

# Towards Standardized Mechanical Characterization of Highly Dewatered Sludge: a Bibliometric Study



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## Variability

### Sludge Origin

- Source: Industrial, domestic
- Composition: inorganic, organic

### Sludge treatment

- Thickening
- Type and dosage of coagulant and flocculant
- Dehydration technology: filtration, centrifugation
- Storage time

## Mechanical Characterization of Highly Dewatered Sludge

### Objectives

- Literature mapping
- Research hotspots
- Method comparison
- Gap identification
- Framework development

### Problems

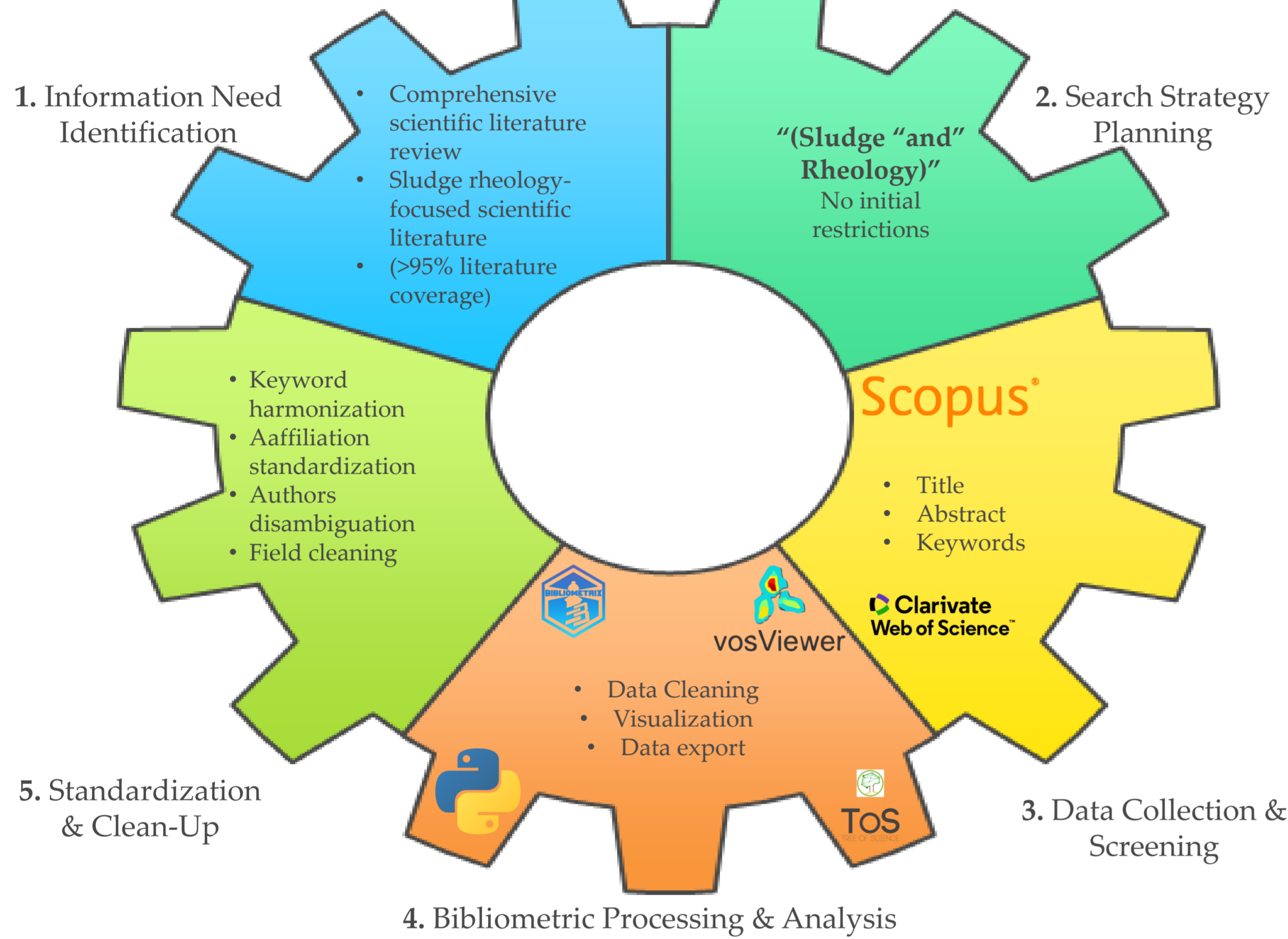
- Literature focused on liquid sludge
- Non standardized measurements
- Lack of data
- Poor reproducibility
- Fragmented terminology
- Limited adhesion studies

