Roadmaps to Nanotech and AGI

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Productive Nanosystems and AGI Roadmaps



Productive Nanosystems

A Technology Roadmap





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 positionallycontrolled chemistry and diffusive transport.

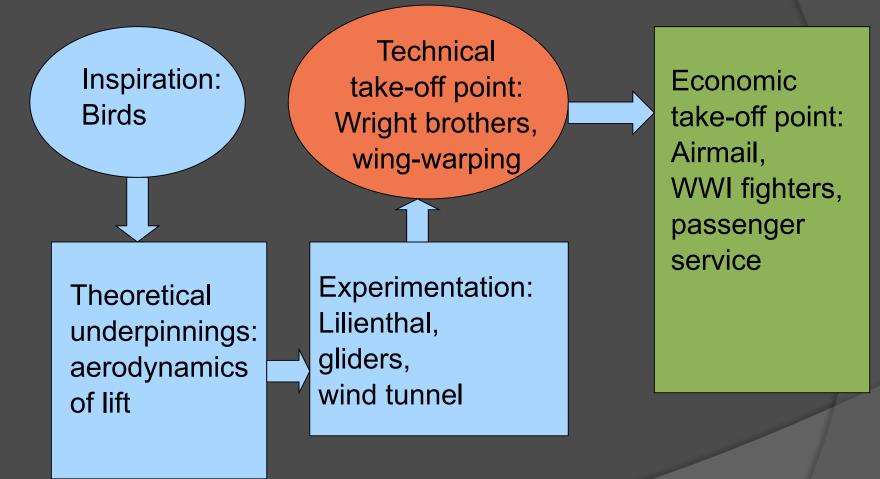
- For AGI, we have brains.
- They use imitation and feedback in a massively parallel computation and communications network.

Phases: Industrial Revolution

Inspiration: Horses Technical take-off point: Watt, Machine tools, High pressure

Theoretical underpinnings: discovery of the atmosphere Experimentation: Newcomen, valve control, coal-mine pumps Economic take-off point: Railroads, steamships, steam shovels, tractors, looms, factories.

Phases: Air transportation



Phases: Nanotechnology

Inspiration: Life

Theoretical underpinnings: Mol. Bio., chemistry, Mech. engr. take-off point: Molecular machine tools

Technical

Experimentation: Nanodevices, positional chem., Atom-Prec. Fab.

You are here

Economic take-off point: Nanofactories, molecularlevel recycling, cheap supermaterials, Moore's Law in manufacturing

Phases: General Al

Inspiration: Brains Technical take-off point: Self-improving software

Theoretical underpinnings: Computation, control theory, Neuro & psych Experimentation: Computers, software, networks, complex systems

You are here

Economic take-off point: Robust, trainable AI; useful robots, robo-cars, natural language interfaces

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

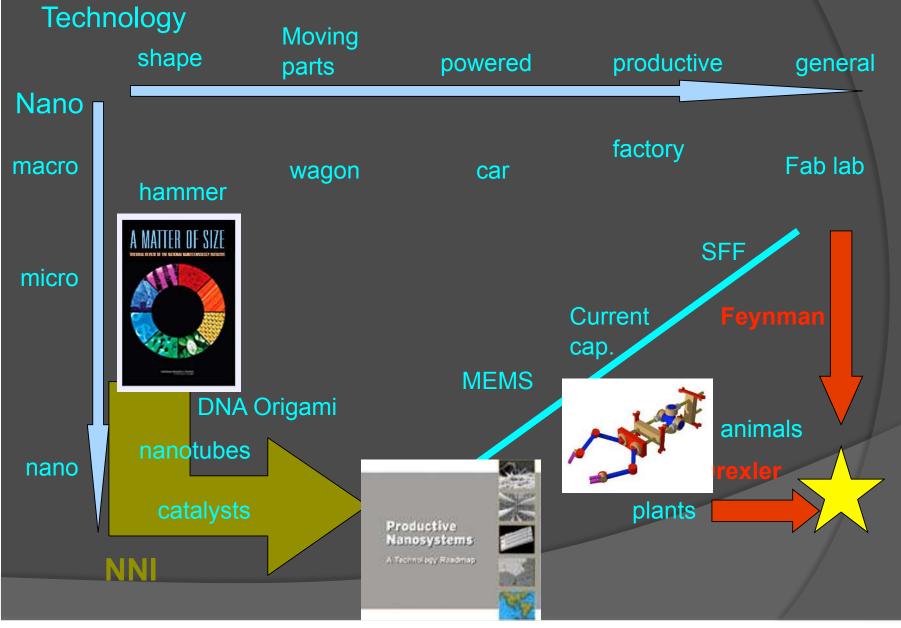
- Precise pathway doesn't matter so much
- Many approaches should be tried
- Everything afterward will be done differently anyway
- The key is to understand instead the properties of the takeoff point
- For many technologies, autogeny is the key

