

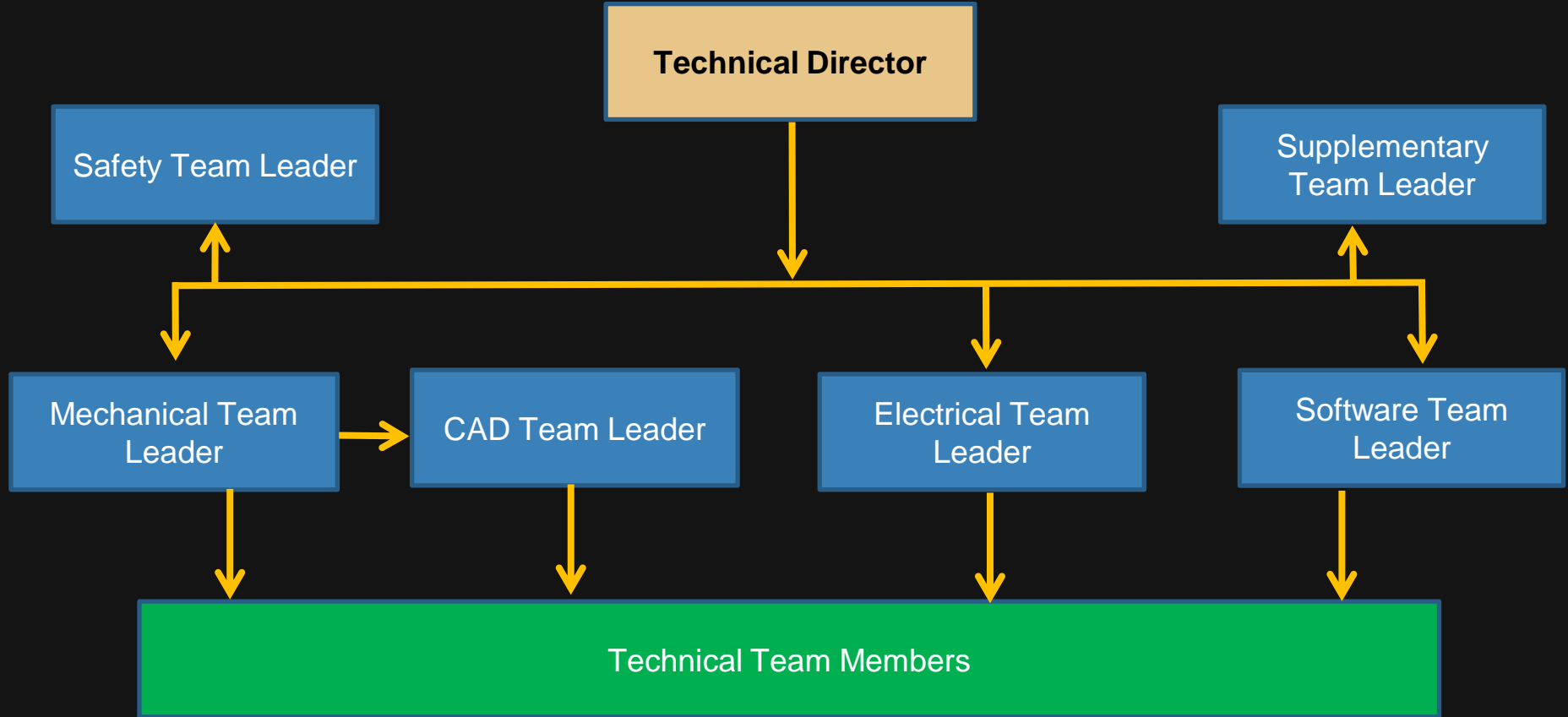
Part II: Robot Design Process Steps

Objectives

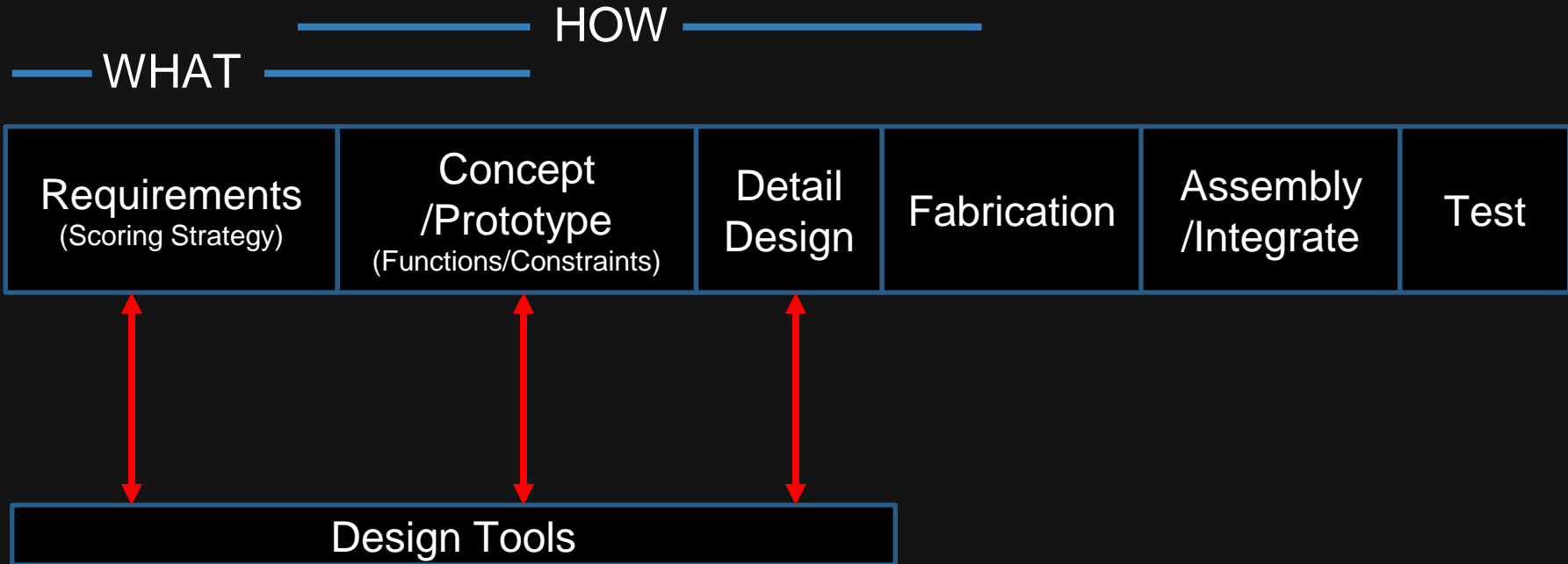
Understand:

1. Robot Design Process Steps
2. Preliminary Design:
 - Proof of Principle,
 - Prototyping
3. Detailed Design Process
 - Detailed Design Process Steps
 - Detailed design process tools

