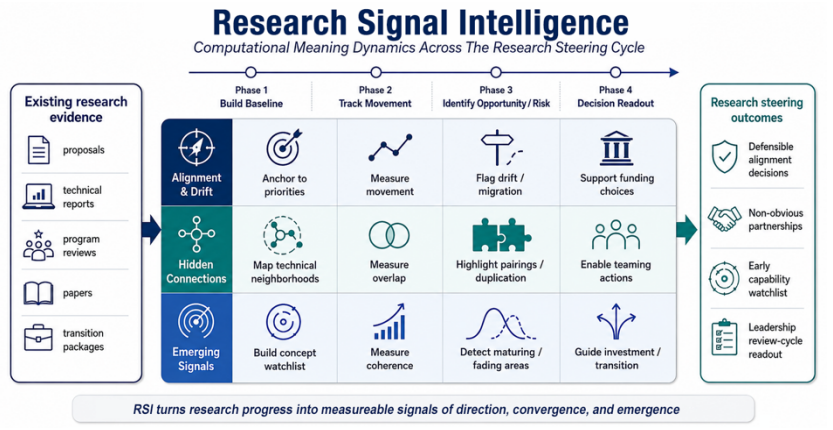
Research Signal Intelligence

See where research is moving before the consequences appear in budgets, reviews, and transition decisions

Research portfolios and programs can look stable on paper while their technical direction is changing underneath. Programs retain the same titles. Competencies remain in the same organizational boxes. Quarterly reviews continue to show progress. Yet research efforts migrate toward different problems, separate teams quietly converge on the same capability, and promising technical areas begin to cohere before they have a recognized name. Today, the research management has no instrument for seeing that movement. The result is four recurring research management failures:

- The portfolio becomes too large to hold in one person's head. No director can continuously read and compare the technical trajectory of dozens of efforts, partners, reports, and emerging areas.
- Critical decisions remain difficult to defend. "This work is better aligned," "these groups should work together," and "this area is becoming important" remain expert judgments rather than evidence that can be shown to leadership and resource sponsors.
- Important changes are recognized late. Drift, convergence, duplication, and maturation often become obvious only after a review cycle, funding decision, or transition opportunity has passed.
- Organizational language hides technical connections. Different competencies, universities, companies, and government organizations can work on the same underlying problem while describing it in completely different terms.

Research Signal Intelligence (RSI) goes beyond automated AI program binning and alignment point-solutions. RSI captures and harnesses the meaning *dynamics*; making the technical state and trajectory of research measurable *as it moves*.



The approach uses Large Language Model (LLM) representations to convert existing technical documents and content into a continuously updated map of what the portfolio is actually working on and how it is change, relative to its history and that of other research efforts. Rather than asking an AI system to summarize or judge the portfolio, the system uses AI as a measurement instrument: it measures where technical efforts sit relative to priorities, how those positions change over time, and which efforts are becoming semantically connected even when their terminology differs. This creates three new management capabilities:

1. **Know whether investment is *moving* toward or away from the mission.** Each effort is measured against Army priorities, capability needs, and other program-defined anchors. Successive reports reveal whether alignment is strengthening, weakening, or moving toward a different objective. Program and project decision makers gain an auditable record of technical direction rather than a point-in-time judgment made during a review.
2. **Find partnerships and duplication that the organization *cannot* see.** The system identifies efforts that occupy adjacent technical territory despite different vocabulary, competencies, performers, or organizational homes. It can also detect when previously separate efforts are converging. The result is a ranked set of collaboration, consolidation, and cross-competency opportunities based on the substance of the work rather than organizational familiarity.
3. **See capability *formation while there is still time* to shape it.** Across the portfolio and relevant external research, the system measures when previously dispersed ideas begin to organize around a common technical direction. These early signals give leadership a way to recognize emerging capability, fading areas, and research lines approaching a point where concentrated investment or transition action may be warranted.

