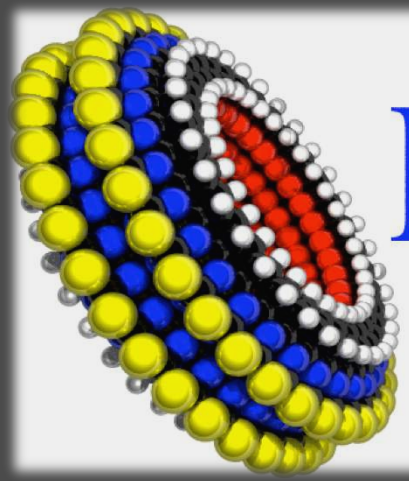
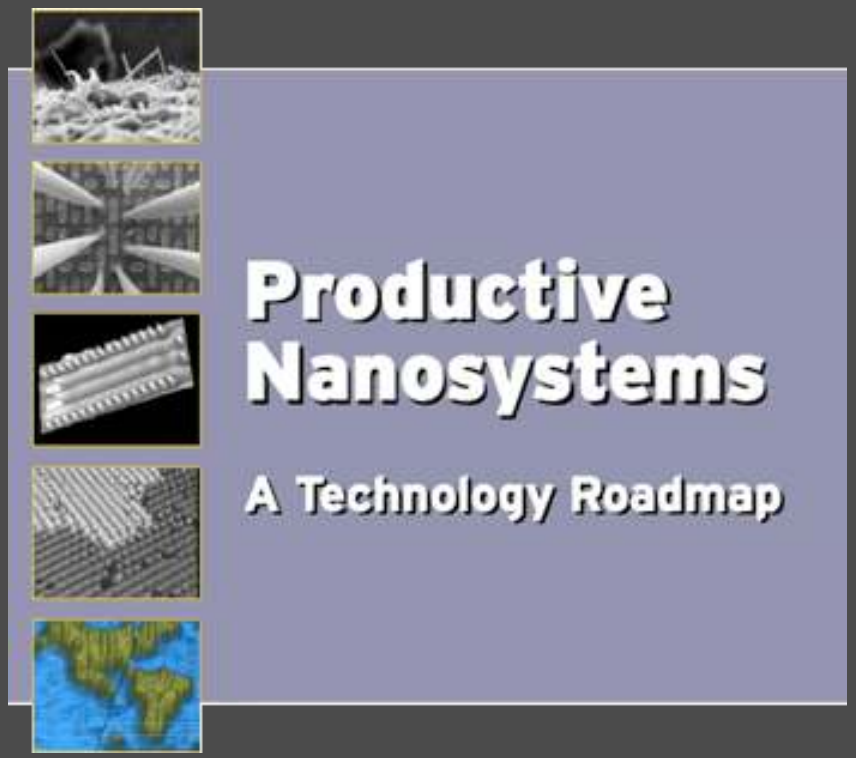
Roadmaps to Nanotech and AGI

J Storrs Hall



FORESIGHT
INSTITUTE

Productive Nanosystems and AGI Roadmaps



Create a new technology

- A **powerful** new technology
- One that could change the world as the Industrial Revolution did
  - Improve health, lifespan
  - Give average people access to things only elites had before
  - Increase range, capability, and options

How can we know it's possible?

- There's a model in nature of a system that does the kind of thing we want
- We think that if we understand it deeply enough we will be able to build a version that is
  - More efficient
  - Faster or more powerful
  - Leave out design flaws
  - Design for different ends