### Importance

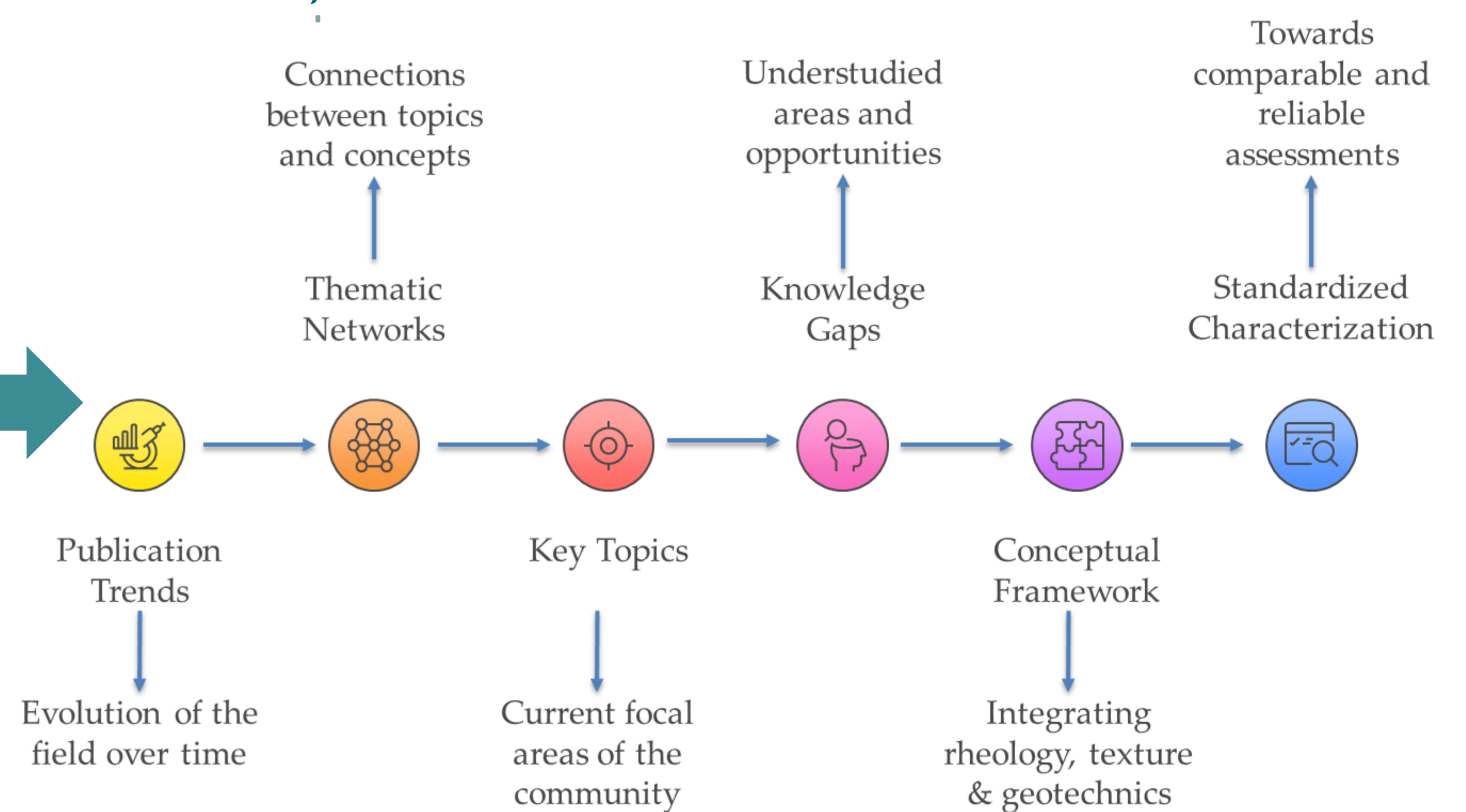
- Predictable Behaviour
- Improve pumping, mixing
- Enhance dewatering and drying
- Product Quality and Safety
- Reduce Operational Costs

