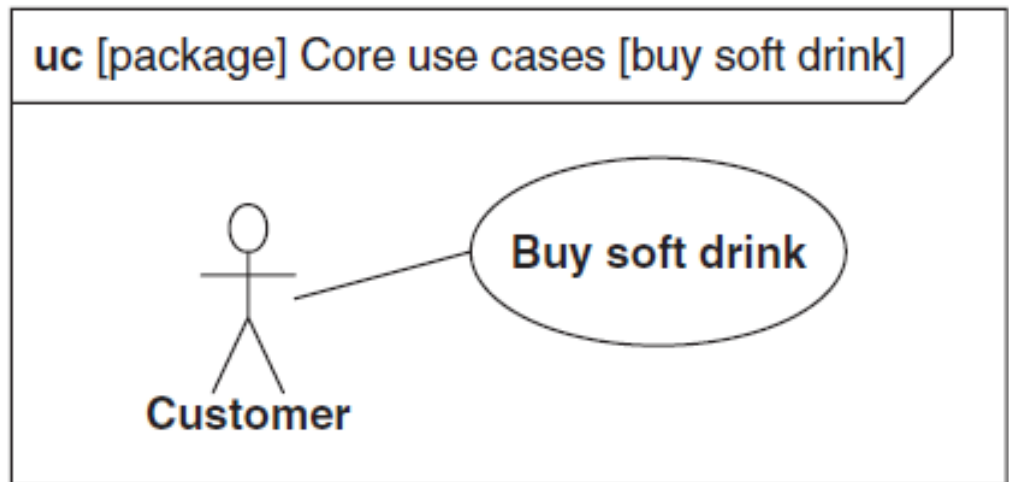
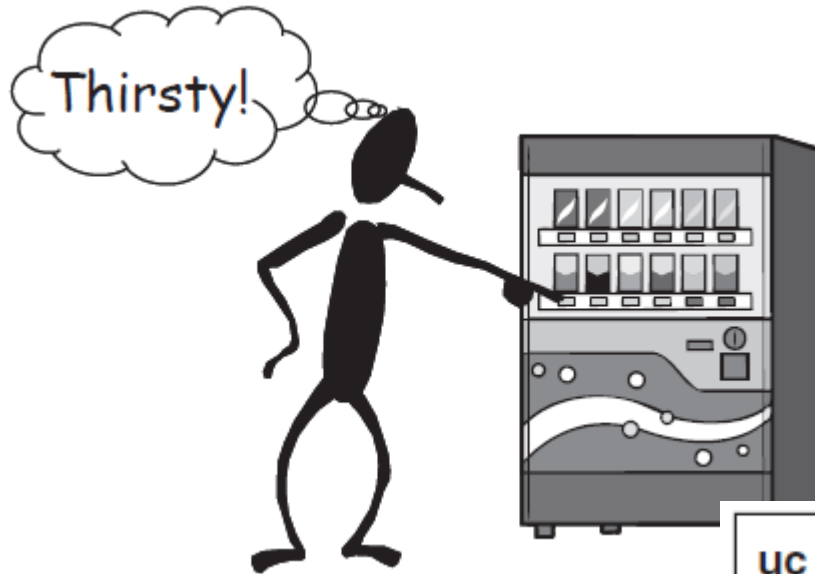
- Auxiliam numa estimativa de custo e tempo inicial;