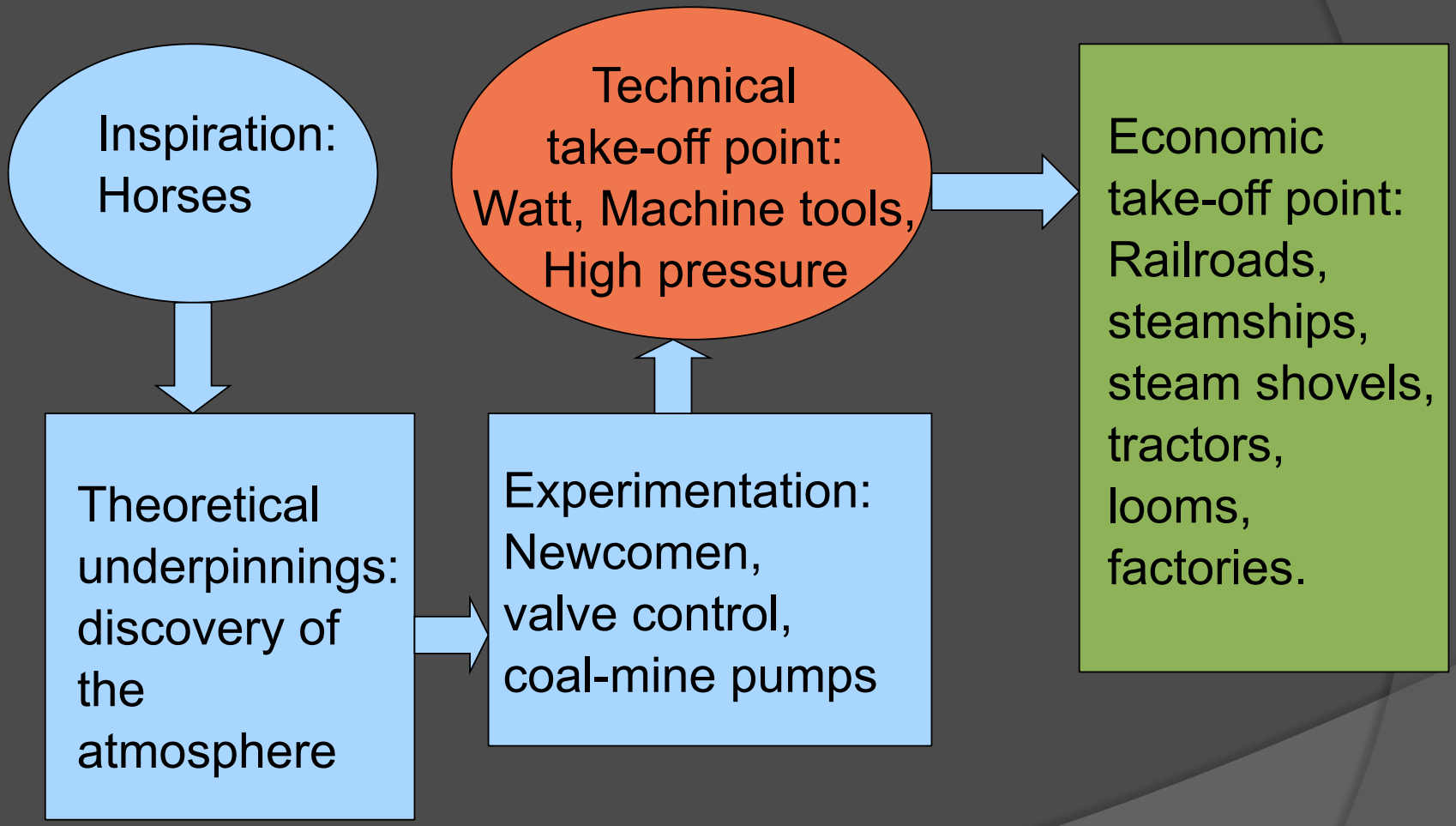
Example: airplanes

- We observe heavier-than-air birds
- Study them and understand:
  - The shape of the wing gives lift
  - Flapping gives propulsion
  - Wing-warping gives control
- We can separate these and use fixed wings, propellors, ailerons

