

Practice of Machine Design

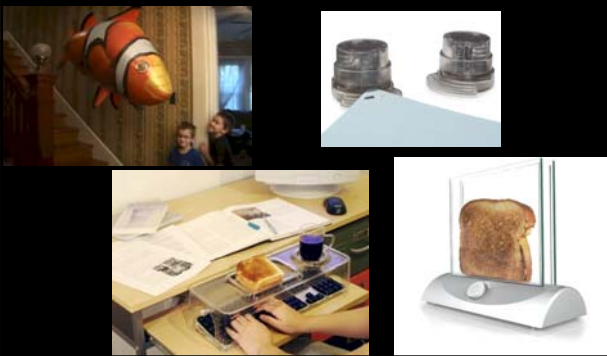
2012 Winter Semester
 Masayuki Nakao
 Kenji Iino

Class Schedule

1. Oct. 5 Kenji, Guidance
2. Oct. 12 Kenji, Innovation vs. Innovative Idea
3. Oct. 19 Kenji, What is the functional requirement?
4. Oct. 26 Nakao, Presenting your analysis
5. Nov. 2 Kenji, Brainstorming to Functional Analysis
6. Nov. 9 Nakao, TBA
7. Nov. 16 Yoshie, Video:
8. Nov. 20 (Tue) Nakao, TBA
9. Nov. 30 Kenji, Empathy for Better Design
10. Dec. 7 Kenji, Group Project 1
11. Dec. 14 Kenji, Group Project 2
12. Dec. 21 Nakao, TBA
13. Jan. 11 Kenji, Student Presentation 1
14. Jan. 25 Yoshie, Watch Video
15. Feb. 1 Kenji, Student Presentation 2

Innovation vs. Innovative Idea

What is innovation and how is it different from an innovative idea?



Innovation

Innovative Idea

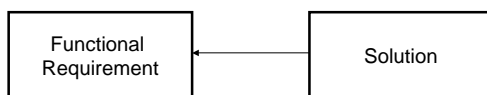
Improvement

How are they different?

- from the perspective of functional analysis

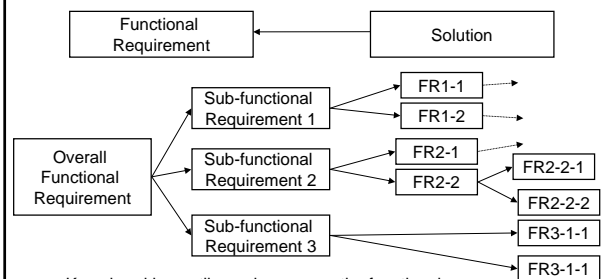
Functional Analysis

Functional and Structural Tree



Functional Analysis

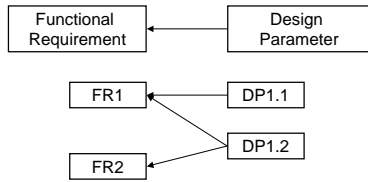
Break the functional requirement into sub-functions



Keep breaking until you decompose the functional requirement into a set of functional elements

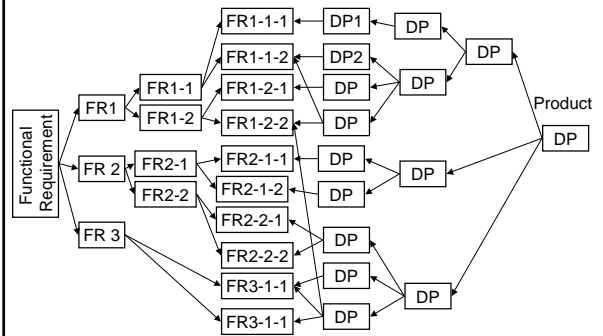
Functional Analysis

A Functional Element is met by a set of Structural Parts (Design Parameter)



One part may serve a number of functions

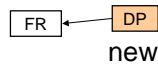
Functional-Structural Tree (F-S Tree)



Improvement

Improvement

Realize an existing functional requirement in a more effective way



Innovative Idea

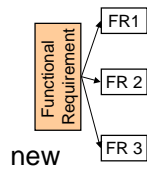
Realize an existing functional requirement with a new sub-function