**Keywords:** : Sewage Sludge; rheology; adhesiveness; cohesiveness; Texture; Viscoelasticity; bibliometric analysis.

## METHODOLOGY



## RESULTS, INSIGHTS AND CONTRIBUTIONS



## SLUDGE A COMPLICATED MECHANICAL MATERIAL

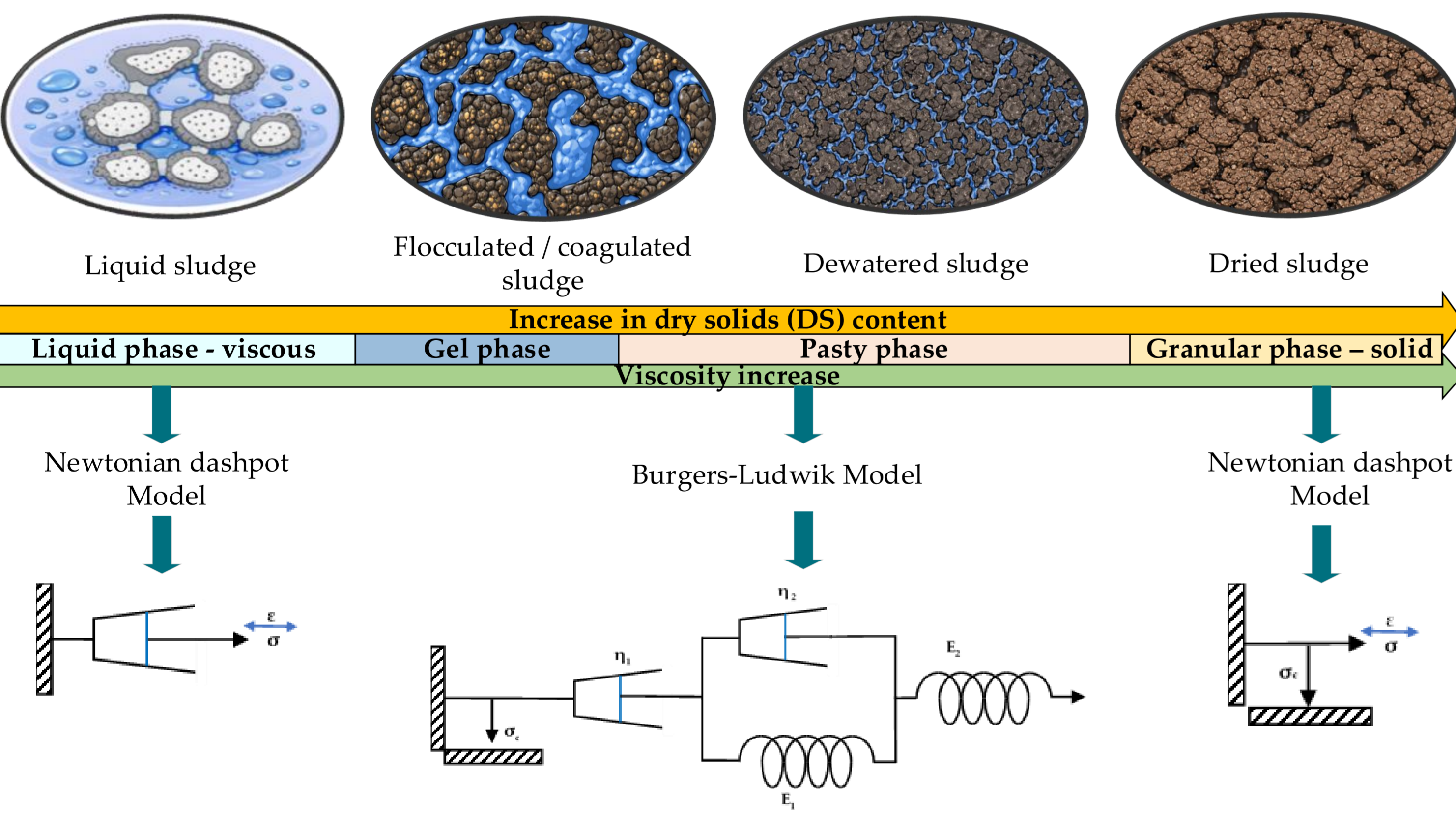
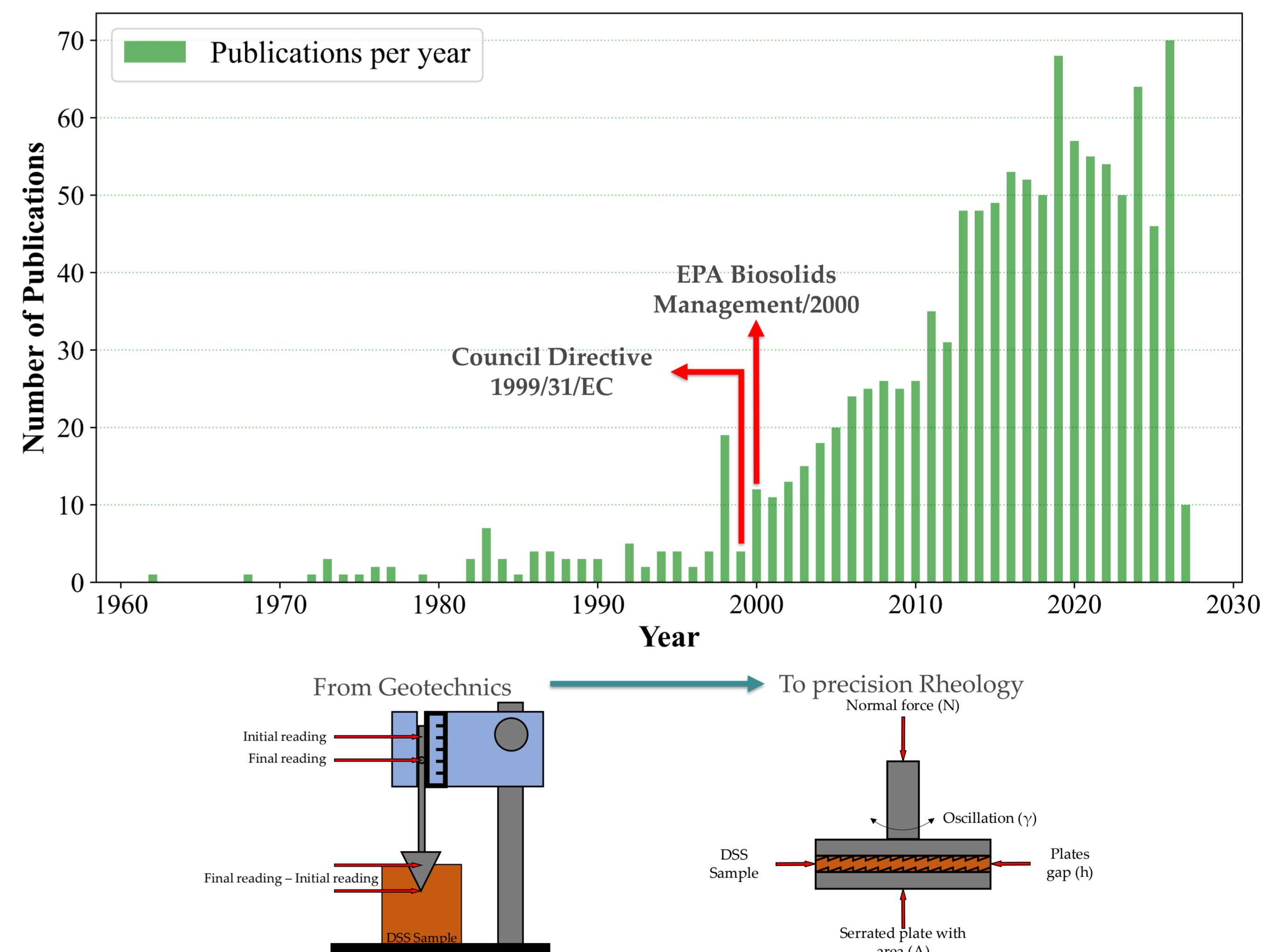


Table . 1 Preliminary Screening of Filtering Tissues Based on Solids Retention After Pretreatment

## DOMAIN EVOLUTION



## TAKEAWAYS

- The literature reveals a growing yet fragmented field dominated by rheological approaches. Regulation impacted research accelerating publications' growth.
- A unified view of sludge mechanical characterization Bridging rheology, texture and geotechnics
- Adhesiveness remains one of the least standardized and most underrepresented sludge properties.
- Current characterization methods provide complementary but incomplete information.
- Bridging rheology, texture and geotechnics enables a more integrated understanding of sludge behavior
- Standardized multi-technique methodologies are required for reliable sludge characterization.
- The analysis highlights the need to move beyond isolated descriptors toward integrated sludge mechanics approaches.
- Improved methodological harmonization is essential for advancing sludge drying, handling and valorization processes.

## REFERENCES

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