

# **Structured Electronic Design**

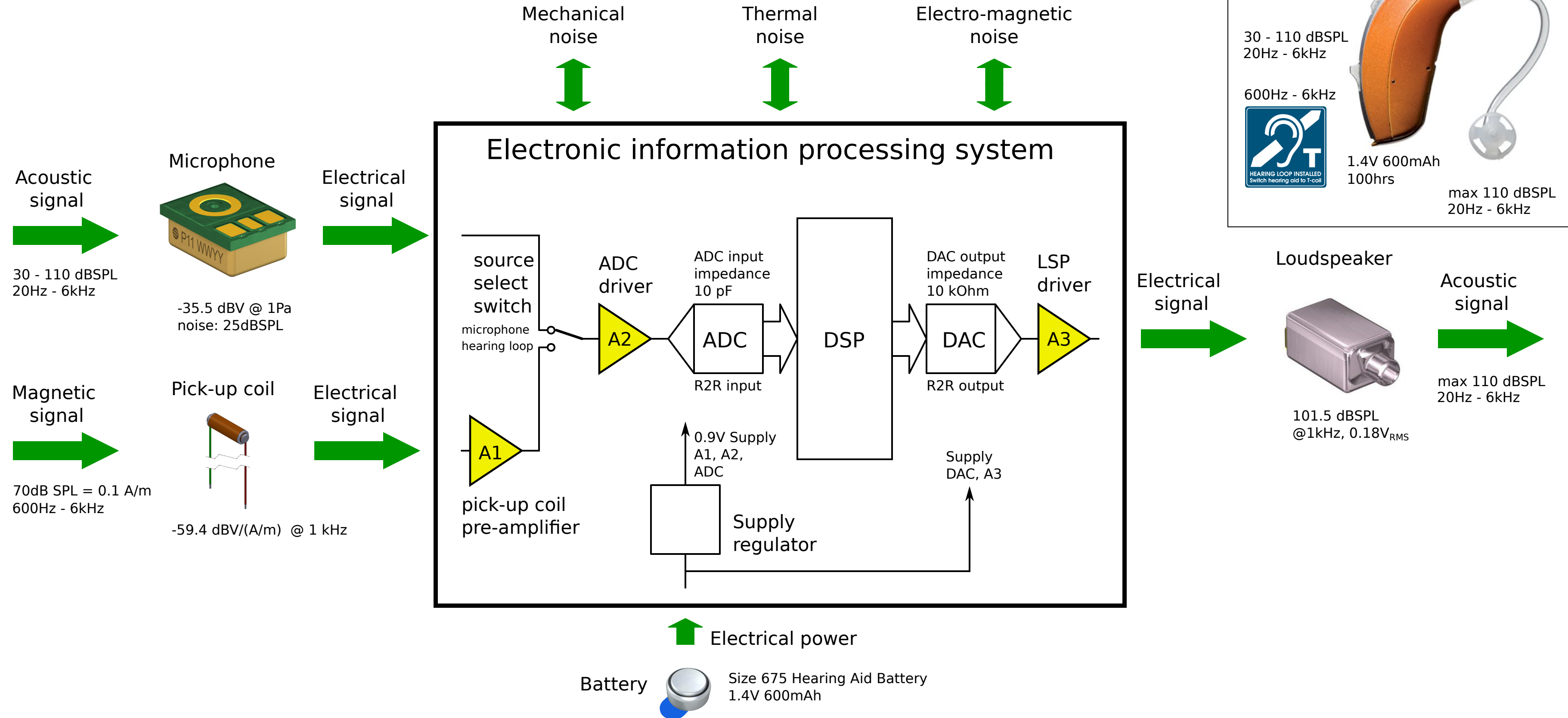
EE4109

Course Introduction 2025

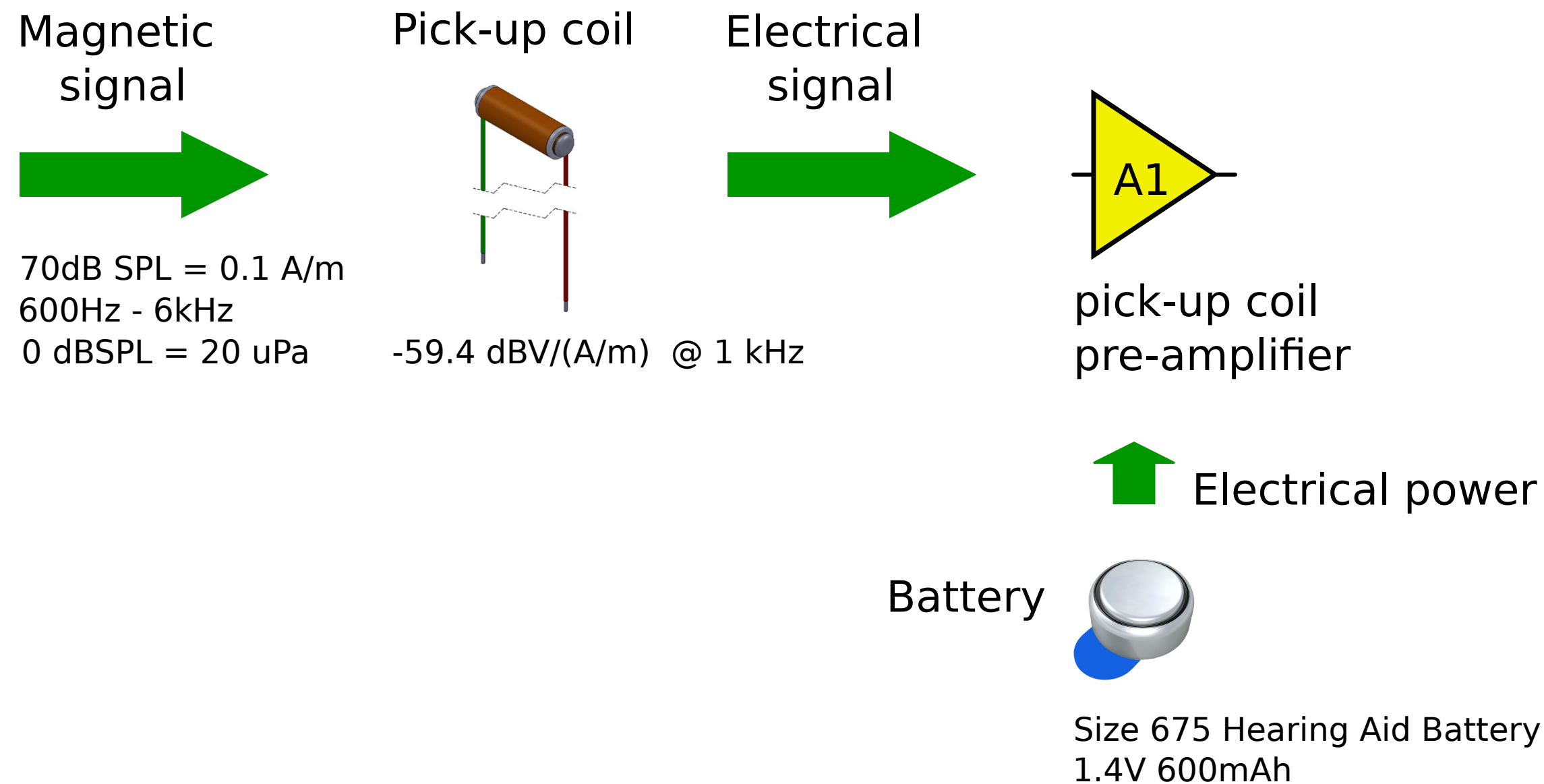
A systems engineering approach to circuit design

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# Hearing Aid



## Application: Hearing Aid pick-up coil preamplifier



# Systems engineering design approach



How do engineers design complex products?



They divide them into less complex parts that can be designed separately



How do engineers divide them into less complex parts?



They assign different functions to different parts

They assign performance and costs budgets to these parts

They define interfaces between these parts



How do engineers materialize functions?