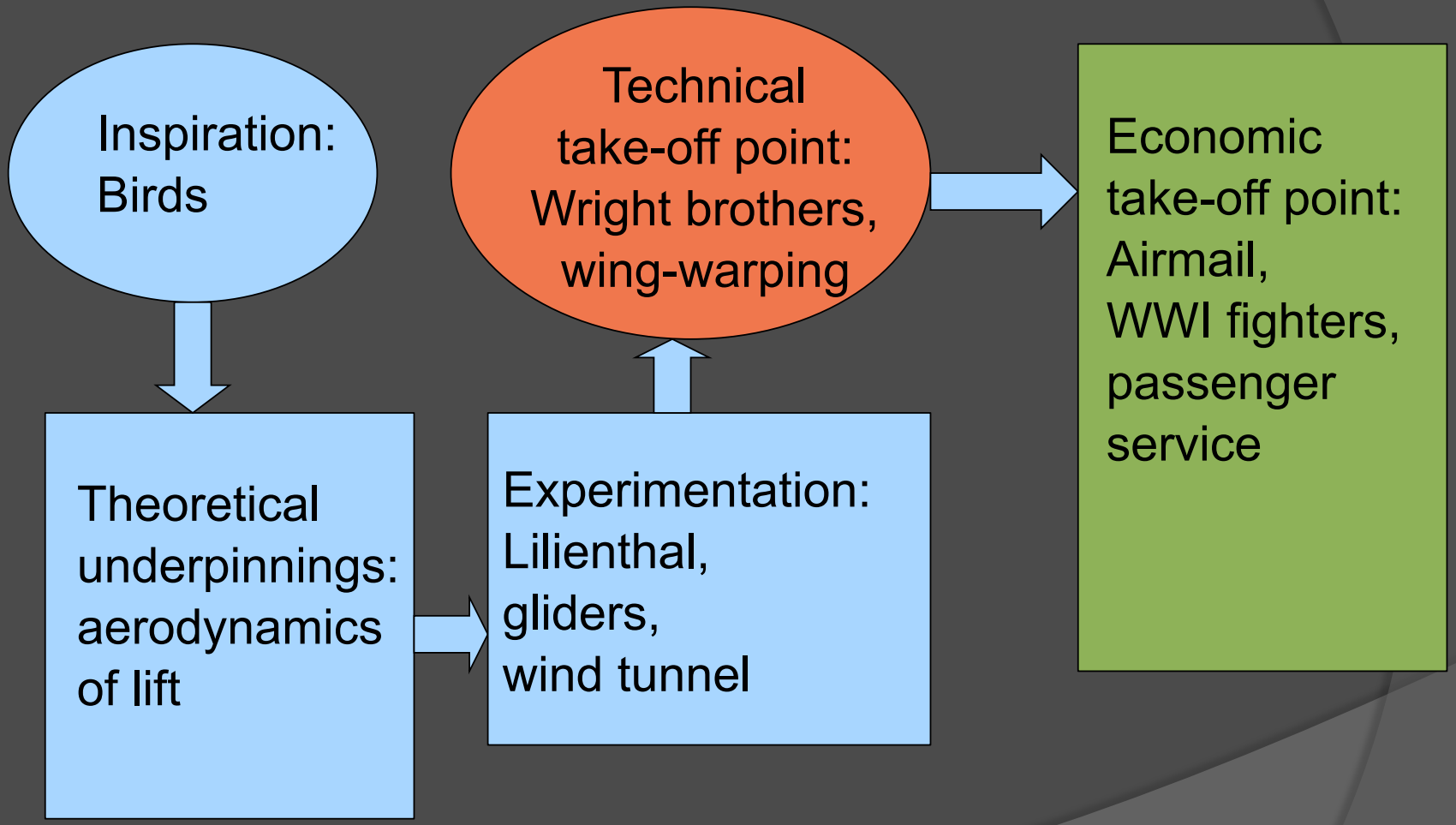
Similarly

- For nanotech, we have the molecular mechanisms in the cell that make life itself work.
- It uses positionally-controlled chemistry and diffusive transport.
- For AGI, we have brains.
- They use imitation and feedback in a massively parallel computation and communications network.

