Massachusetts Institute of Technology

Architecture of Complex Systems
WEEK 4: MODELING WITH DSMs AND MODULARIZATION

Key Takeaways

This week's central theme was DSM, a tool that maps different entities within a complex system. DSM helps you understand the interactions among entities/subsystems/components and allows you to manage these interactions to align the product development with the goals and needs of the system.

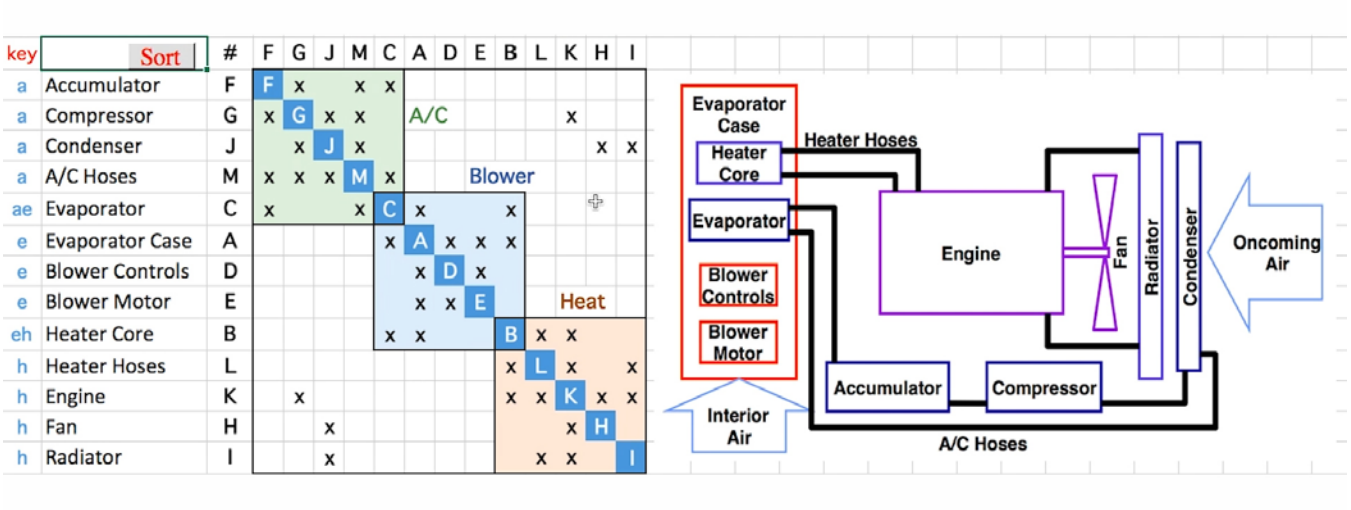
There are three types of DSMs:

- **Formal or Structural DSM:** Used to map the formal/physical interactions among the various components of the system.
- **Process/Task DSM:** Used to identify sequencing and grouping of system tasks or processes.
- **Organization DSM:** Used to map the interactions between people within an organization.

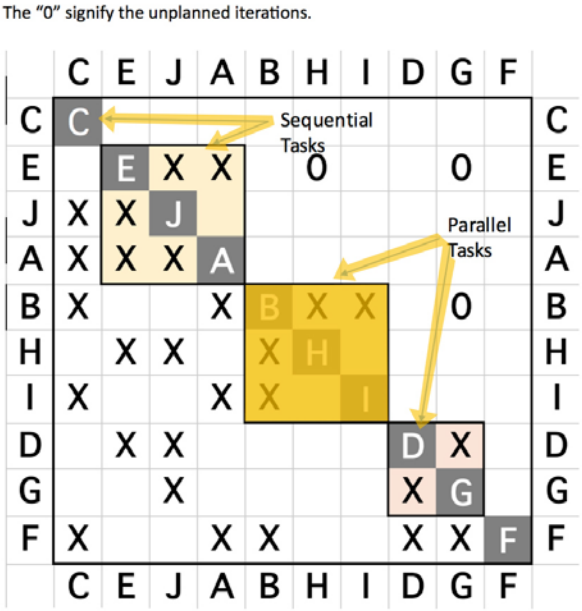
You also looked at how to cluster entities of a DSM together into groups. These groups allow you to better manage the emergence of the system. Additionally, you leaned the *two down, one up* approach that helps you generate better decomposition at Level One by looking at interactions between entities/components two levels down. You saw this approach applied to real world systems, such as the International Space Station and Saturn V.

In the last section, you looked at change request propagation, which is a fundamental attribute of any complex system and one that an architect must consider when designing the architecture of the system. Getting clarity on how change requests propagate through a system enables you to manage them more efficiently. For example, you can correlate the likelihood of change propagation to attributes such as connectedness of the components to other parts of the system. By having this visibility, you can predict how a change might affect the system and take measures to prevent the propagation of changes to other parts of the system.

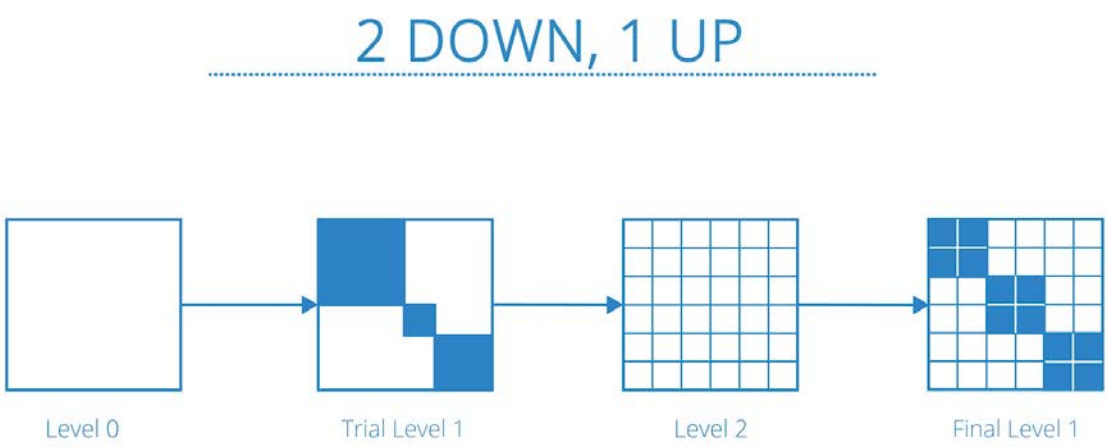
Design Structure Matrix Modeling>Example of System Architecture DSM>



Architecting Process Flow>How to Create a Process Architecture DSM>



Modularization, Two Down, One Up>Principle Demonstration Two Down, One Up>



Change Management>Change Propagation>