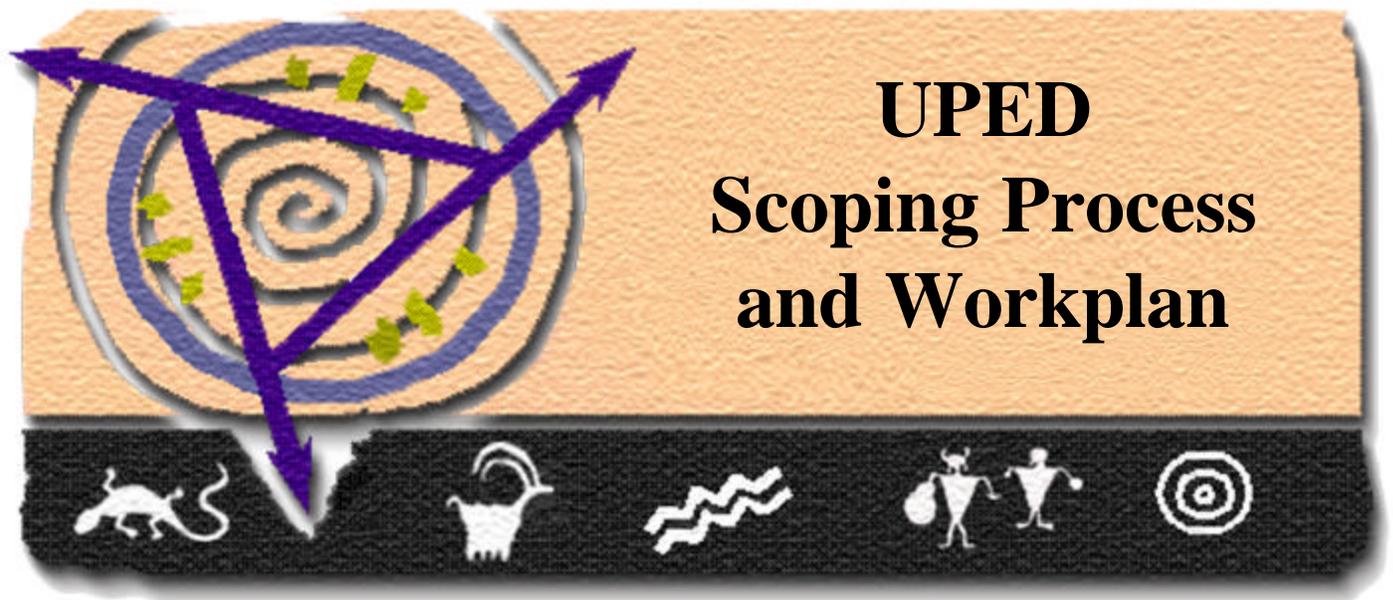


State of Utah Economic and Demographic Projections



Demographic and Economic Analysis
Governor's Office of Planning and Budget
April 2001

State of Utah Economic and Demographic Projections:

UPED Scoping Process and Work Plan

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I. What is UPED¹?

The UPED model is a synthesis of a three-component cohort survival model and an economic base employment model. It produces projections of population by age, sex, and employment by industry for each of Utah's seven multi-county districts. The major assumption in the model is the standard economic base assumption that the export demand for regionally produced goods and services is the driving force behind regional growth or decline. The demand for labor by each of the industry sectors is composed of two elements, basic and residentiary demands for labor. Basic demand is derived from the demand for exports, either directly by those firms that export, or indirectly by those firms that supply exporting firms. The residentiary, or population dependent, demand for labor is derived from those firms that produce goods and services for regional consumption. In the model this demand is sensitive to variations in the size and composition of the population, as well as parametrically sensitive to projected changes in consumption patterns and a host of conditions that affect the demand for imports.