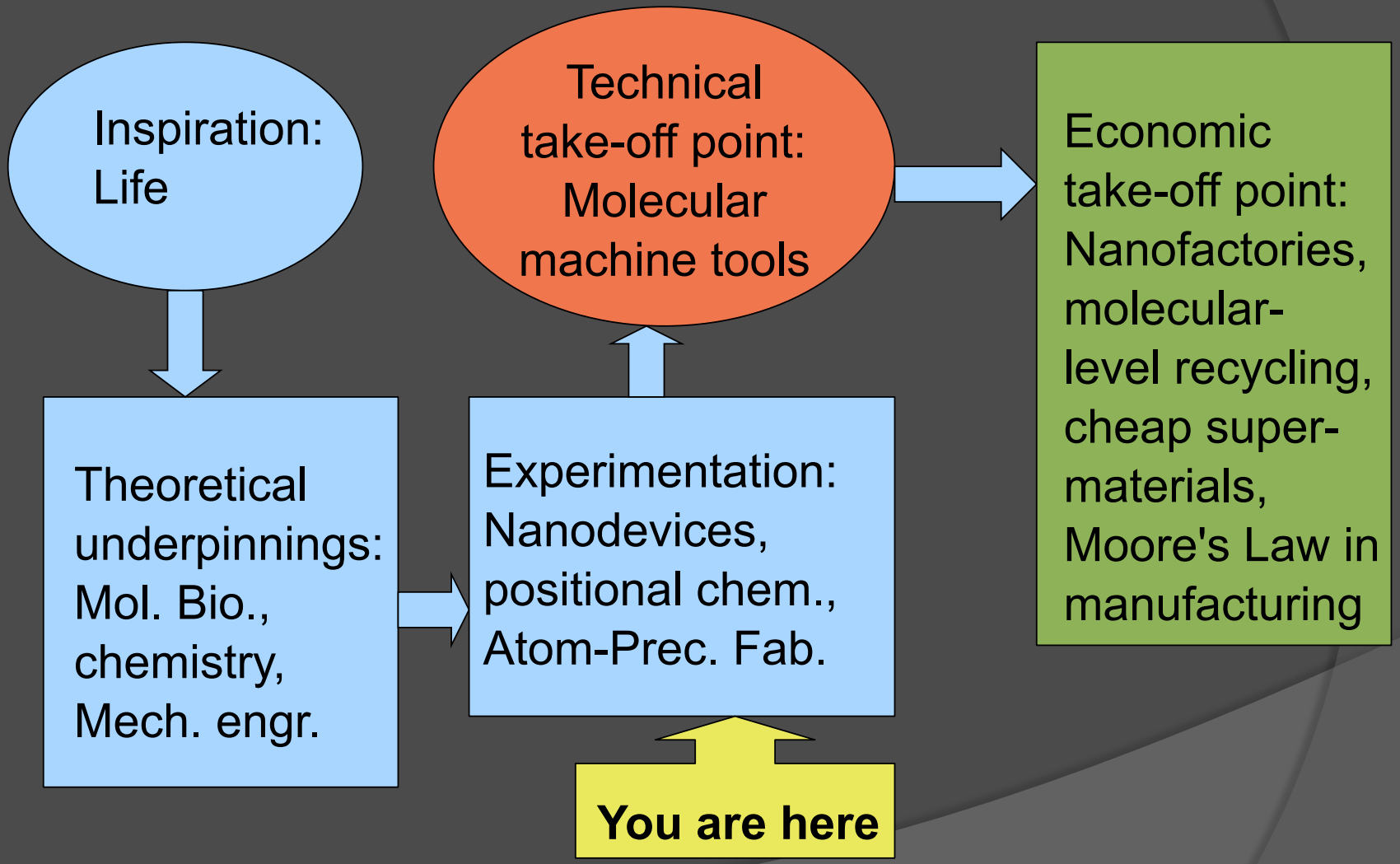
Phases: Industrial Revolution



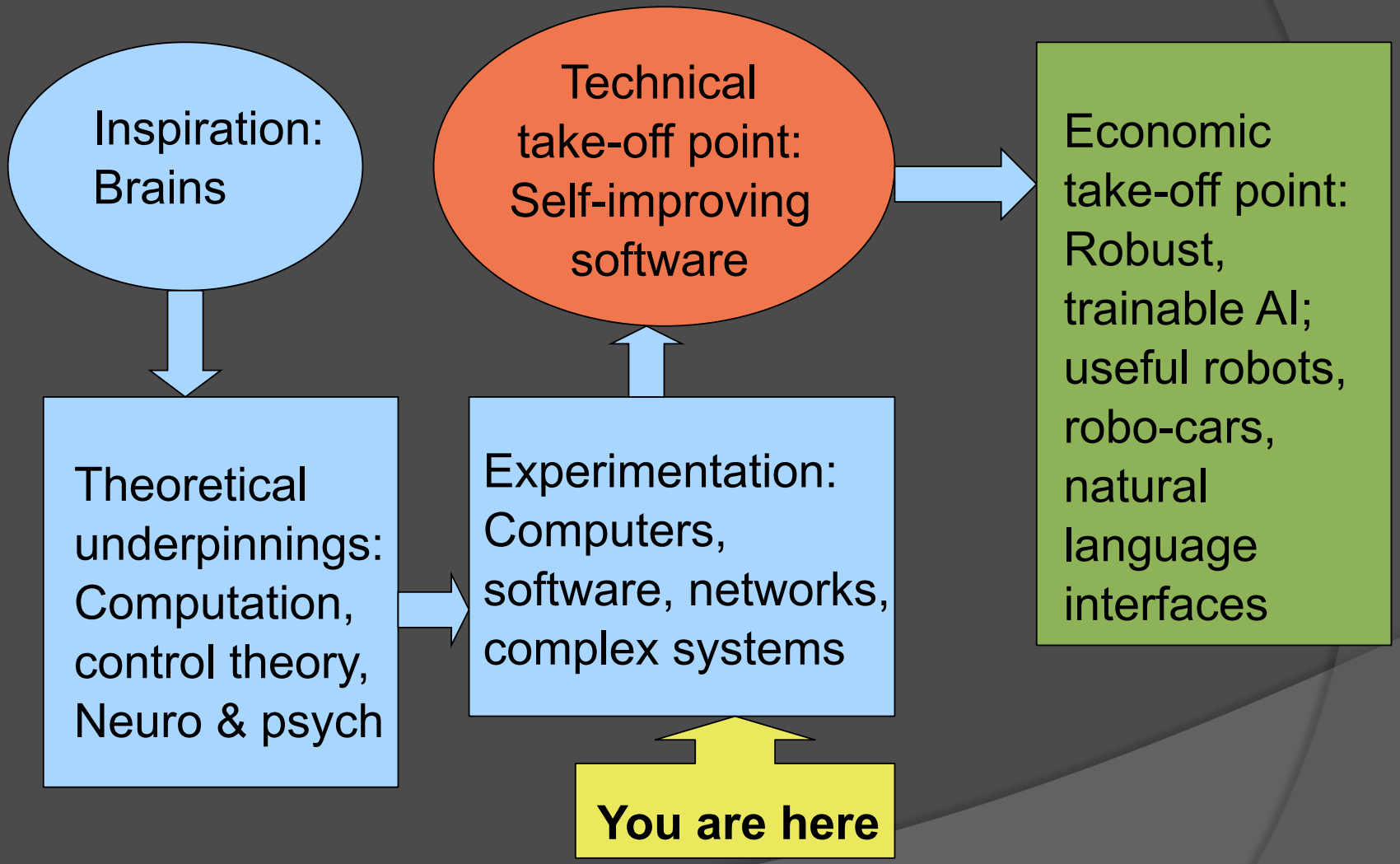
Phases: Air transportation



Phases: Nanotechnology



Phases: General AI



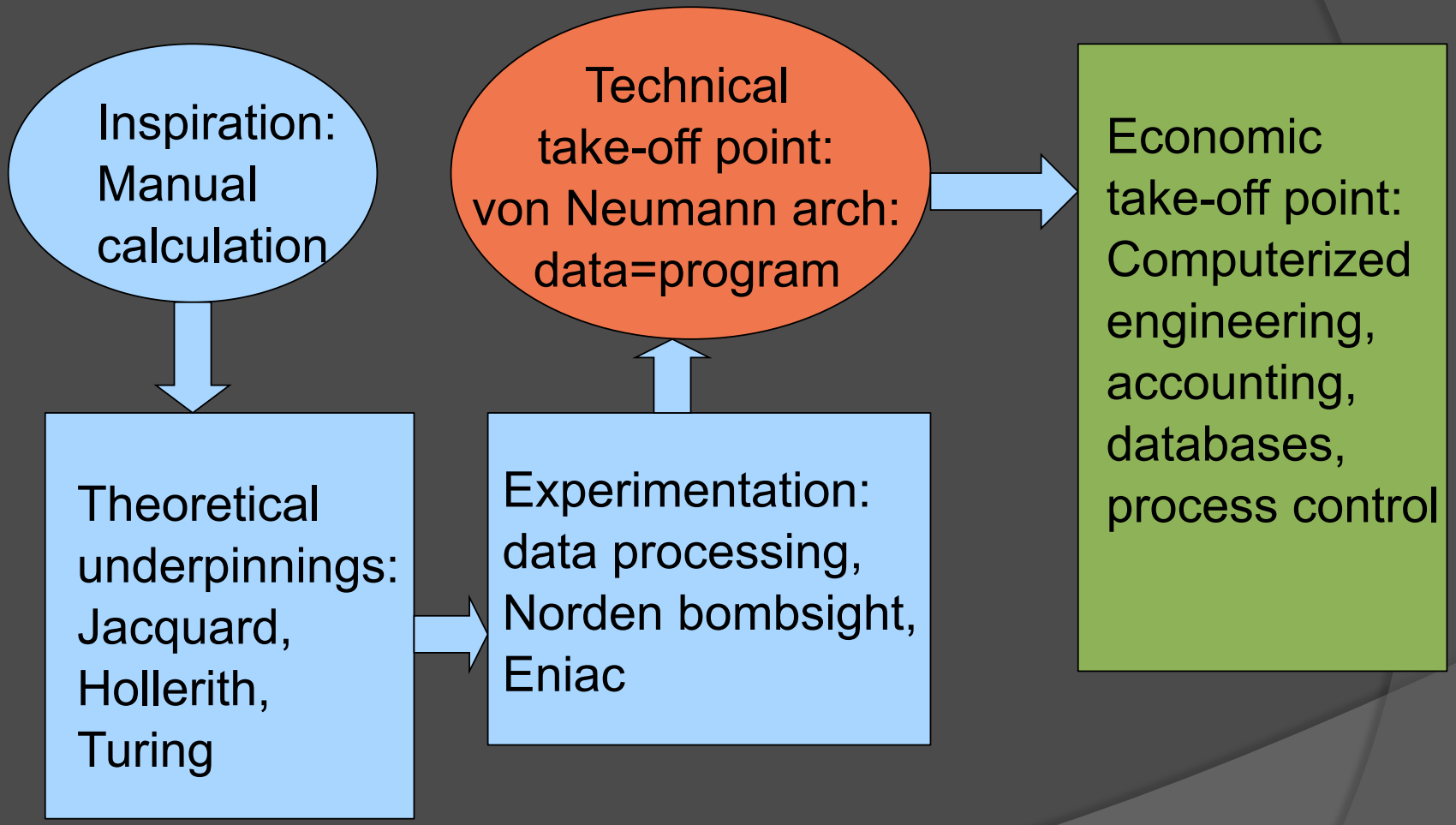
Technical takeoff

- Embodies the ***essential function*** of the proposed technology
- Is proof that the concept works
- Focuses technical effort
- Is a vehicle for practical experience
- Attracts financial (etc) resources
- Forms a crack in the dam

Getting to technical takeoff

- Precise pathway doesn't matter so much
- Many approaches should be tried
- Everything afterward will be done differently anyway
- The key is to understand instead the properties of the takeoff point
- For many technologies, autogeny is the key

Example: Computers



A nanotech topo map

Technology

shape

Moving parts

powered

productive

general

Nano

macro

micro

nano

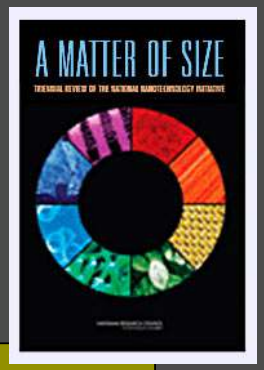
wagon

car

factory

Fab lab

hammer

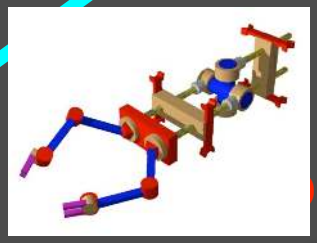


SFF

Current cap.

