LSP SOFTWARE TOOLS

Professional system evaluation is based on using a variety of software tools. The LSP software technology is designed to support three categories of users:

- Professional evaluators (users of customized LSP tools)
- LSP end users (decision makers who evaluate and compare alternative systems)
- LSP administrators

Professional evaluators are decision analysts who prepare complex criteria that support acquisition decisions of institutional (corporate, military, governmental, and other) users. LSP end users are those who use already prepared LSP criteria to evaluate, compare and select specific systems. In many cases the end users may be interested in customizing LSP criteria. LSP administrators are software and decision support personnel in charge of maintenance of the LSP project database and LSP software tools. LSP administrators can use all LSP software components as stand-alone tools. Other users can use the same tools as components (engines) in an integrated system evaluation environment.

The LSP software technology is structured as follows:

- **LSP core technology**
  - **LSP engine**
  - **LSP project database support**
- **LSP tools**
  - ***User interface tools***
    - **ISEE: integrated system evaluation environment**
    - **LSPcust: customizer of LSP criteria**
  - ***Criteria preparation tools***
    - **ANSY: analysis and synthesis of LSP aggregators**
    - **STA: sensitivity and tradeoff analysis**
  - ***Result presentation tools***
    - **CPA: cost-preference analysis**
    - **VERB: verbalizer of LSP evaluation results**
  - ***Advanced system analysis tools***
    - **OPT: system optimization tool**
    - **RELI: reliability analysis tool**

All components of the LSP software technology are presented in Fig. 1. Following is a short description of the role of each component:

- **LSPcalc** is a fundamental engine used directly or indirectly by all other LSP tools. It is primarily responsible for fast calculation of all preferences and numerical correctness of evaluation results. It can also be used as a stand-alone

tool. In such a case it includes help and tutorial components, as well as a complete support for creating and editing LSP criteria, and system evaluation.