The supply of labor is computed by applying age and sex specific labor force participation rates to the adjusted natural increase population, using one of two hypotheses. The first is that these rates vary with unemployment rates, while the second is that labor force participation rates are directly related to relative job opportunities, or the relationship between the demand for labor and the working age population. The adjusted natural increase population is derived by aging and surviving the initial population and by adding births after the appropriate adjustments have been made for exogenous migration; conceptually exogenous migration includes all who migrate for reasons other than employment.

Comparing the supply of people with the demand for labor yields projections of excess supplies or demands. Multiplying the age and sex specific migration propensities by the population at risk produces projections of net in- or out-migration and adjusting until the specified no migration unemployment rate is reached.

The procedure is followed for each of the state's multi-county districts (MCD's), and the results are summed to give projections of state population and employment.

¹ Source for Section II: Reeve, Ross, and Rodger Weaver for the State Planning Coordinator. "Report on the Development and Implementation of the Utah Process Land Use and Tax Base Model (UPLAND)." Office of Governor Calvin L. Rampton. September, 1974.

II. Why is UPED Important?

Utah is one of the few states in the entire nation where all of the state agencies and local governments coordinate to use the same source of information for planning purposes. The data that they use is generated from the UPED model system. This consistency allows private and public sector entities to coordinate their forecasting efforts, a task that is nearly impossible when trying to interpret dissimilar data sets, resulting from different starting points and inconsistent methodologies.

UPED is a valued state asset, and must be treated in a manner where its value can appreciate and be appreciated. A state asset that endures career life cycles must become diffused throughout the entire state system, becoming a resource for multi-county districts, local communities, and possibly other governmental or non-governmental entities. The data that the UPED model system produces are already valuable resources, but GOPB would eventually like to see the system itself serve as a valuable resource to the entities around the state, where they themselves are using and maintaining an institutionalized UPED model system.

III. Accuracy

Another important factor underlining the importance of UPED is the accuracy of its projections. The following charts demonstrate the historical accuracy of UPED's projections, indicating how UPED has been successful in assisting planners and policy makers by accurately projecting population trends.