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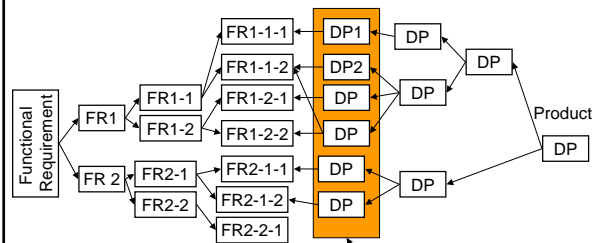
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      style FR2 fill:#fff
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Innovation

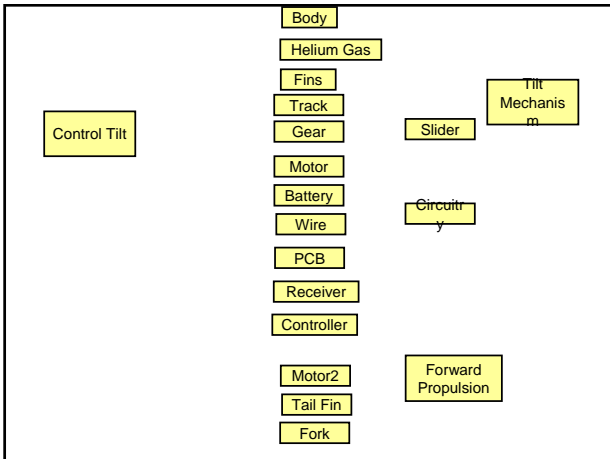
Create a new functional requirement that never existed before



Let's Practice Building an F-S Tree

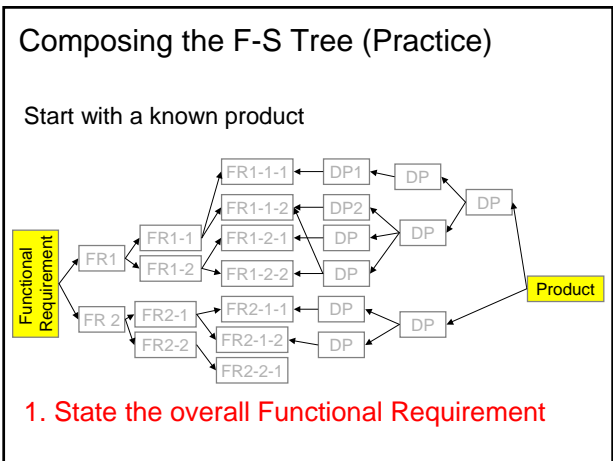
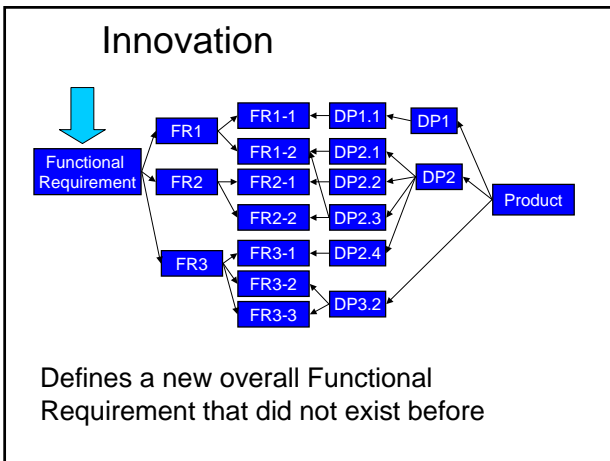
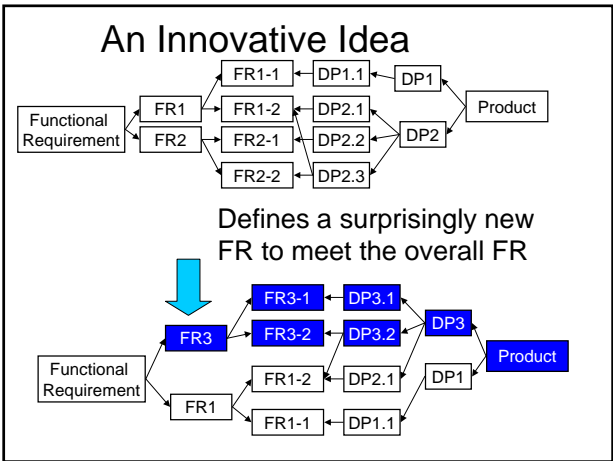
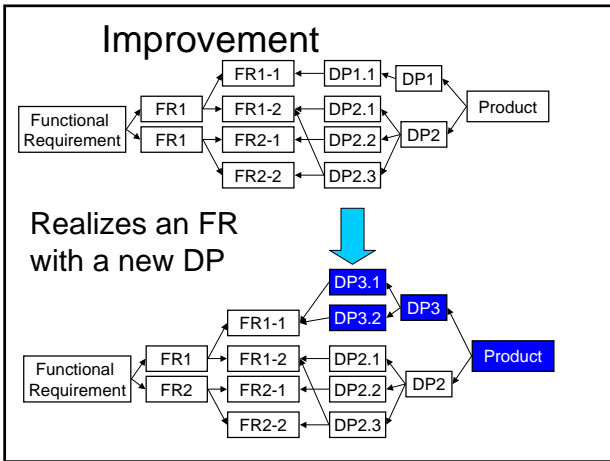


