Feature Location: Identifying Best Practice Empirically

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1 Motivation

❑ **Objectives and Goals**
- Which is the best Feature Location Technique (FLT) for practitioners?
- Review suggests that this is difficult because current literature:
  - Is focused on novel techniques
  - Has evaluations with contradictory findings
  - Has very inconsistent evaluation designs
  - Doesn't give us enough information to replicate the FLTs
- This situation requires standardized empirical best practice
- Allowing more accurate comparison across all FLTs,
- Allowing practitioners to select the best FLTs

❑ **Feature Location**

Analysing programs to find the location of specified user functionality in the code

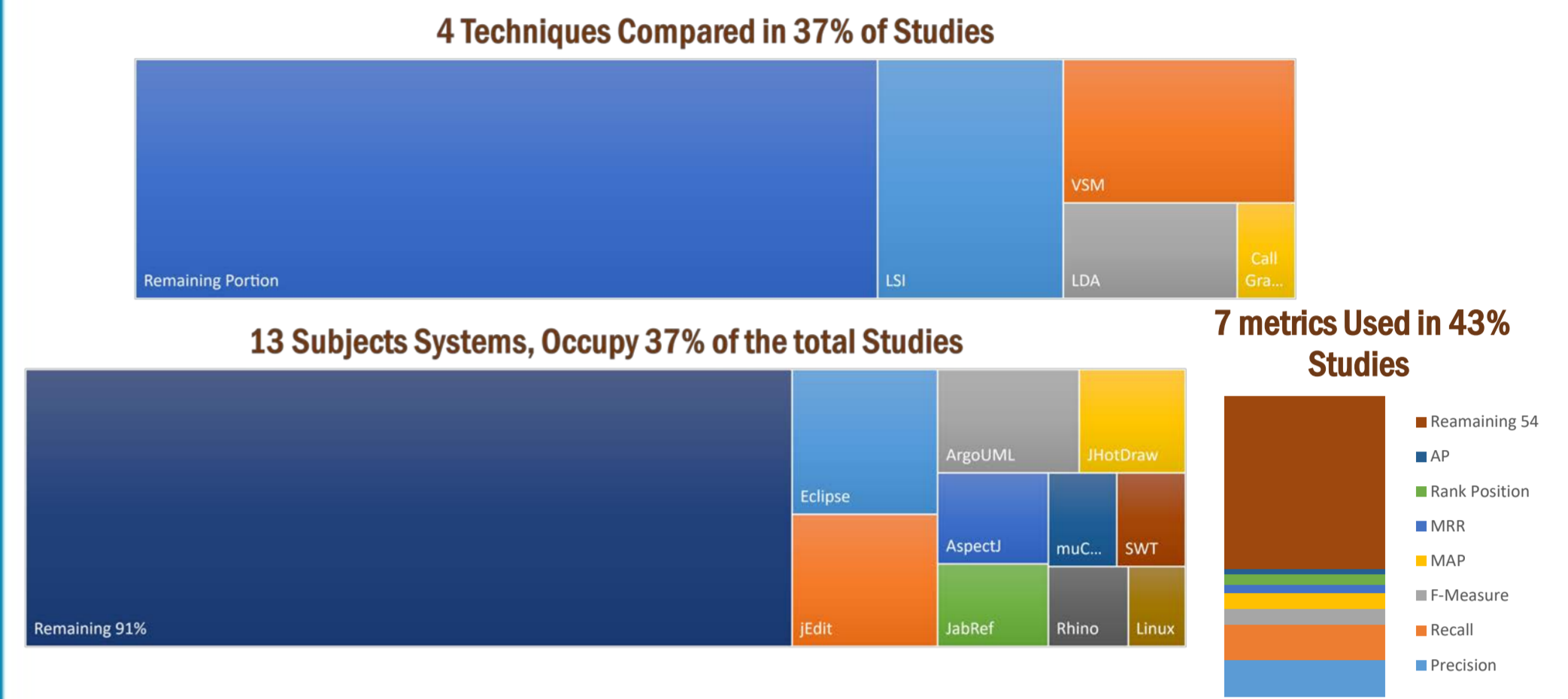❑ **Focus on Novelty Location and Inconsistent Evaluation Design**
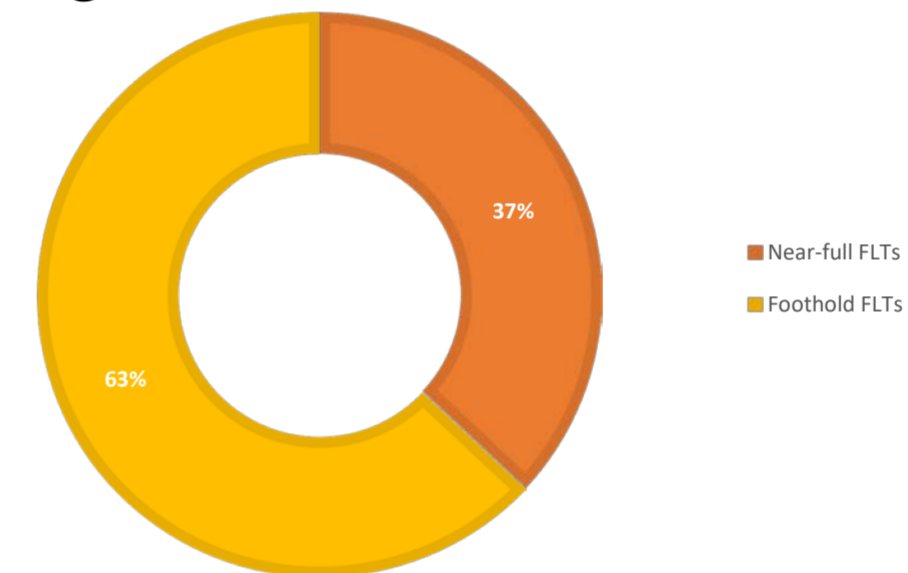- 95% of papers reviewed present new FLTs, Only 9% compared with SOTA FLTs

