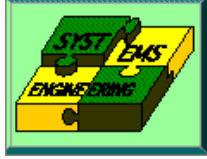
George Mason University



SYST 101: Intro to Systems

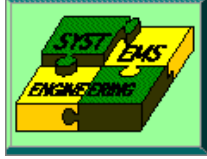
Lecture 8

Feb. 12, 2004

C. Wells, SEOR Dept.

Announcements

- Lab hours beginning Thursday
  - Class period
  - Hour after class period
  - We will load the computer for Mindstorm programming
    - But bring your CD, cable, and infrared transmitter



Agenda

- Project 1 status
- Issue formulation
- Flowcharts

Project Teams

- Who is not on a team now?
- Team member check-in
- Thoughts on peer evaluations

Issue Formulation

- How to determine what's important and what's not?
  - How do you know when you've captured all the issues?

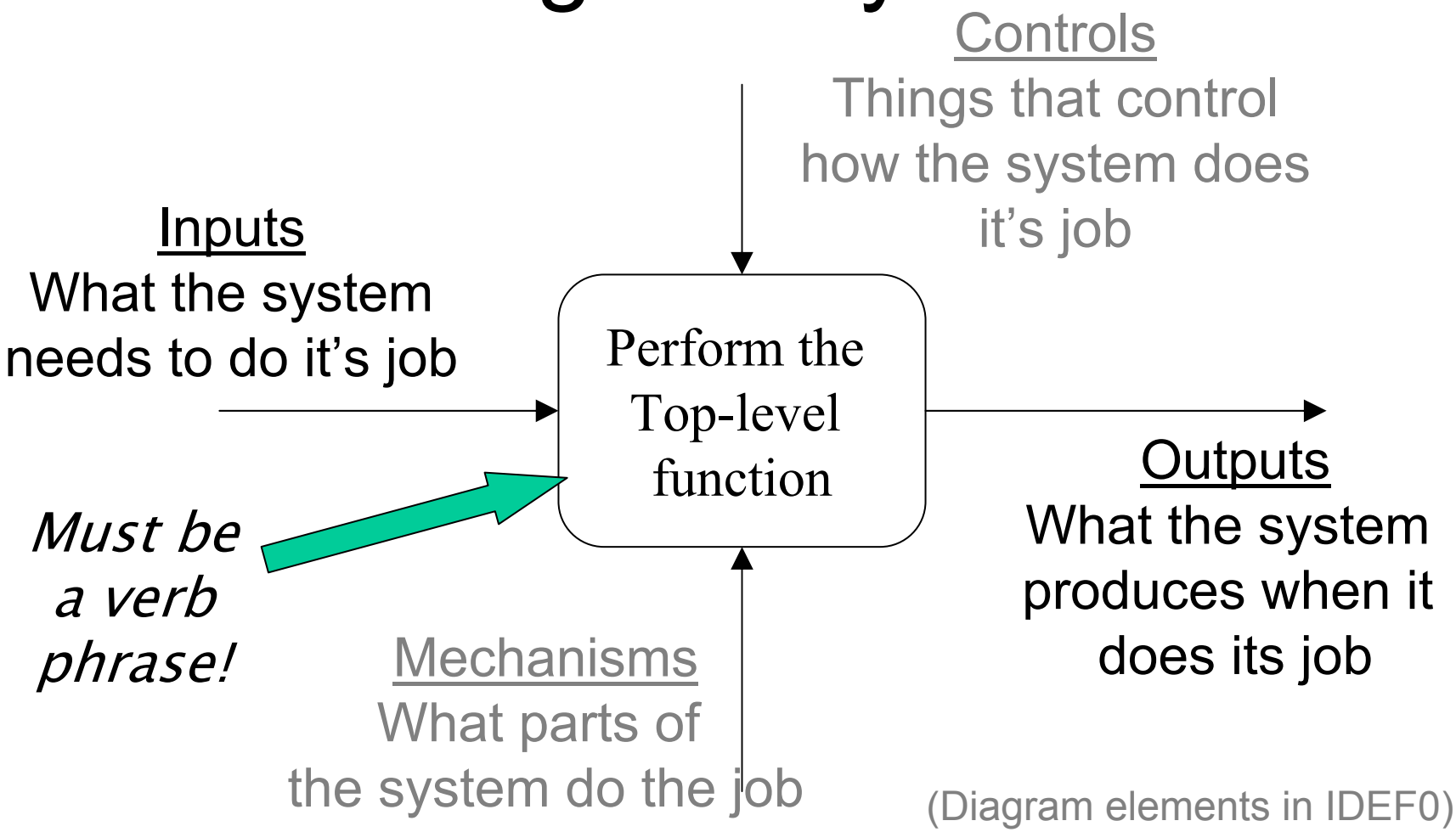
Defining Desired Behavior

- One starting point: Function flow diagrams
  - Flowcharts
  - Decision processes
- Structured analysis and object-oriented techniques addressed in SYST 301 & 520.