Easier to start here for analyzing an existing product

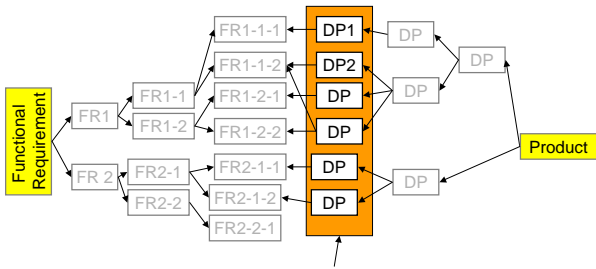


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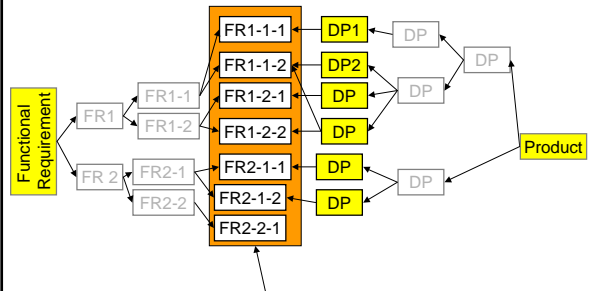
Composing the F-S Tree (Practice)



1. List up all the parts

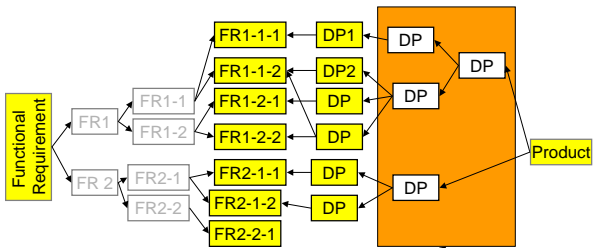
DP: Design Parameter (a.k.a. Part)

Composing the F-S Tree (Practice)



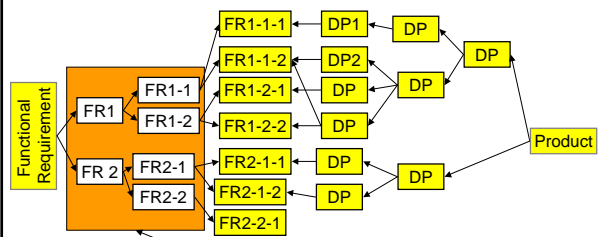
2. State the FR for each DP

Composing the F-S Tree (Practice)



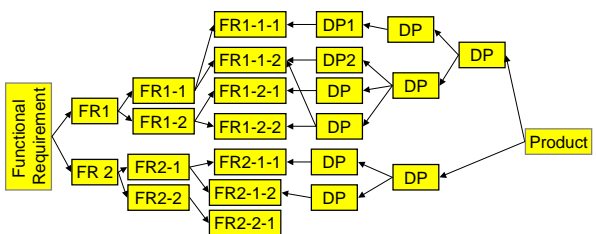
3. Bundle Parts into Assemblies

Composing the F-S Tree (Practice)



3. State higher level FRs

Composing the F-S Tree (Practice)



Let's practice the construction with the Air Swimmer