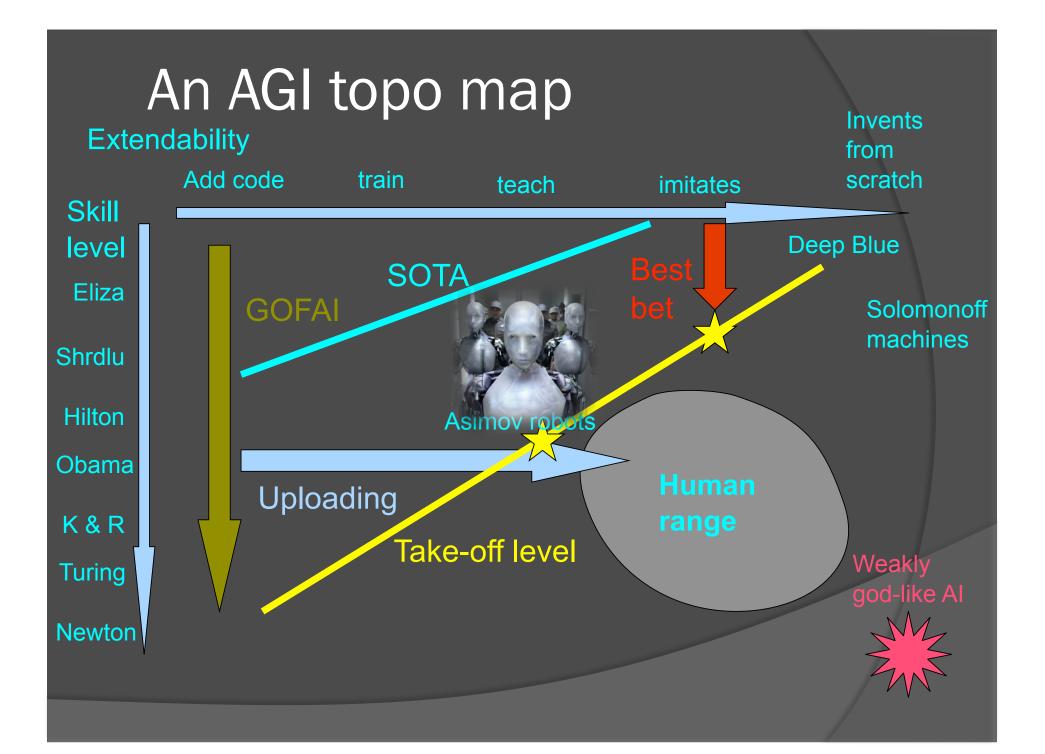
Example: Computers

Inspiration: Manual calculation Technical take-off point: von Neumann arch: data=program

Theoretical underpinnings: Jacquard, Hollerith, Turing Experimentation: data processing, Norden bombsight, Eniac Economic take-off point: Computerized engineering, accounting, databases, process control

A nanotech topo map





Al/nanotech synergies

