The Initiative & Astronomy: Opportunities and Dangers

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Opportunity: Detect Earth-like Planets Around Nearby Stars

- Missions currently under development will be able to detect Earth-like planets around nearby stars
  - Kepler (2007)
  - SIM (2009)
  - **Sometime in the next decade (2004-2014), NASA will likely detect an Earthlike planet**
- JWST will open new windows into the early universe and into molecular clouds: the birthplace of stars and planets

Opportunity: Characterize Earth-like Planets

- Rapid advance in technology, combined with the President's vision, has accelerated the development of the Terrestrial Planet Finders (TPF)
  - TPF-C: large optical telescope (2014)
    - Can directly detect scattered light from clouds or the planet surface
  - TPF-I: constellation of infrared telescopes (2019)
    - Able to detect thermal emission
  - With small additional investment, powerful tools for astronomy
- If there are nearby planets with oxygen, water vapor, clouds, oceans, or signs of life, the combination of TPF-C and TPF-I should detect it

TPF: Model for Exploration Initiative

- NASA selected 4 teams (Ball, Boeing, Lockheed, TRW) consisting of scientists and engineers from industry, academia and NASA centers.
- Teams develop novel ideas that suggests new designs (e.g., coronagraph) and new observational approaches (e.g., time variability of planet, and multi-wavelength analyses)
- NASA will be able to achieve its planet characterization goals at lower cost and more rapidly

Dangers

- Failure to invest in essential long-term technologies needed for TPF-I, Life Finder
- Loss of exciting science opportunities (and national leadership and public support) if NASA abandons approach of supporting highest rated science programs
  - Big bang, dark energy, black holes
  - Beyond Einstein
  - Explorer Program