Process Description

- Just knowing the functions is not sufficient
  - What's the order? What makes me decide to this OR that? When can I start doing a function?
- Dynamic descriptions are also important.

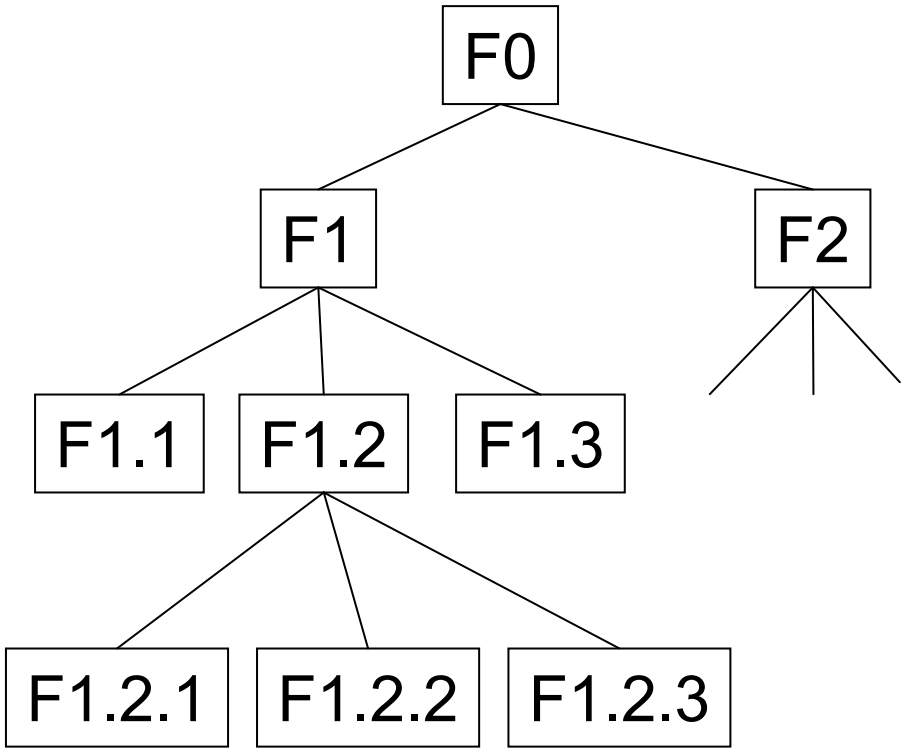
Diagram Syntax



(Diagram elements in IDEF0)