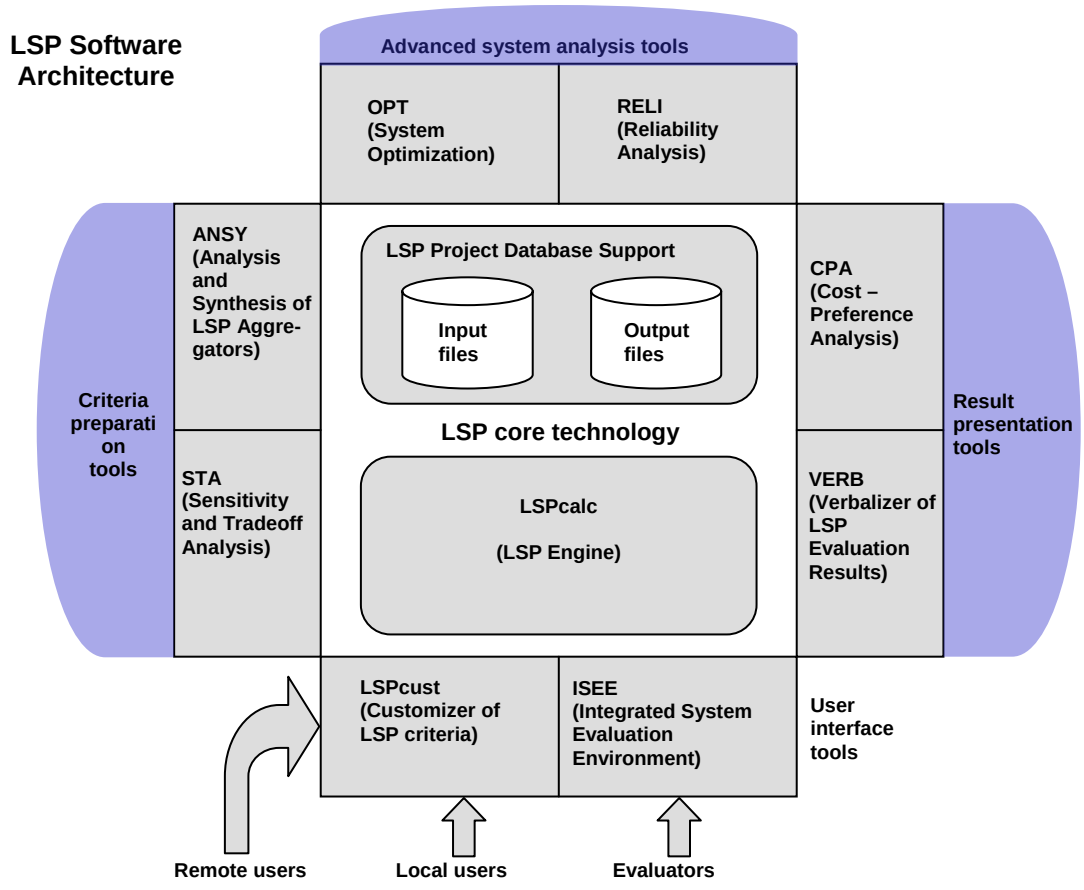

Figure 1. Component and structure of the LSP software technology

- **ISEE** is the main tool that evaluators use for building LSP criteria and evaluating systems. It supports creating system requirement and parameter tree, elementary criteria and criterion aggregation structure. In addition, it provides comfortable GUI based support for editing LSP criteria, and producing professional documentation. ISEE also provides access to other LSP tools.
- **LSPcust** is a user interface tool that end users apply to modify LSP criteria according to their individual needs and specifications. The modified criteria can be immediately used for evaluation and comparison of competitive systems. Thus, LSPcust can also be used for experimental study of effects of modifying parameters of LSP criteria.
- **ANSY** is a tool for analysis and synthesis of LSP aggregators (partial conjunction, partial disjunction, and partial absorption). ANSY uses LSP aggregators as preferential neurons and implements a neural network training process to compute

optimum values of aggregator parameters. The optimum parameters are those values that minimize the difference between the attained input-output mapping of an aggregator, and a desired input-output mapping specified by the user-supplied training set. ANSII computes the optimum andness/orness and weights of aggregation operators according to user requirements.

- **STA** is a tool for sensitivity and tradeoff analysis. The sensitivity analysis investigates the effects of changes of inputs or parameters on the value of selected preferences. The tradeoff analysis investigates compensatory features of LSP criteria, i.e. the possibility to compensate deficiencies in some inputs by improving selected other inputs.
- **CPA** is a tool that combines the results of cost analysis with the results of preference evaluation. CPA uses various mathematical models that combine the global cost and the global preference of each evaluated systems in a single global quality indicator. Such global indicators are necessary for system ranking.
- **VERB** is a presentation tool, an automatic generator of evaluation documentation that presents the evaluation results in verbalized and understandable form at three different levels of detail: an executive summary, a detailed evaluation report, and a full documentation of all numerical results.
- **OPT** is a tool that solves three fundamental optimization problems: (1) finding an optimum system that attains the highest preference for constrained cost, (2) finding an optimum system that attains a given level of preference at a minimum cost, and (3) finding an optimum system that offers maximum quality per unit or cost. OPT also solves the optimum cost allocation problem, giving parameters of optimum configurations for any available total cost.
- **RELI** is a tool for the analysis of reliability of evaluation results. Any evaluation project includes a number of parameters that are assessed by evaluators and may contain errors with respect to unknown optimum values. The goal of reliability analysis is to compute the confidence levels for ranking of each pair of competitive systems. RELI enables evaluators to select the best system knowing the level of confidence that corresponds to the proposed decision.

The presented software support is a second generation of LSP software tools. The first generation consisted of the Criterion Development System (CDS), and the Systems Evaluation Language (SEL). CDS and SEL are primarily designed for professional system evaluators. The second-generation tools are more diversified and are designed to serve a wider spectrum of users.