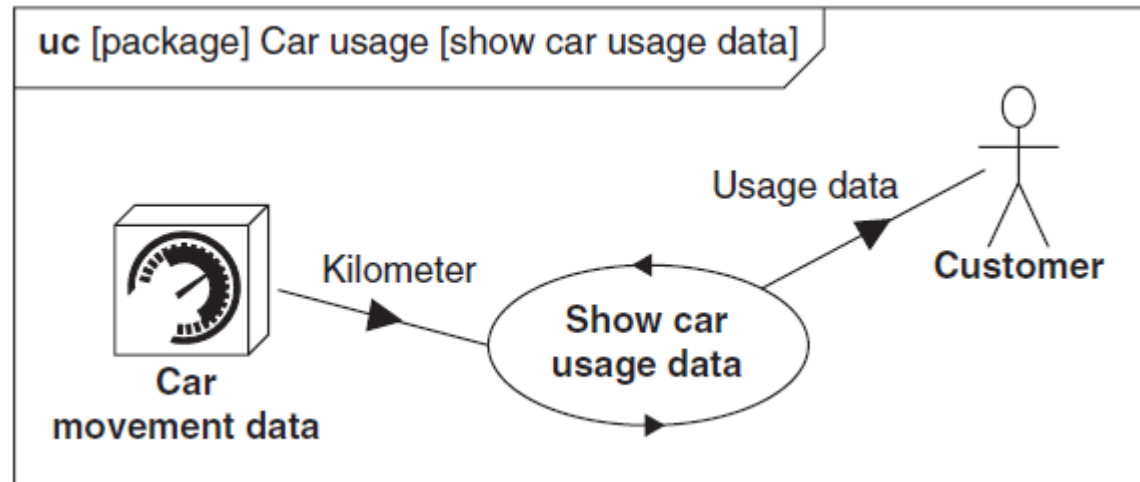
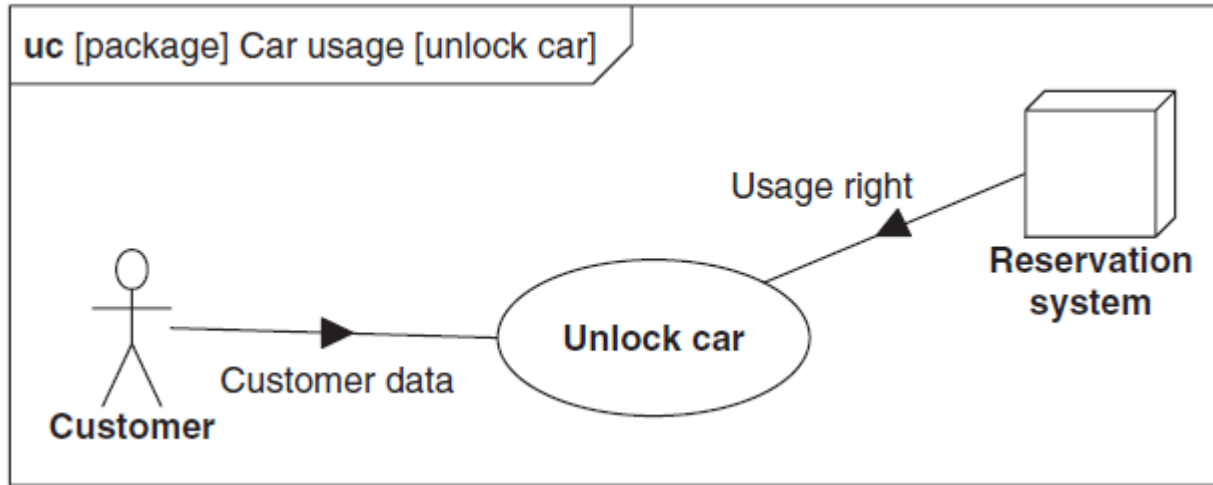
SysML: Pontos de Interação