Figure 1: Actual School Enrollments vs. Historical Baseline Projections

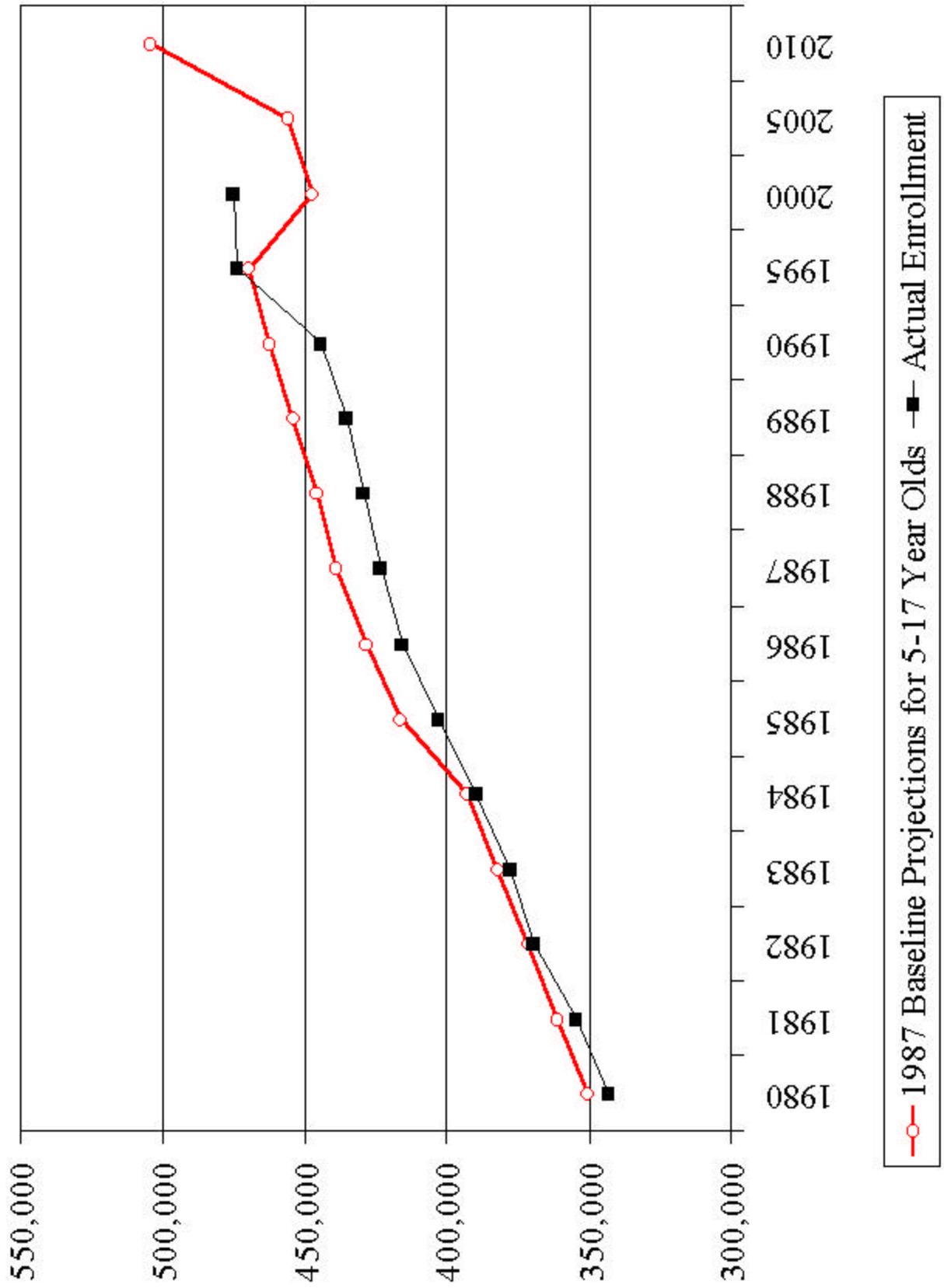
