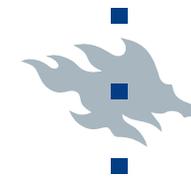
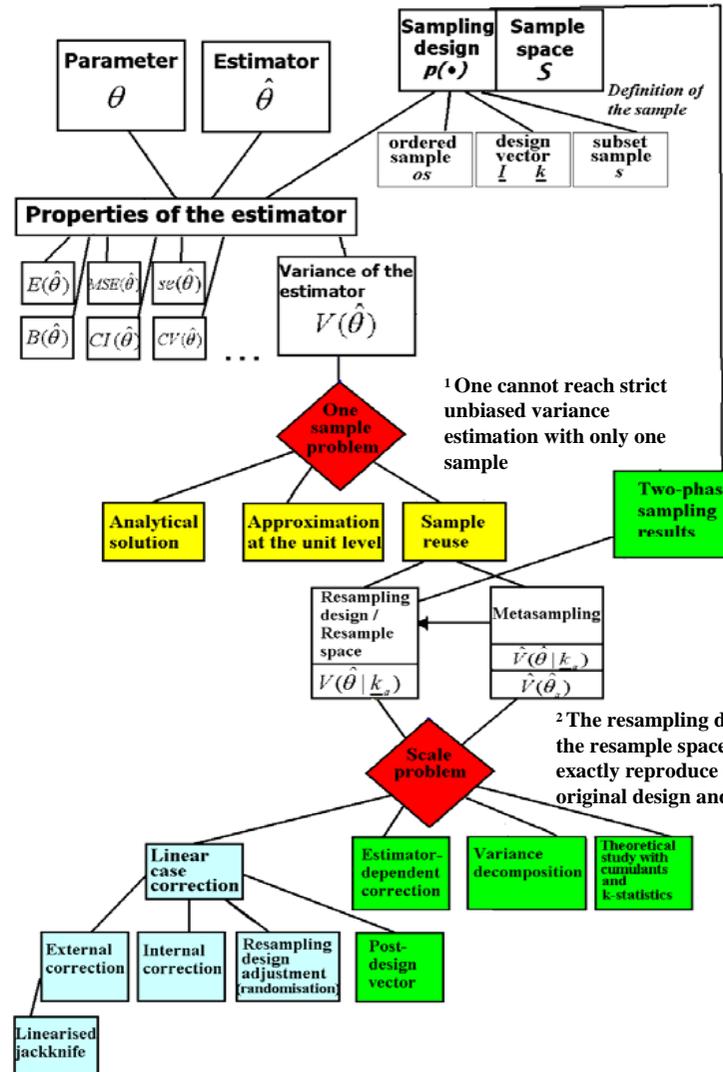


Variance Estimation in Sampling Theory



The key issues of the **sampling theory** are the identification of the units together with the definition of the sampling design and the sample space. This enables the variety of methods at the design and estimation phases in order to improve estimation in sample surveys (e.g. use of registers).

Variance estimation methods mainly focus on solving *one-sample problem*¹. Among analytical solutions and approximation at the unit level (e.g. linearisation) the resampling methods are of growing interest. They apply the resample space based on resampling design (e.g. n-1 jackknife) or several resamples from the resample space, independent (bootstrap methods) or non-independent (e.g. random groups). The nuisance of resampling methods is the *scale problem*², which is emphasised in small populations/strata and samples. Several solutions based on the behaviour of the variance estimator of the linear estimator exist (linear case correction).



Alternative methods focus on avoiding the randomisation with using the design vector approach (*post-design vector*), introducing the information of different subsample space levels in order to make variance estimation more accurate (*estimator-dependent correction*) and studying the structure of the variance for combinatory correction terms (*variance decomposition*). Furthermore, **studies** of two-phase sampling and theoretical correction coefficient for some estimators and designs provide results for different resampling situations.

Publications:

Ollila, P. (2004). *A Theoretical Overview for Variance Estimation in Sampling Theory with Some New Techniques for Complex Estimators*. Doctoral Thesis. Research Reports of Statistics Finland, 240. Helsinki.

Ollila P., Laaksonen, S., Söstra, K., et al. (2004). *Workpackage 4: Evaluation of Software for Variance Estimation in Complex Surveys*. DACSEIS project, Deliverables 4.1 and 4.2.