Functional Decomposition – Representation Techniques

Graphical Representation



Outline Form

- F0
  - F1
    - F1.1
    - F1.2
      - F1.2.1
      - F1.2.2
      - F1.2.3
    - F1.3
  - F2

Deciding on the Subfunctions

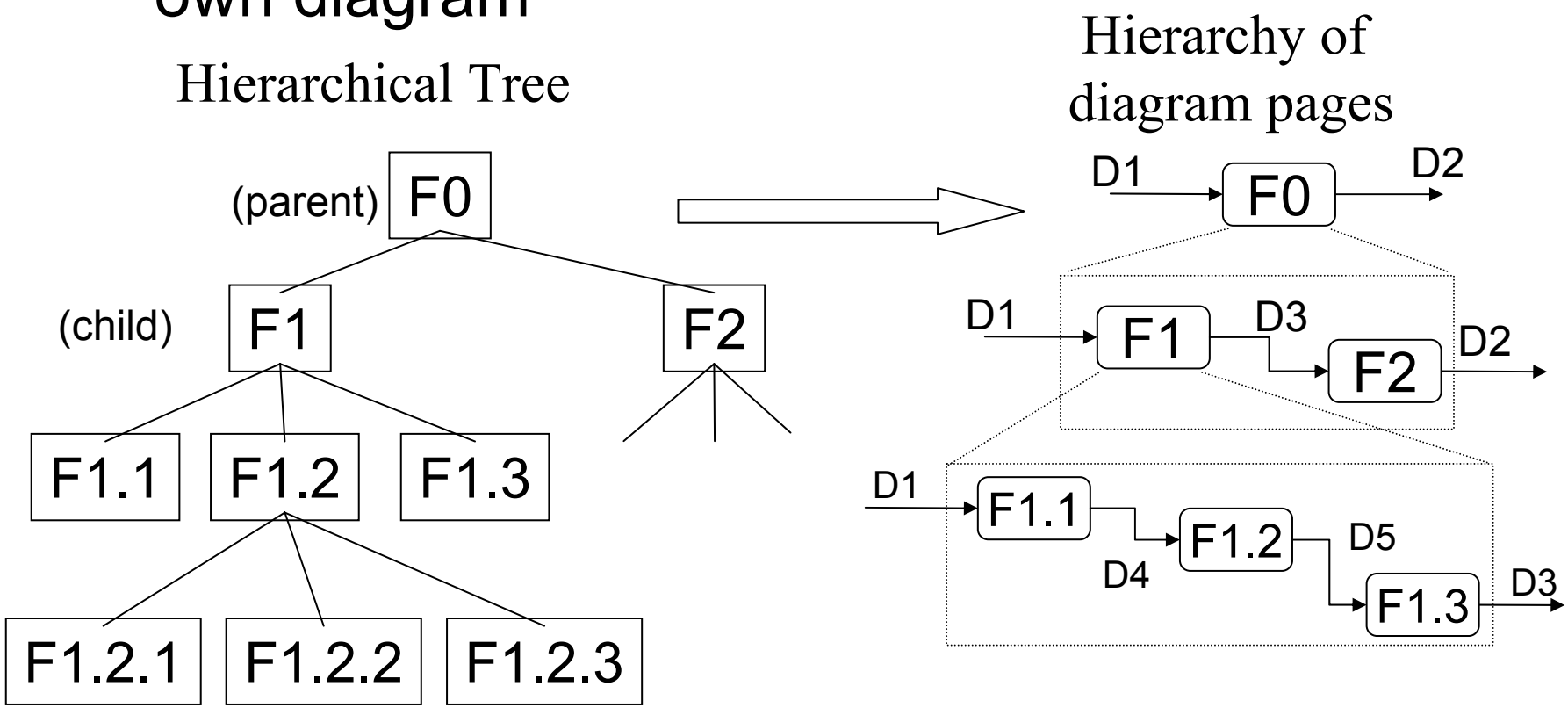
- Does involve some degree of experience, practice, creativity
  - There are no instructions on how to come up with the “right” subfunctions
  - “Bad” or poor decompositions will have certain “symptoms” – return to this later
- Can be iterative with the following analysis steps (dataflows, entity-relationships)

Rules on Functional Decomposition

- No function can be repeated.
- Function names must be verb phrases – connecting flows must be entities (data, things)
- Functions should have clear boundaries between them
  - This will be reinforced when you define the input-output entities.
- How many levels of decomposition are necessary?
  - No single answer – depends on the scope and intended audience of your design project
- How can one tell what's a "good" decomposition?
  - Clear subfunctions, easy connections between them, don't violate the above rules