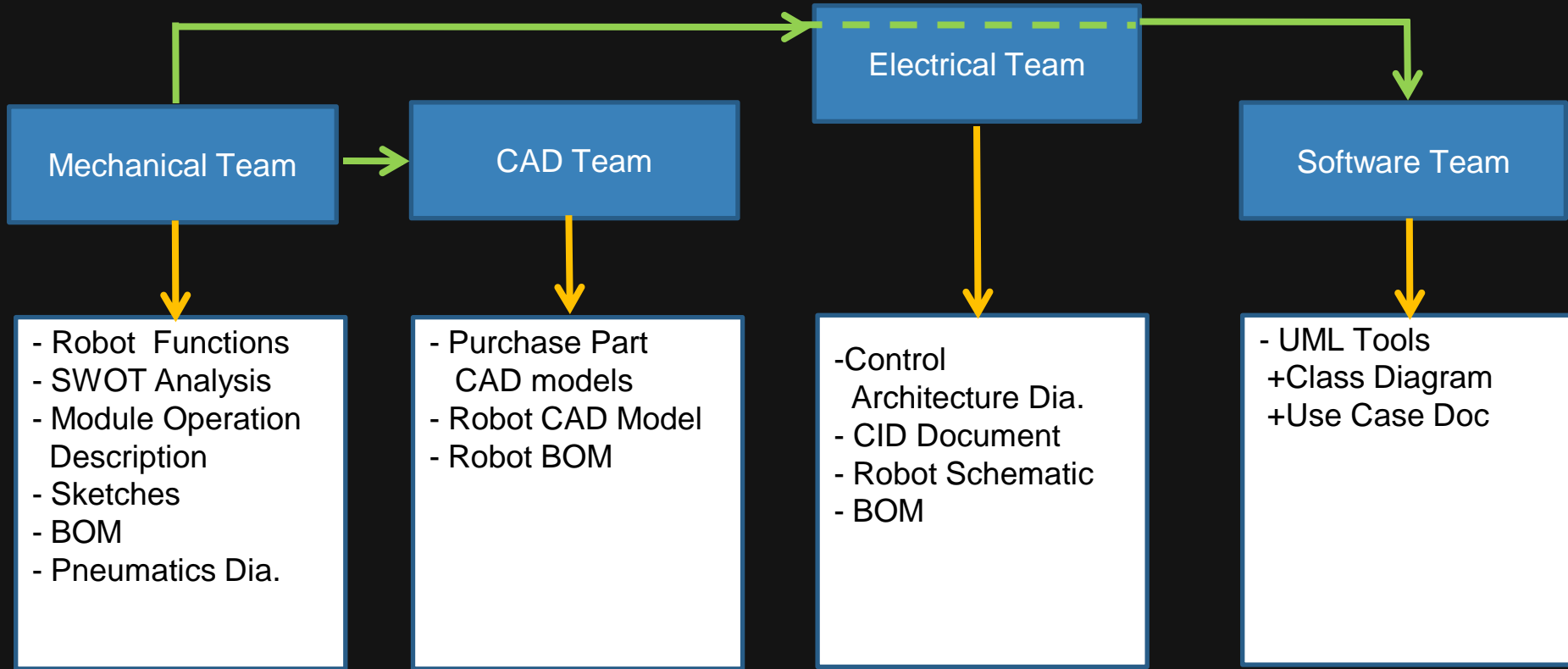
Technical Team Structure



Robot Design Process Steps



Technical Team Design Tools



Knowledge Challenge

1. What are the major tasks in a robot design?
2. What are the Design Tools for Mechanical Team?
3. What are the Design Tools for the Electrical Team?
4. What are the Design Tools for the Software Team?

Robot: Requirements - Strategy

1. Define scoring process – list every way you can score points
2. Define steps to perform a scoring strategy
3. Estimate required cycle time to achieve a scoring strategy, and points

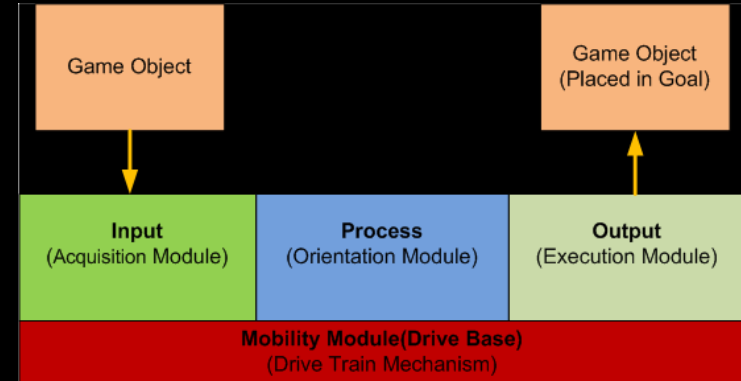
Knowledge Challenge

1. What are the three steps in developing a robot strategy?
2. What are the robot strategy deliverables?

Robot Design – Module Req- Concept

1. Group human actions to robot model modules:

- A. Input – Acquisition module
- B. Process – Orientation/Storage module
- C. Output – Execution Module
- D. Mobility – Drive base



2. Develop concept

- Mechanical – Mechanism concept sketches,
Module functional description
- Electrical – Control System block diagram,
Start CID(Computer Interface Doc)
- Software – Start logical description (Use Case Doc)

Knowledge Challenge

1. What are the four robot model modules?
2. What are the concept sub-team deliverables?

Robot Design – Prelim(proto) – Detail design

1. Prelim Design:

Part A

- A. Proof of Principle – concept test – need to build in a day
- B. Prototype – looks like final design

Part B

- C. Develop Mechanism sketches / BOM(Bill Of Materials)
- D. Develop Electrical control system block diagram / BOM / CID
- E. Develop software Use Case, Function Classes

2. Detailed Design

Mechanical – CAD mechanisms from sketches / BOM

Electrical – Control System schematic / BOM

Software – Start developing robot code

Knowledge Challenge

1. What is the difference between PoP and prototype?
2. What are the Prelim Design sub-team deliverables?
3. What are the Detail Design sub-team deliverables?
4. Why do we make sketches?

Robot Design – Fabrication / Build

1. Fabrication / Build

Mechanical – Fab from sketches / CAD

Electrical – Wire control system panels and test

Software – Continue developing robot code

Robot Design – Integration

1. Mechanical / Electrical Integration

Mechanical – Fix mechanical issues

Electrical – Wire motors / sensors,
Load CAN bus addresses

Software – Test download and I/O(Input/Output)

Knowledge Challenge

1. In Integration phase what do sub-teams do?

Robot Design – Robot Evaluation

1. Mechanical / Electrical Integration

Mechanical – Fix mechanical issues

Electrical – Fix electrical issues

Software – Test robot software

Drive Team - Drive the competition robot