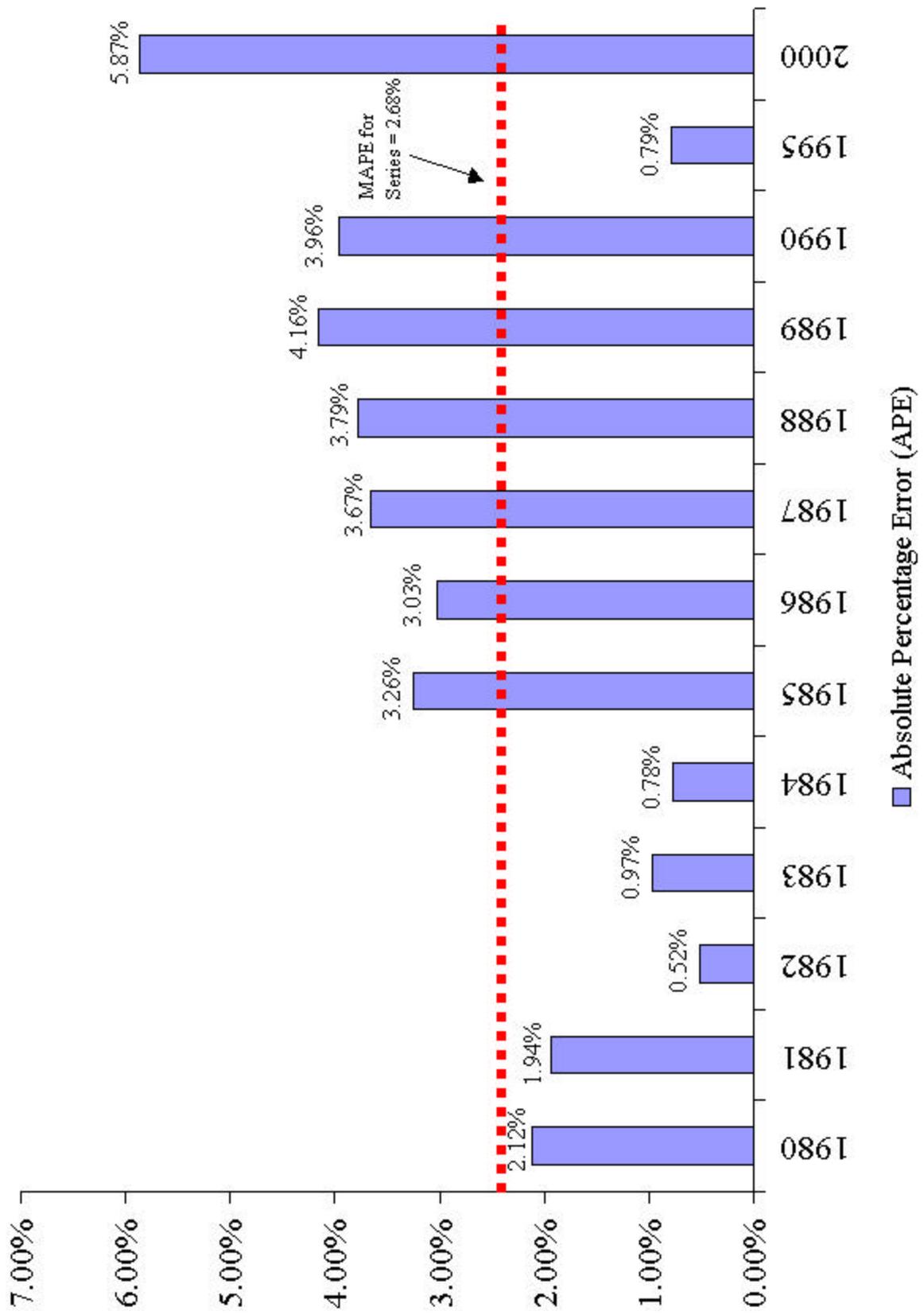
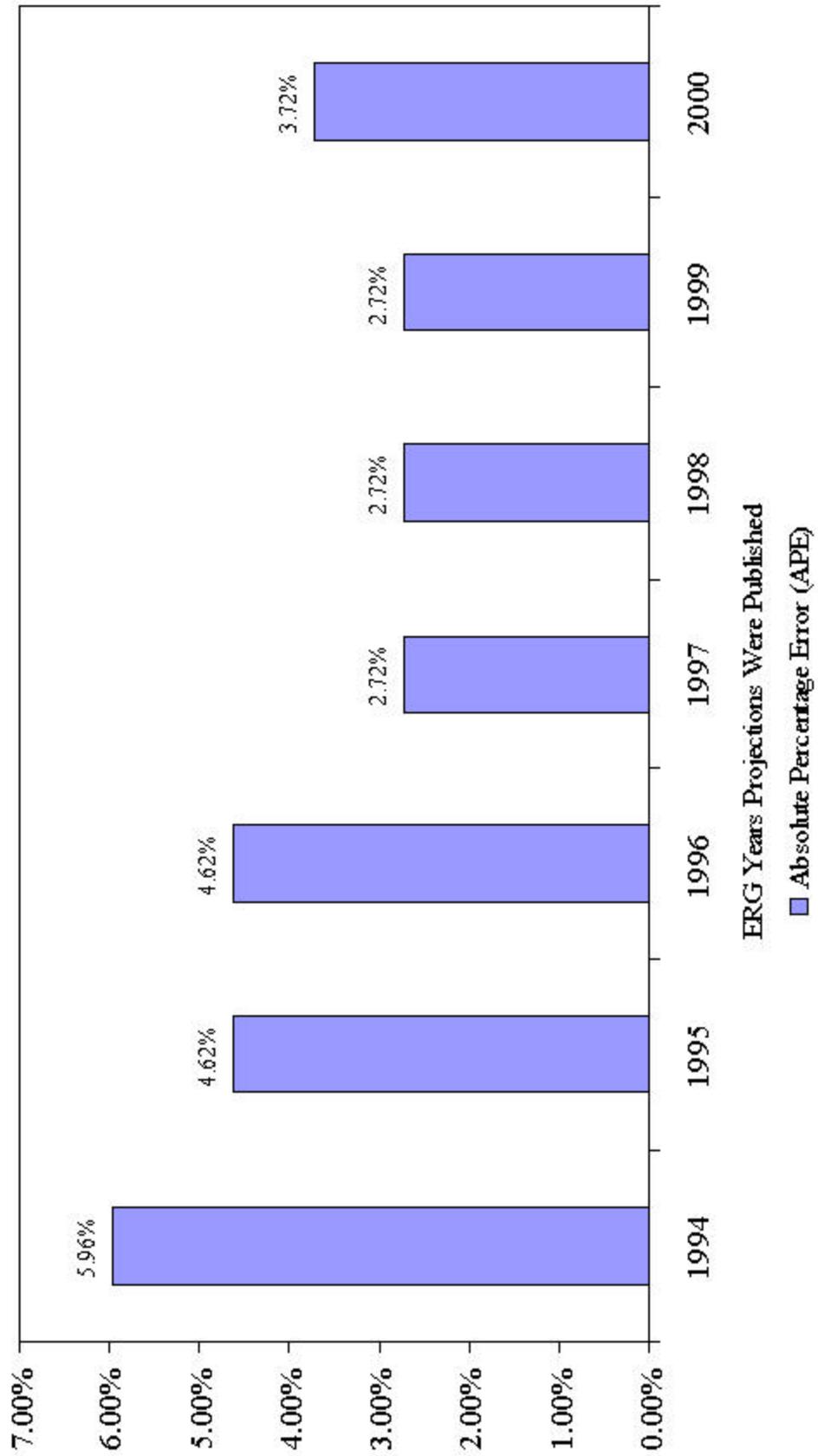


