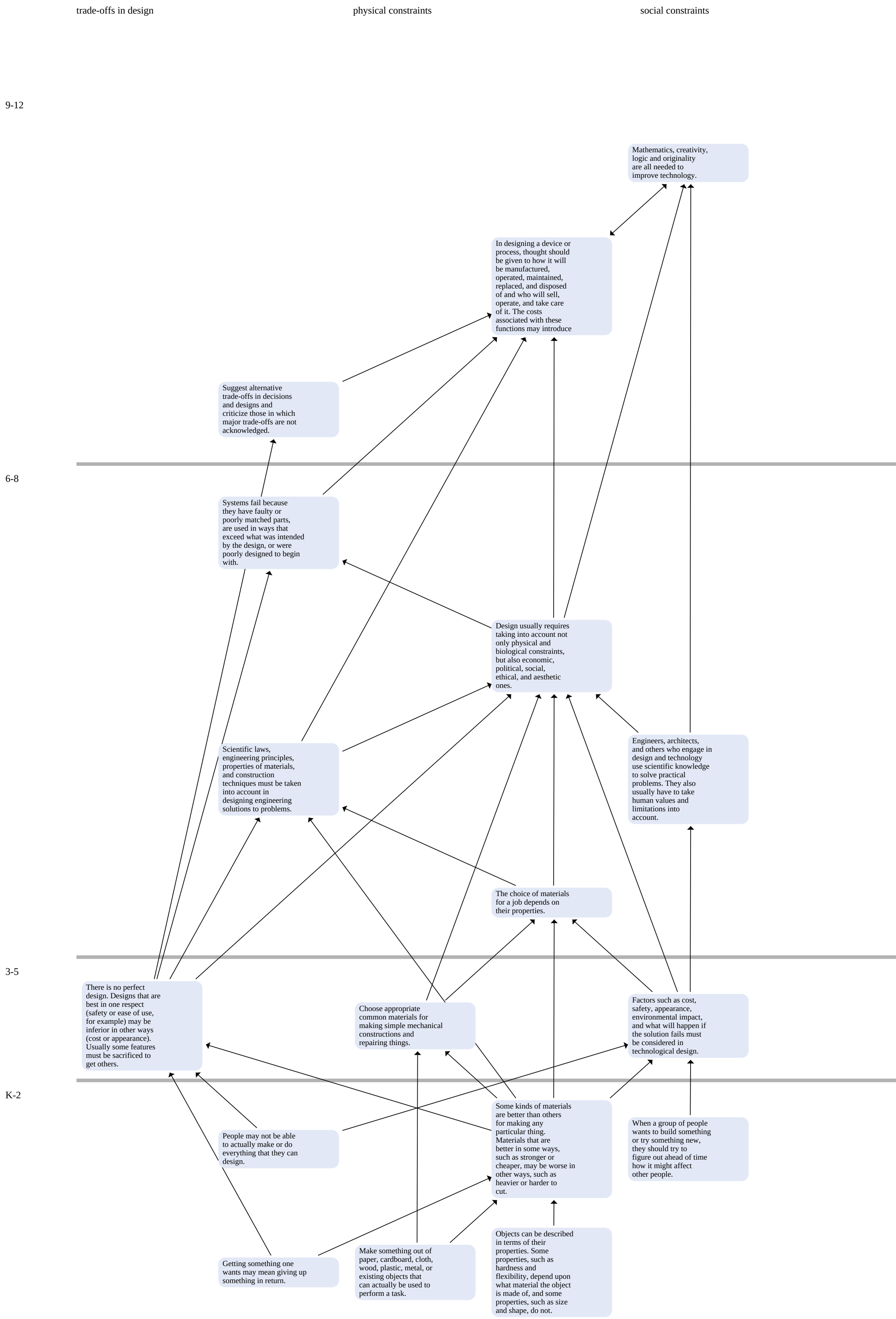
trade-offs in design
physical constraints
social constraints
9-12
Mathematics, creativity, logic and originality are all needed to improve technology.
In designing a device or process, thought should be given to how it will be manufactured, operated, maintained, replaced, and disposed of and who will sell, operate, and take care of it. The costs associated with these functions may introduce
Suggest alternative trade-offs in decisions and designs and criticize those in which major trade-offs are not acknowledged.
6-8
Systems fail because they have faulty or poorly matched parts, are used in ways that exceed what was intended by the design, or were poorly designed to begin with.
Design usually requires taking into account not only physical and biological constraints, but also economic, political, social, ethical, and aesthetic ones.
Scientific laws, engineering principles, properties of materials, and construction techniques must be taken into account in designing engineering solutions to problems.
Engineers, architects, and others who engage in design and technology use scientific knowledge to solve practical problems. They also usually have to take human values and limitations into account.
The choice of materials for a job depends on their properties.
3-5
There is no perfect design. Designs that are best in one respect (safety or ease of use, for example) may be inferior in other ways (cost or appearance). Usually some features must be sacrificed to get others.
Choose appropriate common materials for making simple mechanical constructions and repairing things.
Factors such as cost, safety, appearance, environmental impact, and what will happen if the solution fails must be considered in technological design.
K-2
People may not be able to actually make or do everything that they can design.
Some kinds of materials are better than others for making any particular thing. Materials that are better in some ways, such as stronger or cheaper, may be worse in other ways, such as heavier or harder to cut.
When a group of people wants to build something or try something new, they should try to figure out ahead of time how it might affect other people.
Getting something one wants may mean giving up something in return.
Make something out of paper, cardboard, cloth, wood, plastic, metal, or existing objects that can actually be used to perform a task.
Objects can be described in terms of their properties. Some properties, such as hardness and flexibility, depend upon what material the object is made of, and some properties, such as size and shape, do not.