1. Systematize the tests of gravity and spacetime physics on the scales of cosmology, maybe using a parametrized model for departures from GR. There is no compelling reason to doubt the extrapolation to cosmology, but good science demands tests.

2. Tighten the web of evidence for detection of Λ. The case is good but not yet compelling, considering the bizarre nature of this term.

3. Straighten out Pauli's problem with the quantum physics of the vacuum.

4. Find the place in cosmology for the baryon-antibaryon asymmetry.

5. Continue exploring Dirac's question: might the dimensionless parameters of physics be dynamical?

6. Substantiate the physics of the dark sector. Maybe dark matter is more complicated than a nearly collisionless gas, or dark energy a slowly varying function of position – as in the anthropic principle – or more interesting than a scalar field that talks only to gravity and itself

7. Fix the standard model for small-scale structure in the dark sector, as in the void phenomenon and the apparent lack of cusps in low surface density galaxies.

8. Test the models we must interpose between the physics of the dark sector and its expression, so we can discover whether known anomalies in the theory and observation of structure formation are only apparent, or real anomalies are hidden by parameter adjustments.

9. Explore the story of the very early universe: are we really limited to inflation- or brane-inspired scenarios?

10. Rationalize the Cosmic Coincidences.

Curious Cosmic Coincidences

1. Time scales: in the standard cosmology we fluorish (in order of magnitude)

   a. at the transition from matter-dominated expansion;

   b. when the Hubble length is the classical electron radius times the ratio of the electric to gravitational forces between an electron and proton (Dirac);

   c. as the Milky Way is running out of gas for the formation of new planetary systems, and the global star formation rate has begun rapidly decreasing;

   d. as galaxies have become useful tracers of mass.

2. Relative distributions of mass and light:

   a. the low order galaxy n-point correlation functions seem to be better approximations to simple power laws than are the mass correlation functions;

   b. the mass density runs in galaxies show at most modest response to the transition from the baryon-dominated central parts to the dark matter-dominated outer parts.

It is reasonable to expect that some of these curiosities are just accidents, and some will be seen not to be curious at all when we really understand the theory and its relation to the observations; but it is sensible to be aware that some might be clues to improvements in the physics.