SysML: Diagrama de Caso de Uso

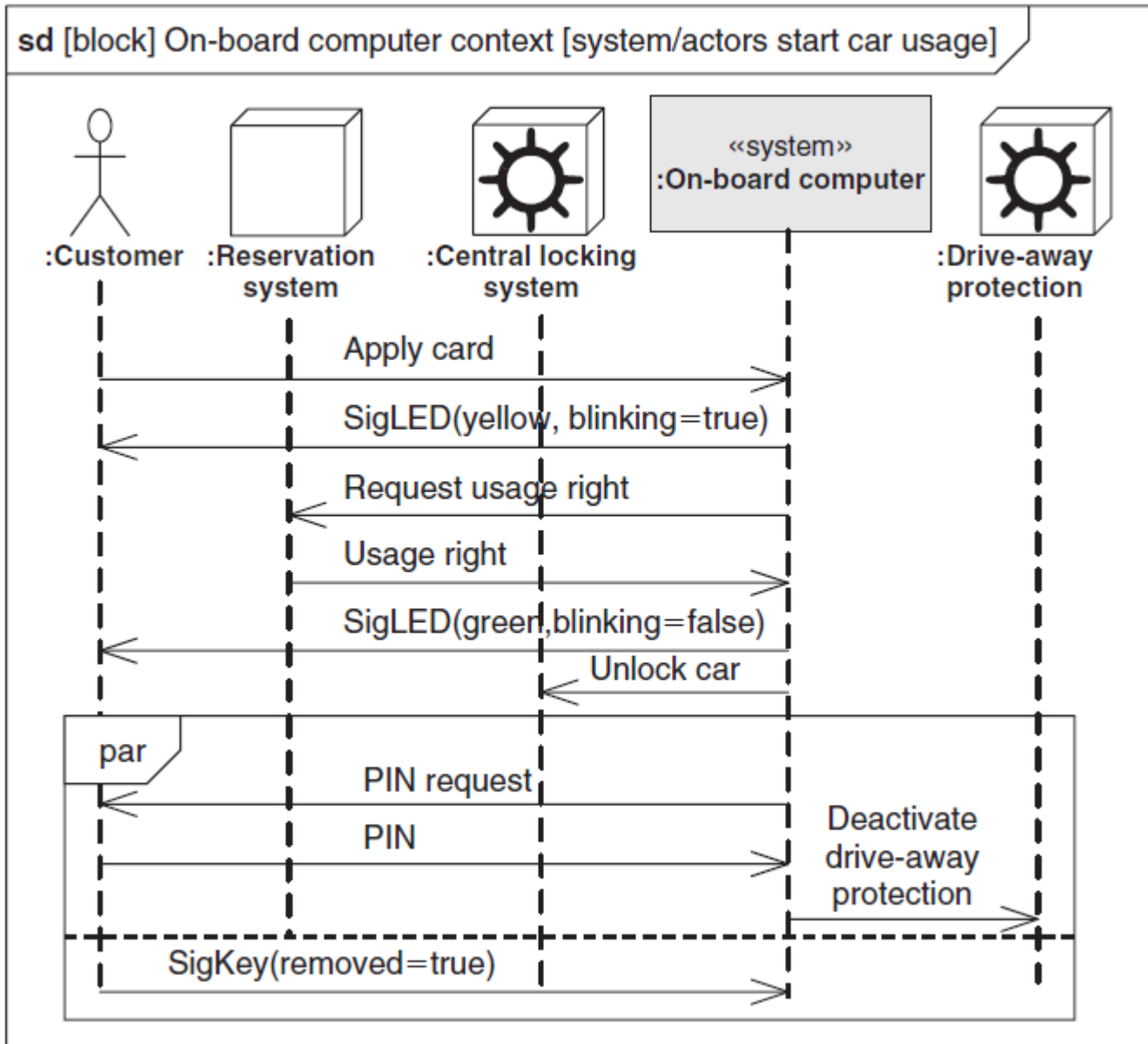


SysML: Diagrama de Caso de Uso

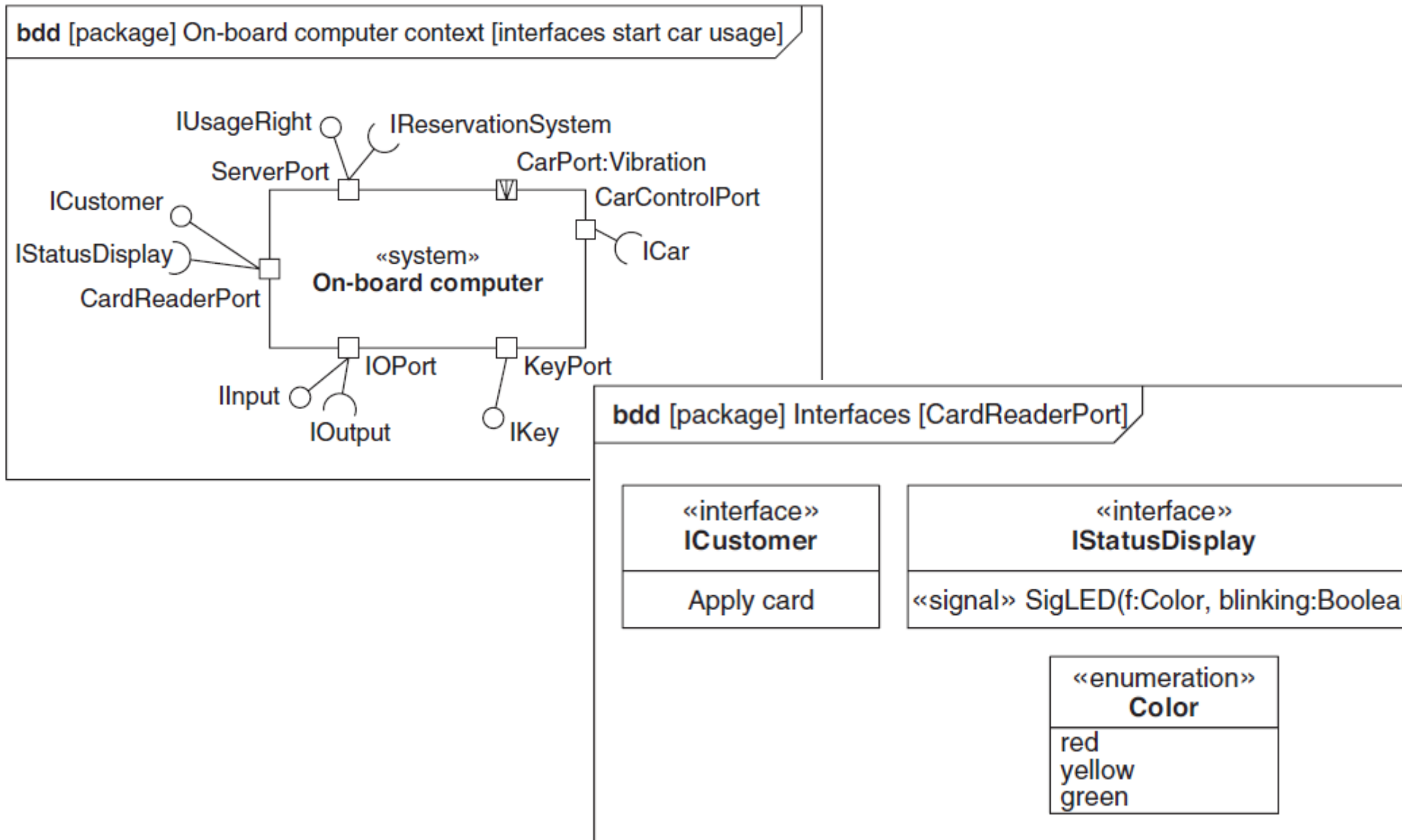


Caso de Uso
Contínuo

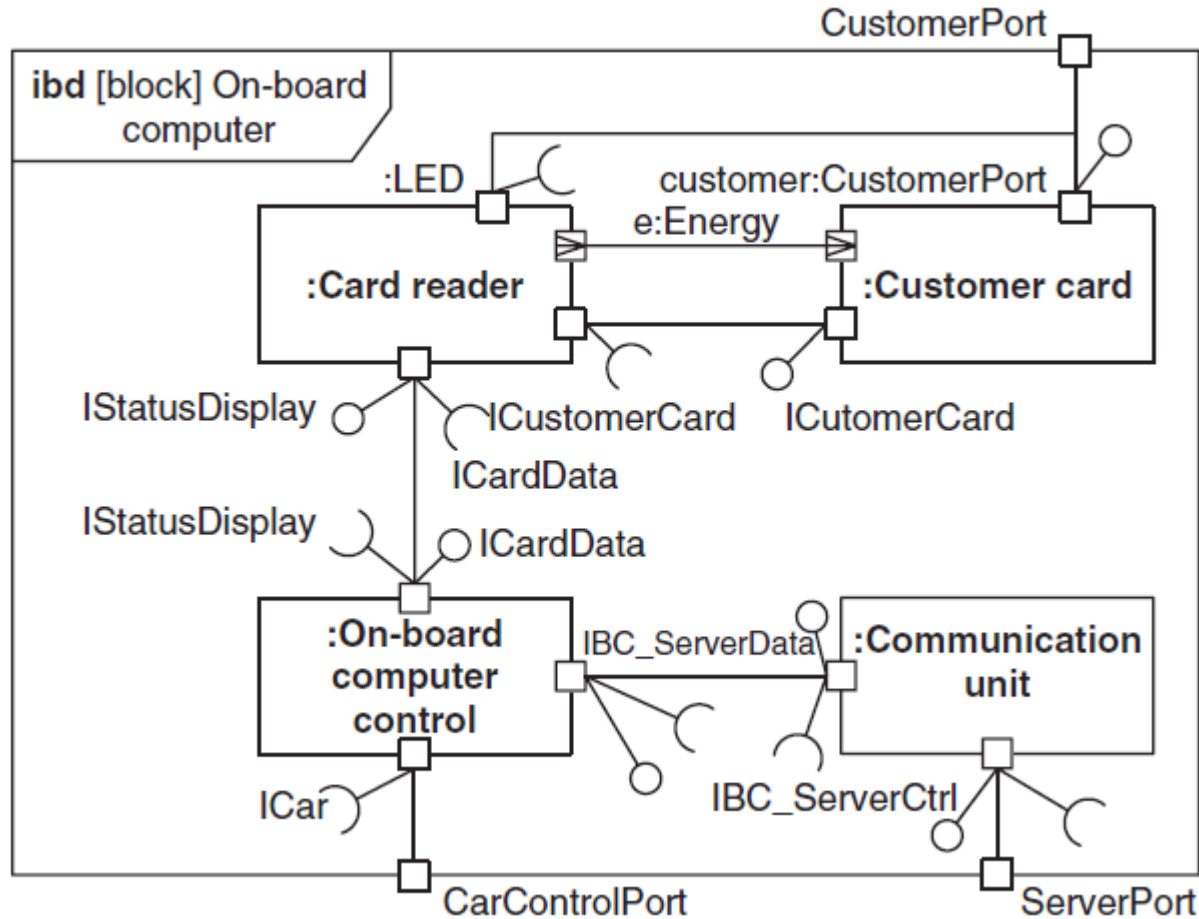
