

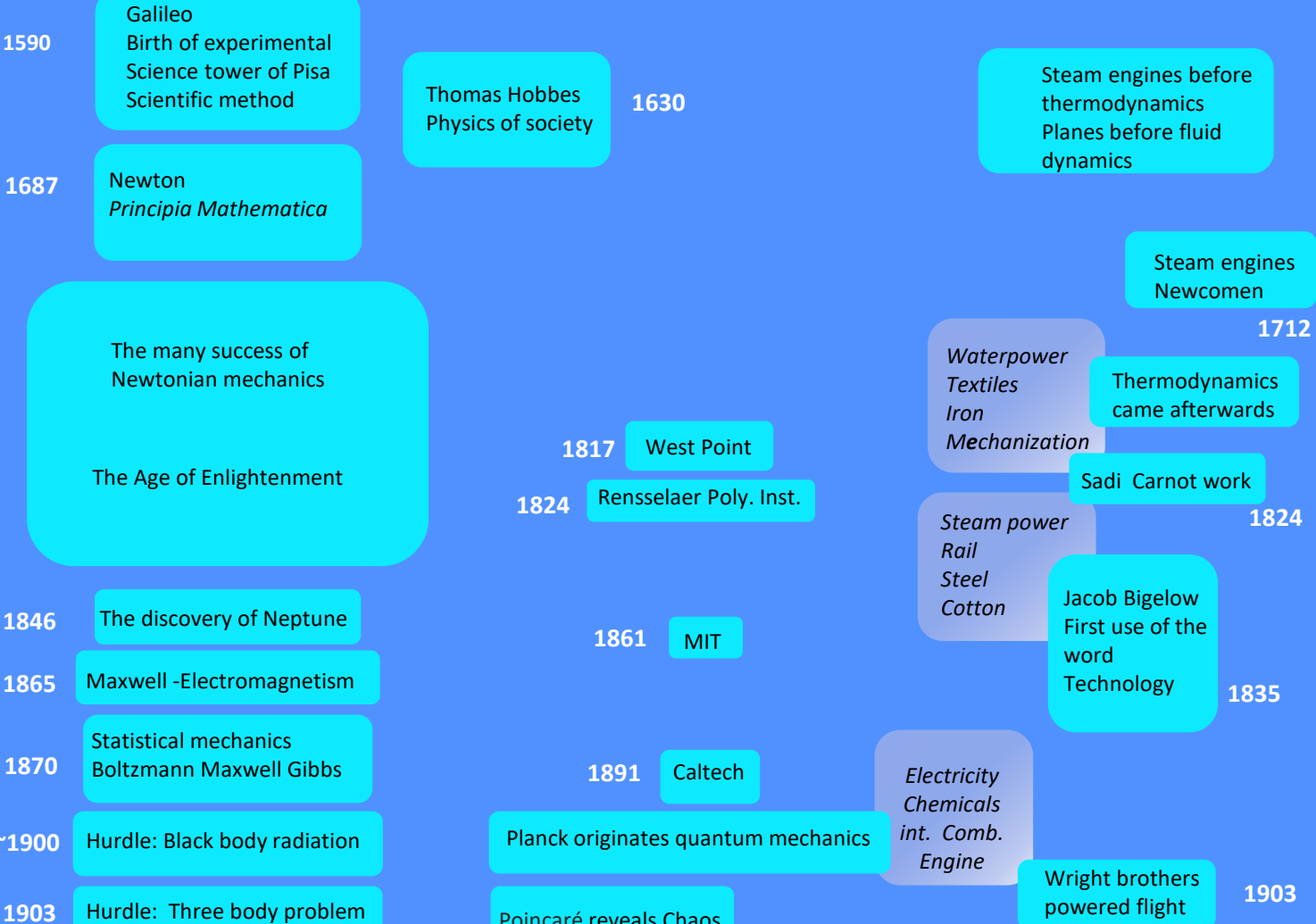
Science

Discover
Understand

Engineering

Technology

Invent
Operationalize



Challenge to reductionism; limits of bottom-up approaches

Algorithms
Reveal Solutions

Consider many particles/agents

1948 Shannon Math. Theory of Communication

1950 Turing Test

*Petrochemicals
Electronics
Aerospace*

1964 IBM 360

Go back to statistical mechanics

Self-organization
Complex Systems

Network science

Agent based models

*Digital Networks
Software
Biotechnology
New Media*

Fly planes virtually
Design materials on a computer

Up to here understanding drove prediction

Artificial Intelligence

*AI
Automation
Robotics
Clean Tech*

Prediction liberated from understanding

representational art

Art

everything going at once identifiable periods... abstraction cubism