Figure 2: Absolute Percentage Errors (APE's) for 1987 School-Age Population Projections



**Figure 3: Absolute Percentage Errors (APE's) for State of Utah Population Projections for the Year 2000
(as Measured Against Census 2000 Data)**



IV. Why is Additional Funding Necessary?

The process must be reinvented in order to ensure the long-term staying power of the Utah Process Economic and Demographic model. A large part of this reinvention requires transparency. Transparency requires thorough documentation and an openness that allows outside critical review for both academic and applied purposes. The State of Utah has committed vast amounts of human talent, time, and financial resources into the development and maintenance of UPED. It has invested these resources because of the understanding from both technical experts and policymakers of how vital this tool has become in the state's projection process. Over the lifespan of UPED, however, the model has not become institutionalized in a way that ensures its long-term survival. Opening up the model, from both a programming and theoretical sense, will test the rigor and increase the functionality of the model.

Significant improvements and advancements with the UPED model system have been made over the years to increase accuracy and functionality, and the various state agencies and local governmental entities that make their planning decisions based on UPED's projections would like to see UPED continue to be an important, functioning, policymaking tool. GOPB is convinced of the scientific benefit of opening the model up to evaluation and review. The scientific evaluation is vital to the rigor of the model and the projection process, as all great theoretical achievements that have withstood the test of time have grown stronger through professional critique.

All parties are in agreement that if UPED is to survive the career life-cycles of the personalities presently involved, a great deal of knowledge transfer must occur. The individuals that currently are responsible for the maintenance of the UPED model system need to sit down with technical writers and programmers to document the core model. Besides documentation, GOPB believes that a professional evaluation of the programming language should be undertaken. An outside review would allow an objective evaluation of fitting the best language to the applications, without sacrificing the statistical computational abilities that the model requires.