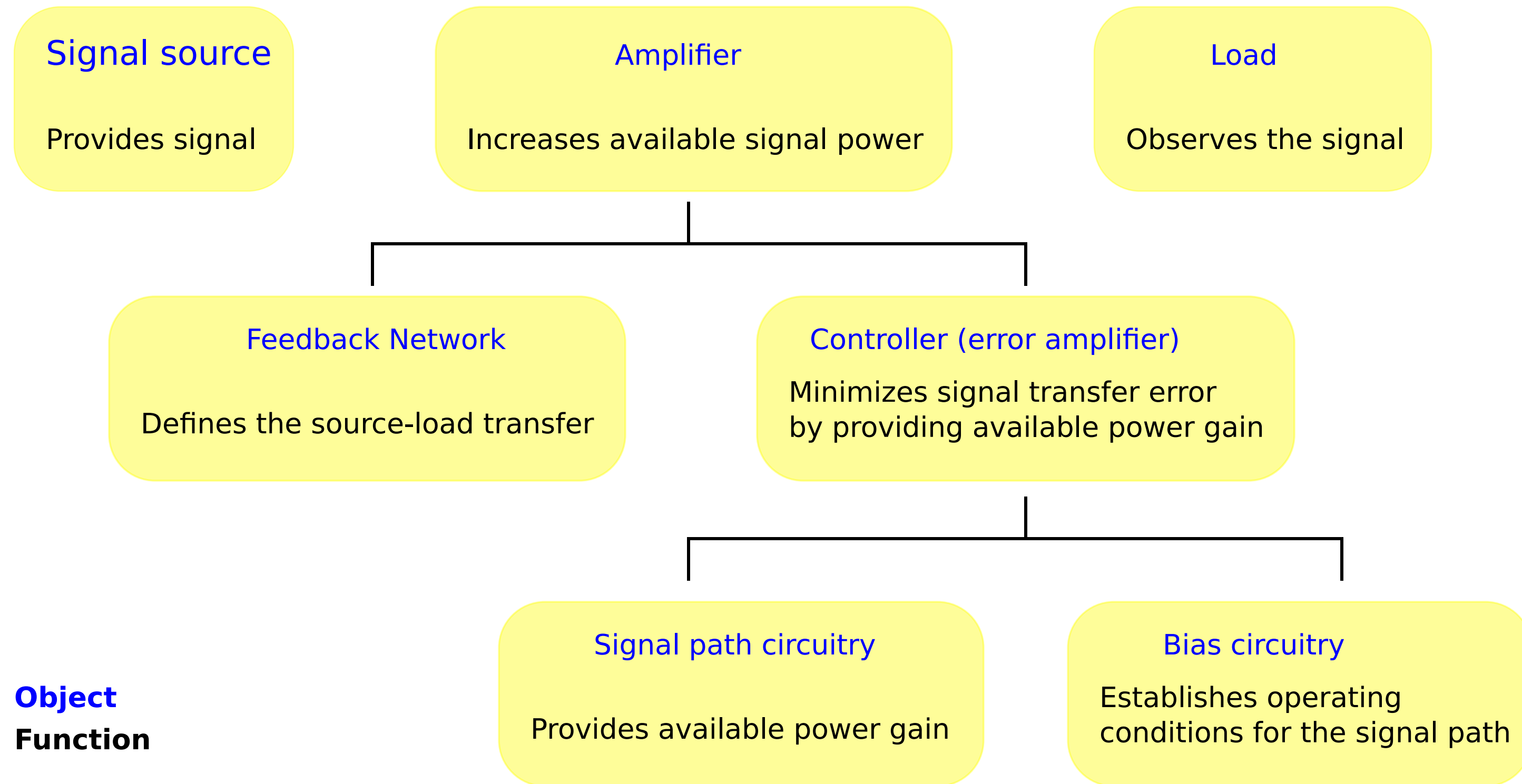


They apply known physical effects

They apply design techniques to improve their performance/cost ratio

This all is done in an hierarchically structured way

# Hierarchical breakdown of a feedback amplifier application



# Group exercise

| Signal source | Load | Feedback network | Error amplifier signal path | Error amplifier biasing | Performance or cost aspect            |
|---------------|------|------------------|-----------------------------|-------------------------|---------------------------------------|
|               |      |                  |                             |                         | Power dissipation                     |
|               |      |                  |                             |                         | Bandwidth                             |
|               |      |                  |                             |                         | Frequency response                    |
|               |      |                  |                             |                         | Weak nonlinearity                     |
|               |      |                  |                             |                         | Accuracy                              |
|               |      |                  |                             |                         | Noise                                 |
|               |      |                  |                             |                         | Drive capability                      |
|               |      |                  |                             |                         | Transfer, input / output impedance    |
|               |      |                  |                             |                         | Operating point temperature stability |
|               |      |                  |                             |                         | Chip area                             |

Complete this matrix:

- Put a marker in a field if the row performance aspect or cost factor is a key factor in the design of the column part; motivate your answer.
- For each marker formulate a design question and put it on a separate sticky note.
- Create a design sequence by ordering the sticky notes.