• The UDF has been a remarkably successful campaign!
• What are we learning about the early Universe, and why is it significant?
• Where do the present teams agree and disagree … and why?
• Where do we go next with Hubble, and what does this mean for the exploitation of future facilities?

Richard Ellis: “Cosmic Dawn” Summary
The UDF is a big hit!!

- The deepest image is inspirational, galvanizing public interest as well as that of astronomers.
- The first scientific results have emerged remarkably quickly.
- HUDF illustrates the unique role of deep Hubble data and the merits of publicly available data sets pioneered at STScI.

Richard Ellis: “Cosmic Dawn” Summary
What we have learned and why it is so significant

Hubble’s optical and near-infrared cameras have determined the abundance of early young galaxies, seen when the Universe was only 600–900 million years old — 95% of the way back to creation —

This is an observational first!

Richard Ellis: “Cosmic Dawn” Summary
What we have learned and why it is so significant

- Has Hubble found the very first sources switching on after the "dark ages," when there was only pure hydrogen and helium?

- Are these sources sufficient to be responsible for "lifting the curtain" and ending the dark ages?

*Richard Ellis: "Cosmic Dawn" Summary*
While the data sets agree, the devil is in the interpretation!

- The UDF is a small field; clustering affects counting in such small areas (Rhoads and Malhotra) — continued surveying is essential.
- The limits to which the sources can reliably be detected will be addressed by further data (Windhorst and Bunker).

Richard Ellis: “Cosmic Dawn” Summary
• The question of more distant (and earlier) sources is of crucial importance (Illingworth and Bunker).

• Firm answers to the big questions may require detailed knowledge about the physical conditions of individual sources — how hot? — What composition? (Stiavelli et al.)

The most effective way to resolve many of the present issues is to explore further back in time … Are there yet earlier sources?

Richard Ellis: “Cosmic Dawn” Summary
Hubble’s Next Step

Hubble has demonstrated its capability of taking improved measures of this population and has potential for finding earlier examples.

Reliable census of sources **beyond current limits** will be possible with newly completed infrared WideField Camera 3 (WFC3).

*Richard Ellis: “Cosmic Dawn” Summary*
The James Webb Space Telescope will undertake physical studies of such early sources. Further Hubble data will enable us to plan how to use this future facility.

Richard Ellis: “Cosmic Dawn” Summary
Looking Back to Cosmic Dawn

Richard Ellis: "Cosmic Dawn" Summary