GOPB has drafted, and would like to gain support for, a work plan that immediately addresses the most pressing short-term requirements of this reinvention process, namely documentation of the core UPED model and a user's guide. It is the consensus of the interested parties that documentation is key, because it ensures that a trained professional can make use of the model in the event that something happens to the crucial personalities involved in the institutionalization process. The reason behind the work plan is to give GOPB, and the other interested parties, a road map so as to measure performance against the desired goals within specific time parameters. The work plan will also guide the players involved with the institutionalization process down the same path and toward the same goals.

V. Work Plan

UPED Documentation Work Plan April 13, 2001

Goal: Preserve UPED as the long term economic and demographic model for the State of Utah.

Short Term Objective: Document the UPED software

Long Term Objective: Secure a stable home for the development and maintenance of the UPED model system

I. FUNDING – Actively pursue state supplemental funding and federal grants – Ongoing

- A. Viewed as multi-year, but one-time documentation and re-programming effort
- B. Supplement state funding with federal grants (EDA, FHA, EPA, HUD, DOE)

II. MANAGEMENT – Form UPED Steering Committee – April

- A. Purpose is to guide effort, approve contracts, and advise GOPB
- B. Proposed members to include:
 - ▶ R. Thayne Robson, Director, Bureau of Economic and Business Research, University of Utah
 - ▶ Dr. Robert P. Huefner, Professor of Political Science, University of Utah
 - ▶ Dr. Harvey J. Miller, Professor of Geography, University of Utah

III. SCOPING – Continue to seek recommendations from outside experts – January through December

- A. Share background letter, source code, schematics (existing), and listing of program files in advance
- B. Arrange time for in-depth probing and scoping involving steering committee, Ross, Neil, Ray, and Natalie
 - ▶ Suggested work plan / action steps
 - ▶ Resource requirements
 - ▶ Programming language
 - ▶ Potential vendors or individuals for out-sourcing
- C. Potential outside experts to include
 - ▶ Tom Henderson, Chair, Univ. of Utah, Office of Computing
 - ▶ Phil Emmi, Univ. of Utah, Geography Dept.
 - ▶ Department of Workforce Services programming staff
 - 1) Ron Ahlstrom, Manager
 - 2) Paul Laforge
 - 3) Gary Ray
 - 4) Mike Silvester
 - ▶ Darrell Danner, Metroware
 - ▶ Programmers, ITS
 - ▶ Jim Matthews, IT Strategic Planner, American Express
 - ▶ Jeff Tayman, SANDAG
 - ▶ William Schaffer, Georgia Institute of Technology
 - ▶ Census Bureau contact

IV. MODEL SYSTEM USER GUIDE DOCUMENTATION – Prepare User Guide / Operation Manual Documentation – June through December*

- A. Ross to prepare first draft including model system description and map, recipes for applications (baseline, impacts, goal seeking, and sensitivity), and references (variables and program units) (The map, displaying structure, and flows - inputs, outputs, and options, will be the top priority here)
 - ▶ DEA to assist with schematics and any other processing/publishing that can be shared
 - ▶ Outline to include:
 - Overview of system and its components
 - Software installation and operation
 - Program sequence
- B. Review private sector user documentation standards
- C. Hire a technical editor to work with Ross to complete user's guide
- D. User testing to include GOPB, BEBR, AOG contacts

*** Requires firm deadline and may require personal services contract.**

V. TECHNICAL GUIDE DOCUMENTATION – Prepare Technical Documentation for Programmers – (Fall 2001 through 2002)

- A. Select outside programmer and technical editor to work with Ross
- B. Document core UPED model
 - ▶ Data processing
 - ▶ Parameter estimation/projection
 - ▶ Post processing programs
 - ▶ Maintenance

VI. USER INTERFACE ENHANCEMENT – Improve User Interface

- A. Select outside programmer and appropriate language (FORTRAN, C or C+)
- B. Focus on core UPED model

VII. EXTRAORDINARY DEVELOPMENT ISSUES – Incorporate NAICCS and Census 2000

IX. COUNTY ALLOCATION DOCUMENTATION – UCAPE and CASA

IX. PROFESSIONAL LITERATURE – Academic Article on Core UPED Model*