Functional Decompositions

- Every function that is decomposed gets it's own diagram



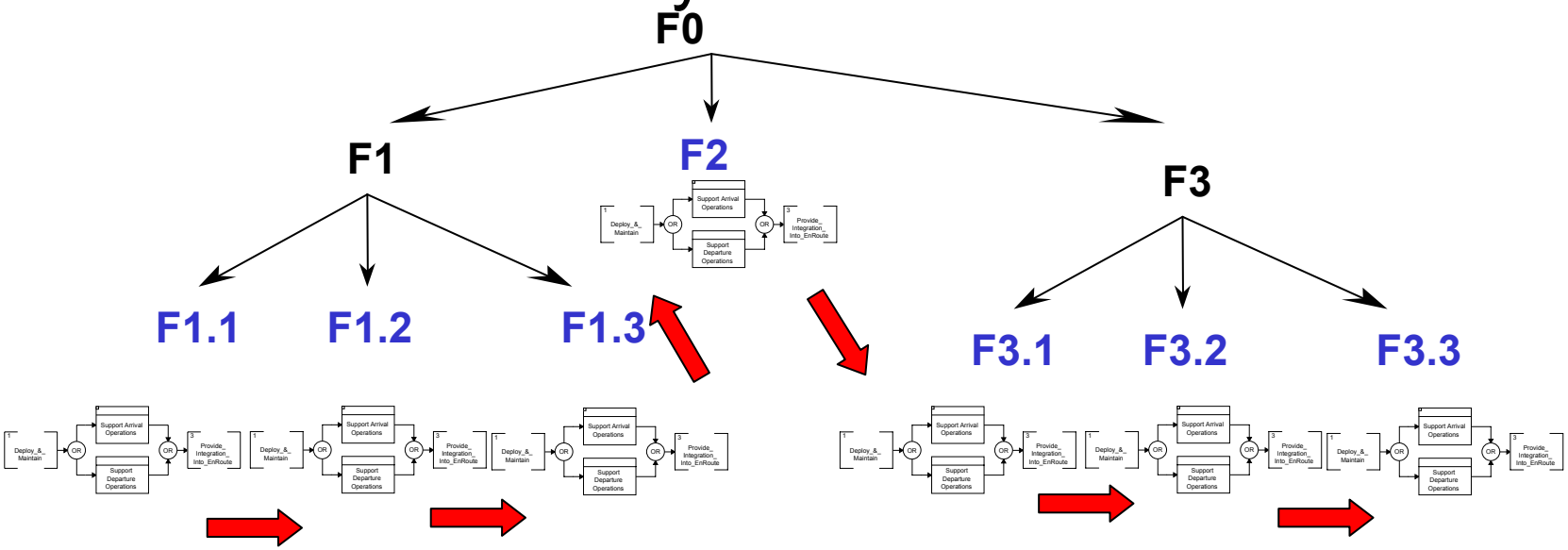
FFBDs

(Functional Flow Block Diagrams)

- FFBDs are one method of describing system behavior
- Behavior modeling is a key component of a complete system description
  - What the system does -> Functional View
  - What the system is made up of -> Entities & Mechanisms
  - How the system behaves -> Behavioral View
- Goal: Achieve an Understanding of the Diagram Syntax and Construction Techniques

FFBDs Form a Coherent Chain

- FFBDs are build for each leaf node in the functional hierarchy



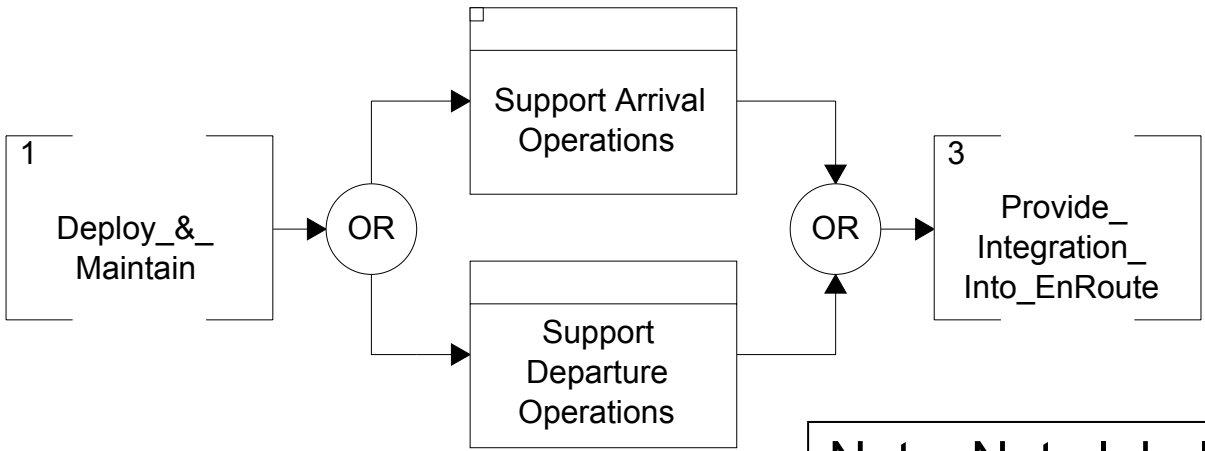
Leaf node: Nodes in the functional hierarchy which do not have any further decomposition.

FFBD Constructs

- Basic - Input and Output boxes at each end correspond to preceding and following activities
- Logic connecting nodes control the action
  - Functions need not be sequential

FFBD Diagram Constructs

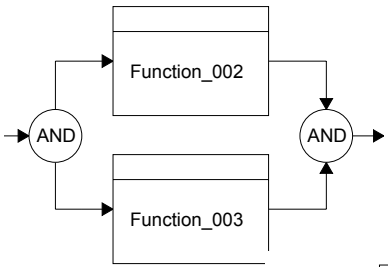
- Desired Behavior: In this case, we want each activity to be able to be performed concurrently and asynchronously of the other activity. Therefore, use a parallel structure.