Growth of Evaluation Components

Contradictory Findings Abound

Wang et al., 2011   Binkley et al., 2015
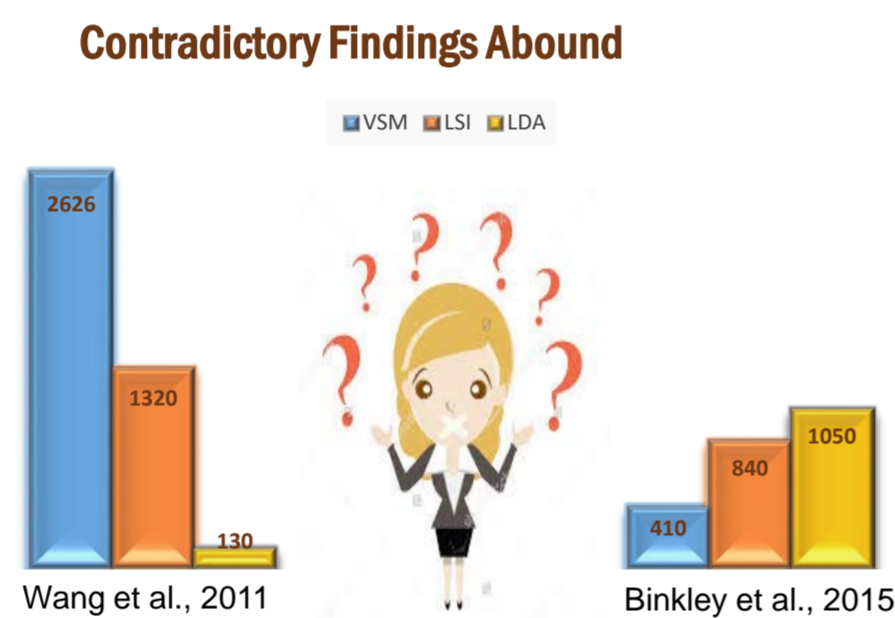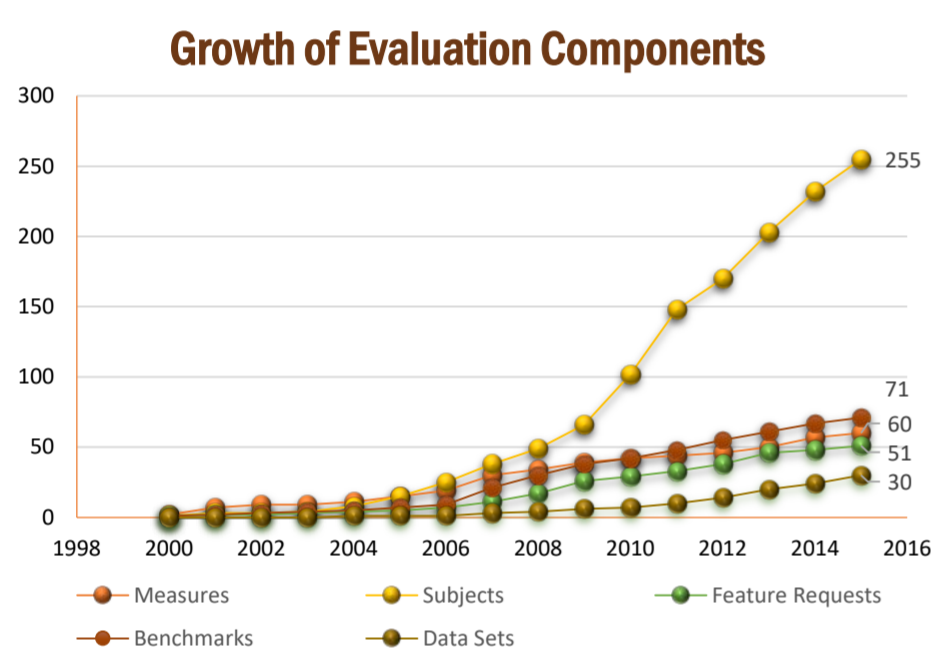
2 Moving to Optimum Empirical Design

❑ **Recommendations for FLT Evaluations**
- Use More Widely Accepted Empirical Design Components