Feynman

MEMS



DNA Origami

nanotubes

catalysts

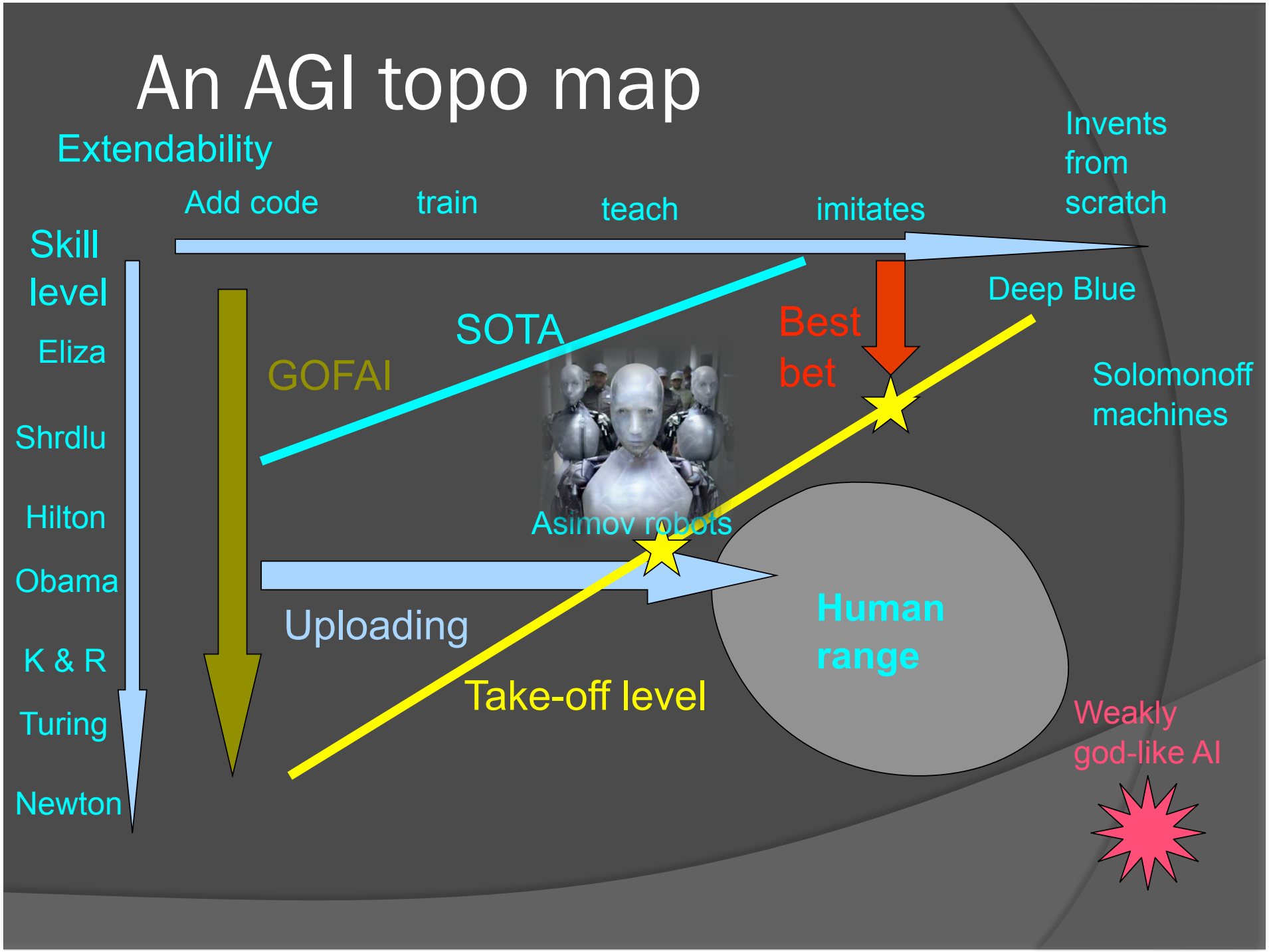
NNI

animals

rexler

plants

An AGI topo map



AI/nanotech synergies