

****For Method Classification:****

> "We analyze each researcher's publication keywords and abstracts to identify their primary research approach. Our algorithm recognizes six method categories—Computational, Theoretical, Empirical, Experimental, Fieldwork, and Mixed Methods—based on terminology patterns. This allows us to match researchers with complementary methodological approaches, which Professor Du identified as the second most important factor in collaboration success."

****For Career Stage:****

> "Career stage is determined by analyzing publication history. We classify researchers as Pre-Tenure if they began publishing within the last 5 years, or if they're early in their career with fewer than 10 publications. This enables strategic pairings—like Post-Tenure mentors with Pre-Tenure researchers—which Professor Du noted matters for effective collaboration dynamics."

**Detailed Explanation (For Q&A or Deeper Discussion)**

**Research Method Classification**

****What We Do:****

- Analyze all keywords and abstracts from a researcher's publications
- Use pattern recognition to identify methodological indicators
- Assign the method category with the strongest evidence

****Why This Matters:****

- Professor Du emphasized that "complementary skill sets" are crucial (40% weight)
- Different methods bring different perspectives to sustainability problems
- Example: A Theoretical researcher paired with an Empirical researcher can bridge theory and practice

****Method Categories:****

1. ****Computational**:** Machine learning, algorithms, simulations, AI
2. ****Theoretical**:** Frameworks, models, conceptual work
3. ****Empirical**:** Surveys, statistical analysis, quantitative data
4. ****Experimental**:** Controlled trials, laboratory studies

5. **Fieldwork**: Case studies, qualitative research, observations

6. **Mixed Methods**: Combining multiple approaches

Example from Your Data:

- "Carrasco Kind, Matias" (Computational) matched with "Mendoza, Kim" (Theoretical)
- Explanation: "Complementary methods (Computational + Theoretical) create strong research synergy"
- This demonstrates the algorithm finding method complementarity

Career Stage Classification

What We Do:

- Calculate years since first publication (using 2025 as reference)
- Consider both publication recency and volume
- Classify as Pre-Tenure or Post-Tenure

Classification Rules:

- **Pre-Tenure**: First publication within last 5 years, OR (within last 10 years AND < 10 total publications)
- **Post-Tenure**: Established researchers with longer publication history

Why This Matters:

- Professor Du noted career stage matters for "mentorship vs. peer collaboration" (15% weight)
- Pre-Tenure + Post-Tenure pairs create mentorship opportunities
- Post-Tenure + Post-Tenure pairs enable peer collaboration

Example from Your Data:

- "Lough, Benjamin" (Post-Tenure) matched with "Zhou, Dan" (Pre-Tenure)
- Explanation: "Optimal mentorship pairing (Post-Tenure guiding Pre-Tenure) creates ideal collaboration dynamic"
- CCS score: 91 (high due to strong career fit component)

How to Present This in Your 90-Second Demo

Slide 1: The Algorithm Overview

> "Our Collaboration Compatibility Score uses three factors from Professor Fei Du's research:

- > 1. Topic alignment—45% weight
- > 2. Method complementarity—40% weight
- > 3. Career stage fit—15% weight"

Slide 2: Method Classification (Show Example)

> "We automatically classify research methods by analyzing publication content. Here, we see a Computational researcher matched with a Theoretical researcher—complementary approaches that create research synergy."

Visual: Show a match from your dashboard with different methods highlighted

Slide 3: Career Stage Pairing (Show Example)

> "Career stage enables strategic pairings. This Post-Tenure researcher is matched with a Pre-Tenure researcher, creating an optimal mentorship opportunity—exactly the kind of collaboration dynamic Professor Du identified as valuable."

Visual: Show a Pre-Tenure + Post-Tenure match with high Career_Fit score

Slide 4: The Result

> "Our algorithm generated 40 high-quality collaboration matches using real UIUC sustainability researcher data. Each match includes a CCS score and explanation showing why the partnership works."

If Judges Ask Technical Questions

Q: "How accurate is the method classification?"

> "Our algorithm uses pattern recognition on publication keywords and abstracts—the same data researchers use to describe their work. While no automated system is perfect, this approach captures the primary methodological approach researchers use in their sustainability work."

Q: "Why only Pre-Tenure and Post-Tenure? What about Mid-Career?"

> "We simplified to two categories for the MVP to focus on the key distinction Professor Du identified: mentorship opportunities versus peer collaboration. This binary classification captures the essential dynamic while keeping the algorithm interpretable."

Q: "How do you handle researchers with multiple methods?"

> "The algorithm identifies the dominant method based on frequency of methodological indicators across all publications. This gives us a primary classification while recognizing that many researchers use multiple approaches."

Q: "What if a researcher has no keywords or abstracts?"

> "We have fallback logic that defaults to 'Empirical' for method classification, and uses publication count for career stage. In practice, most UIUC researchers have rich publication metadata."

Key Messages to Emphasize

1. **Data-Driven**: Uses real university publication data, not assumptions
2. **Evidence-Based**: Based on Professor Fei Du's research on collaboration factors
3. **Transparent**: Algorithm logic is explainable and defensible
4. **Practical**: Produces actionable collaboration recommendations
5. **Scalable**: Can be applied to any researcher dataset