4 Techniques Compared in 37% of Studies

13 Subjects Systems, Occupy 37% of the total Studies

7 metrics Used in 43% Studies

- Map studies in goal and evaluation frame of reference for contextualization
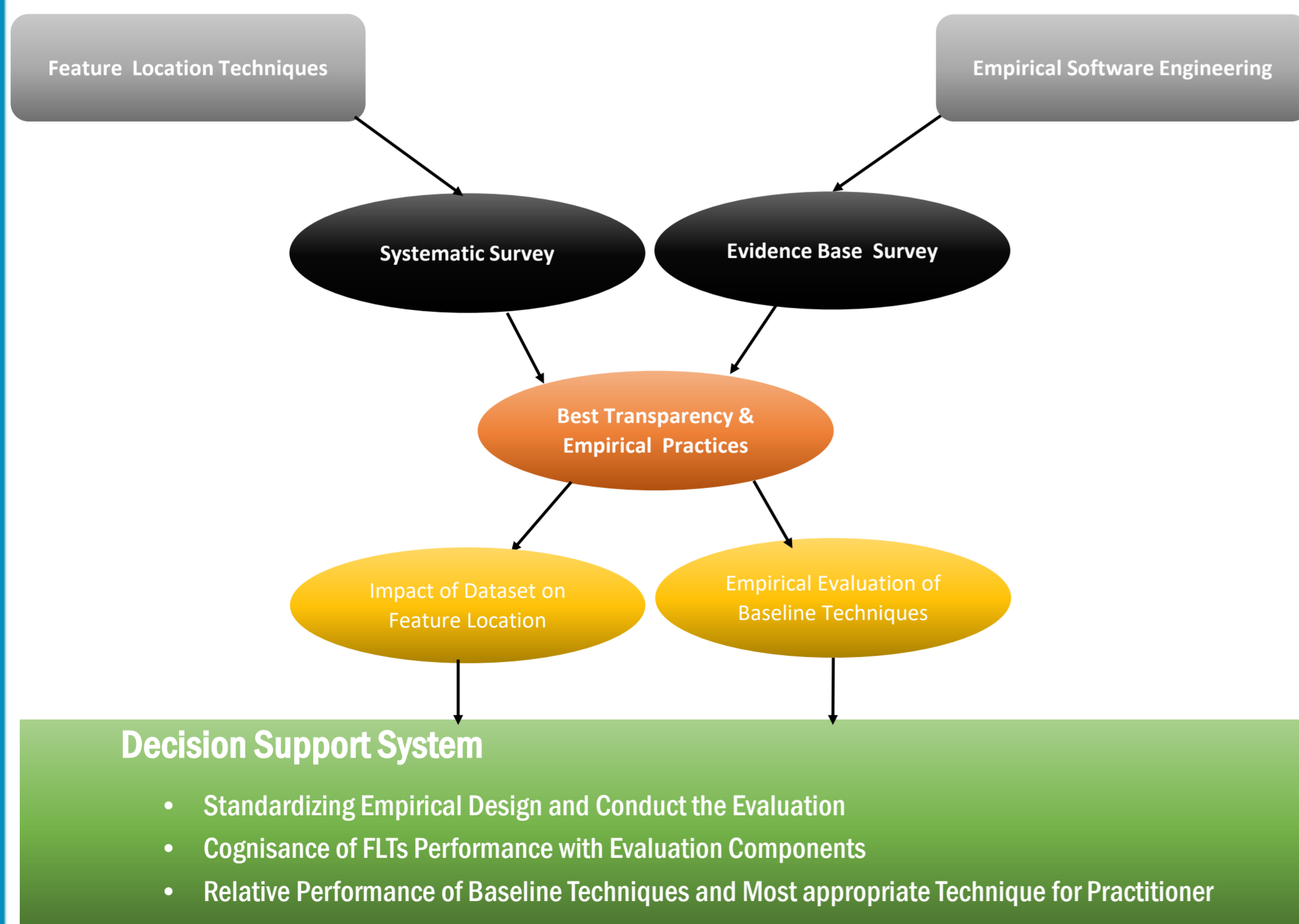

- Near-full FLTs
- Foothold FLTs

- Assess the 8 Baseline Techniques Allow Cross-comparison of FLTs using Optimum Empirical Design

3 Methodology

❑ **Review current FLT literature and Best Empirical Practices**
❑ **To Conduct Empirical Comparative Evaluation**
❑ **Uncover Impactful Dataset Characteristics**
❑ **Evidence Based Recommendation of Optimum**

Technique For Feature Location

170 Studies in Literature

	Frequency
Comparative Studies	9
Tools	16
Novel FLTs	145

Feature Location Techniques → Empirical Software Engineering

Systematic Survey   Evidence Base Survey

Best Transparency & Empirical Practices

Impact of Dataset on Feature Location   Empirical Evaluation of Baseline Techniques

Decision Support System
- Standardizing Empirical Design and Conduct the Evaluation
- Cognisance of FLTs Performance with Evaluation Components
- Relative Performance of Baseline Techniques and Most appropriate Technique for Practitioner