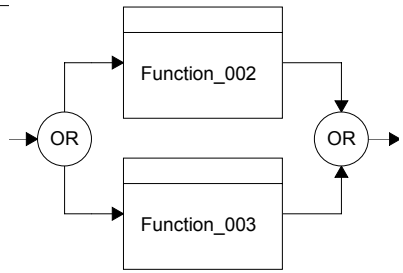
Note: Note labels on the input and output ref. boxes.

Other FFBD Diagram Constructs

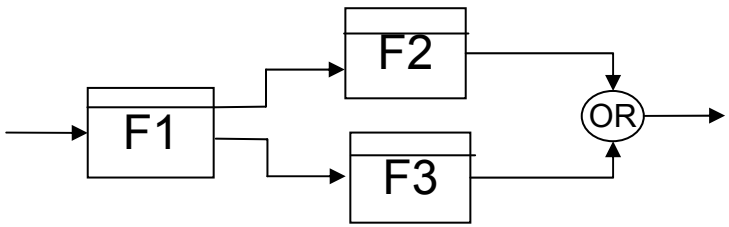
- Additional Constructs Available



Both functions can run concurrently, and both must finish before process continues

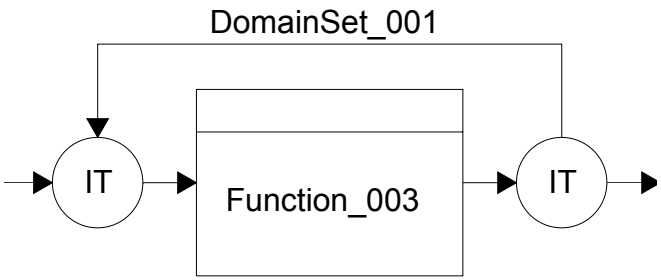


Both functions can run concurrently, but process can continue when either one finishes

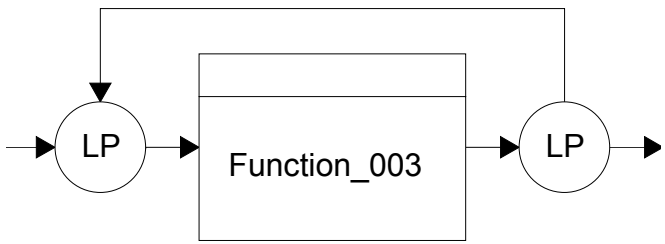


"If x then do F2, when y do F3". Need to define 2 or more Completion_Criteria for F1

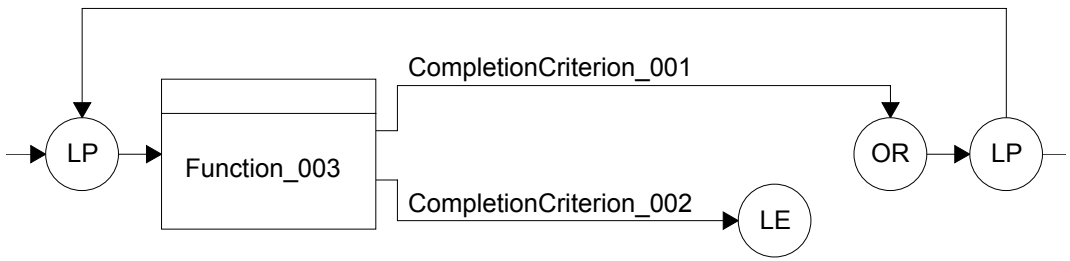
FFBD Diagram Constructs 2



Iterate: Function_003 performed for every element in some DomainSet_001.



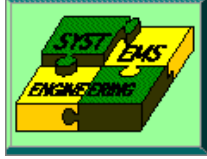
Loop: Function_003 performed until some condition is satisfied.



Loop with Exit: Function_003 performed until some condition is satisfied. Loop Exit (LE) leaves the diagram.

Implications of FFBDs

- Does not address people issues
  - FFBD are like plans: worthless if nobody executes them
- Provides ordering not a schedule
- Only as good as the thought that goes into it
  - Does not ensure “goodness”



Assignments

- Reading
  - Petroski, Chapter 4, “Zippers and Development”
- Homework
  - Work on Project 1