SysML: Diagrama de Interação



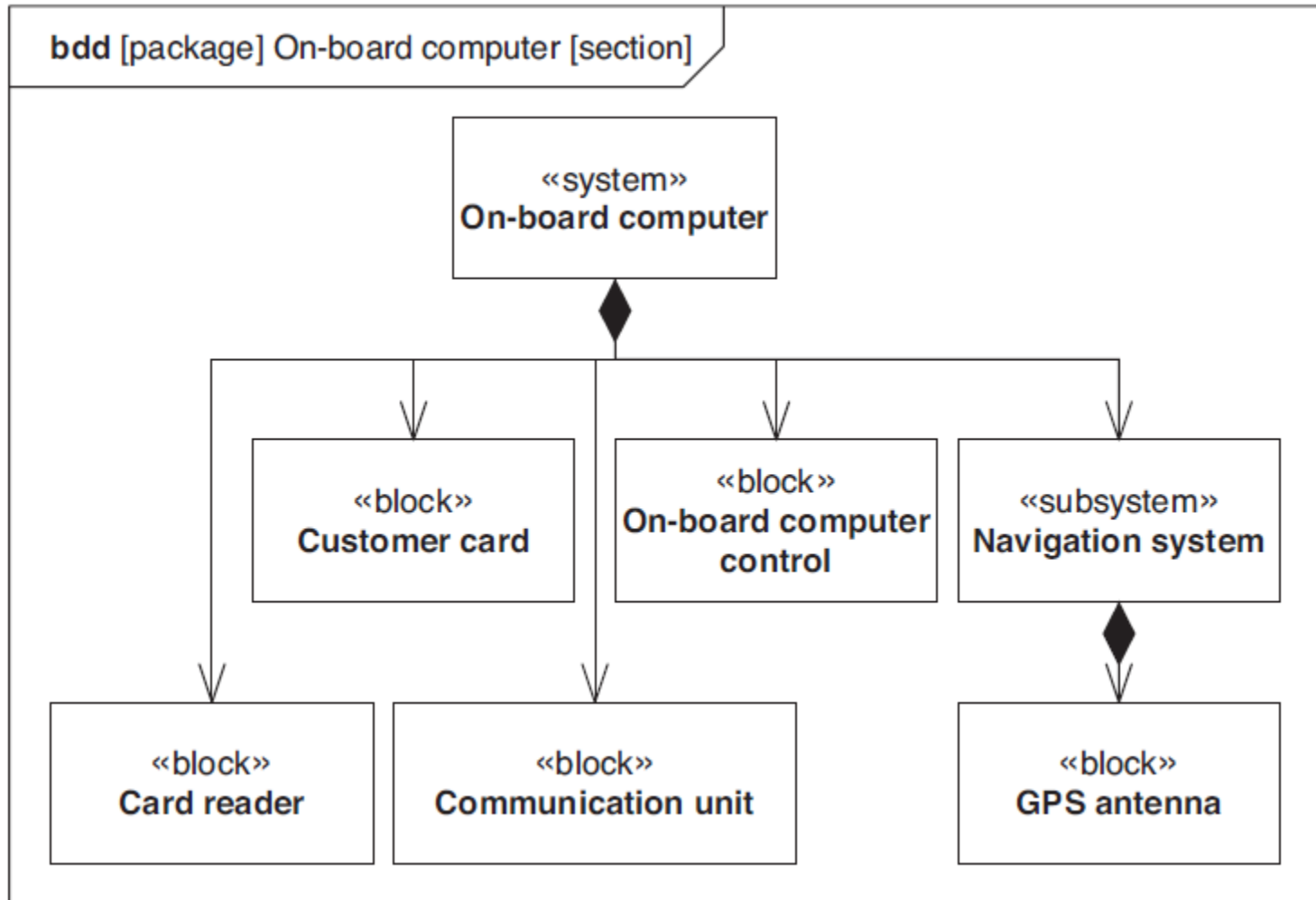
SysML: Interfaces do Sistema



SysML: Interfaces do Sistema



SysML: Estrutura do Sistema



O Sistema dos Sistema

- Em SysML, o projeto que se está modelando/construindo pode vir a ser um bloco dentro de outro sistema;
- Assim como, um bloco dentro do nosso sistema pode ser um sistema independente;

MARTE

- Modeling and Analysis of Real Time and Embedded Systems;
 - Padrão OMG para modelagem de sistemas embarcados com UML 2

Referências

- [1] GANSSLE, Jack G. The Art of Designing Embedded Systems, 2000.
- [2] Weilkiens, Tim. Systems Engineering with SysML/UML: Modeling, Analysis, Design. 2006. Elsevier.