

## Concept Space

Design task

Design a human powered Structural sub-system  
C0: vehicle

Dichotomy

Using Steel

not using  
Steel

Rough ideas

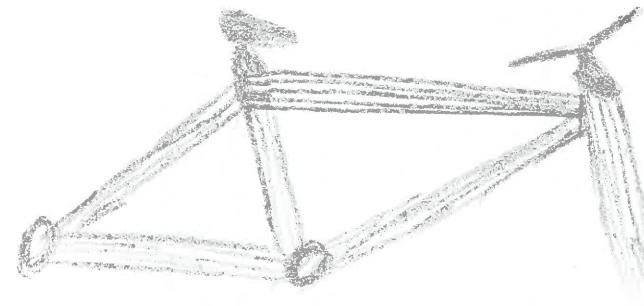
C2:  
Carbon fiber  
layered tubes

C2:  
Aluminum  
tube

C2:  
Titanium  
tubes

Sketch

C3:



## Knowledge Space

Traditional Knowledge

Existing Solution

tubes are  
made of  
simple steel,  
no real  
structure  
to the tube.

Single layered steel tubes  
are hard and heavy,  
making the bike harder  
to drive forward.

Biological system: onions

Biology Knowledge

Unexpected Property

Onions have  
layers that  
make them  
more sturdy.

Onions are not  
hard at all, but  
their layered structure  
enables them to  
have a more solid  
feel, and more durable.