4 Comparison of FLTs and Future Work

❑ **Relative Performance of the Baseline Techniques**
- Use to Cross-compare the existing FLTs
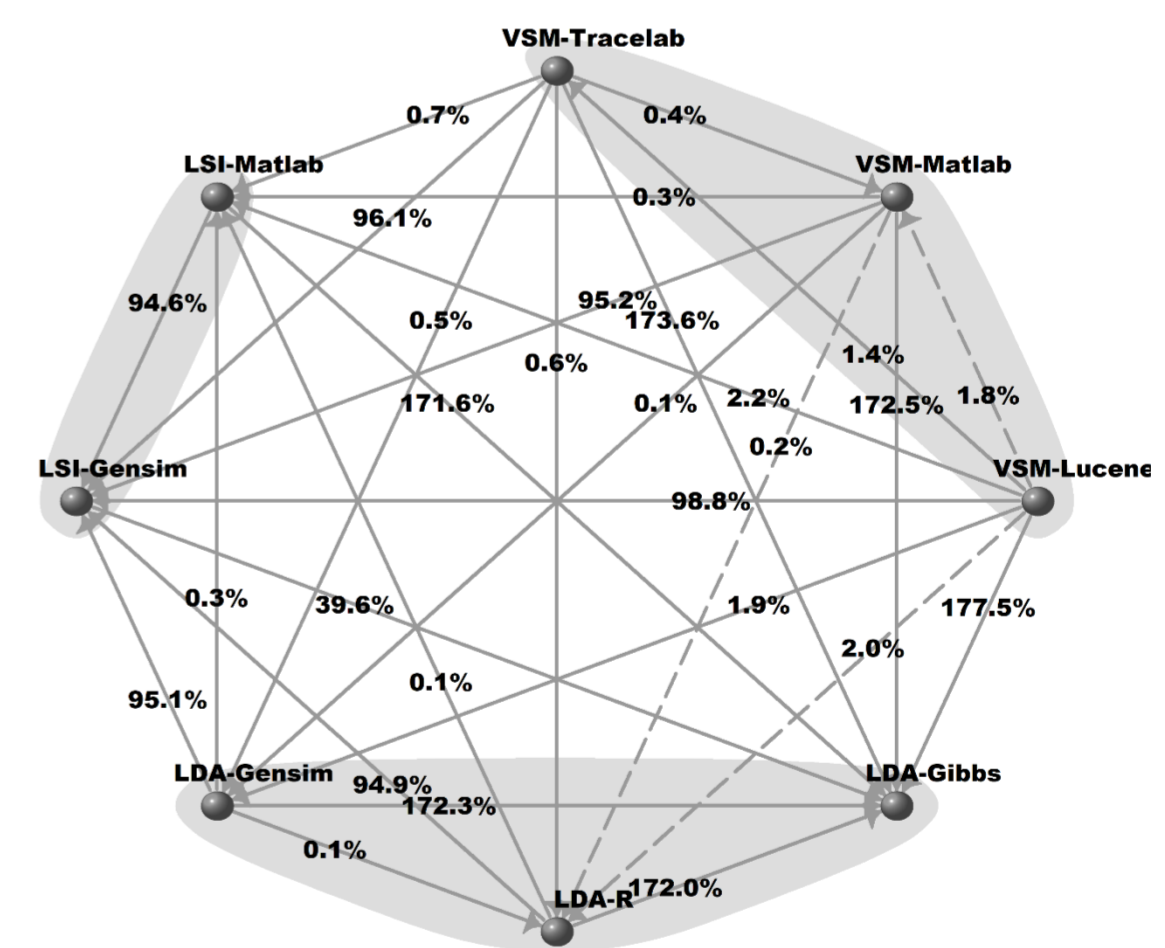
- VSM-Luecene is the Best Baseline to be used as Comparator

❑ **Empirical Synthesis of FLTs to Recommend Best FLTs**
- FLTs Results Synthesis on the Basis of a Homogeneous Baseline Evaluation

❑ **Cognisance of FLTs Performance with Evaluation Components**
- Impact of Benchmark-related Code Statistics and Structure on FLTs
- Impact of the User-Input Size-based Characteristics on FLTs

❑ **Future Work**
- Impact of Software System Characteristics on FLTs
- Recommendations towards Software Process Management Tools to Enhance FL