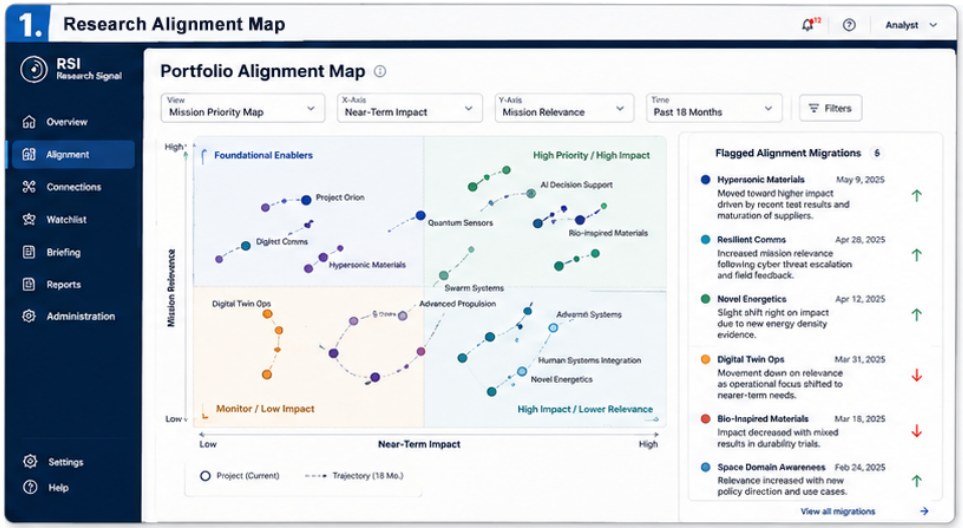
This effort is grounded in a broader body of computational meaning dynamics research that treats technical language not as static text, but as a measurable evolving system with geometry, neighborhoods, trajectories, and identifiable transition structure. Across that research, latent-space movement, neighborhood rewiring, curvature, and trajectory dynamics have been formalized, empirically tested, and subjected to falsification and kill-test designs rather than treated as heuristic analytics. Research Signal Intelligence applies that scientific foundation to a new problem: making the direction, convergence, and emergence of a research outcomes observable before those changes become obvious through conventional management signals.

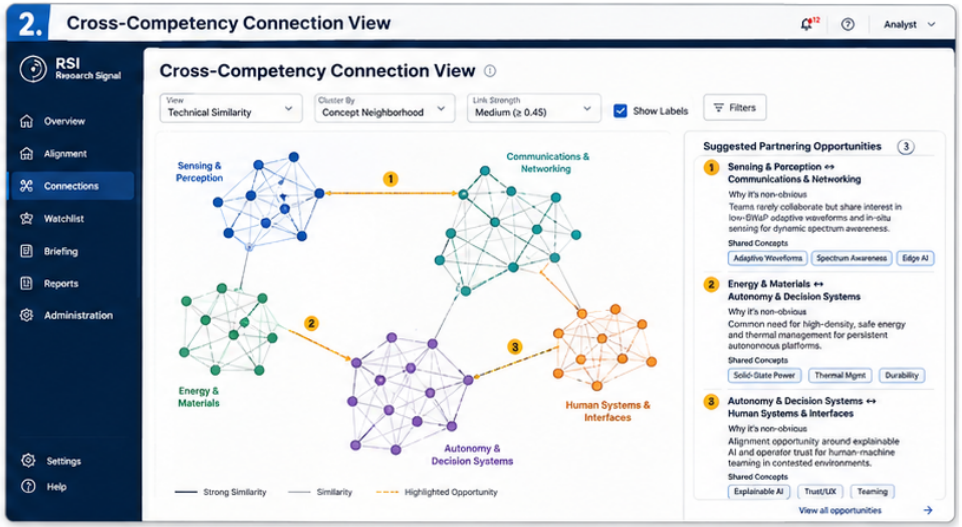
The research laboratory already measures what research costs, who performs it, when milestones occur, and what research products are delivered. What it yet doesn't do is, measure the movement of the technical meanings connecting those things. As portfolios become larger, faster, and increasingly AI-driven, that missing layer becomes the difference between reviewing research after it happens and actively steering towards priority capabilities.

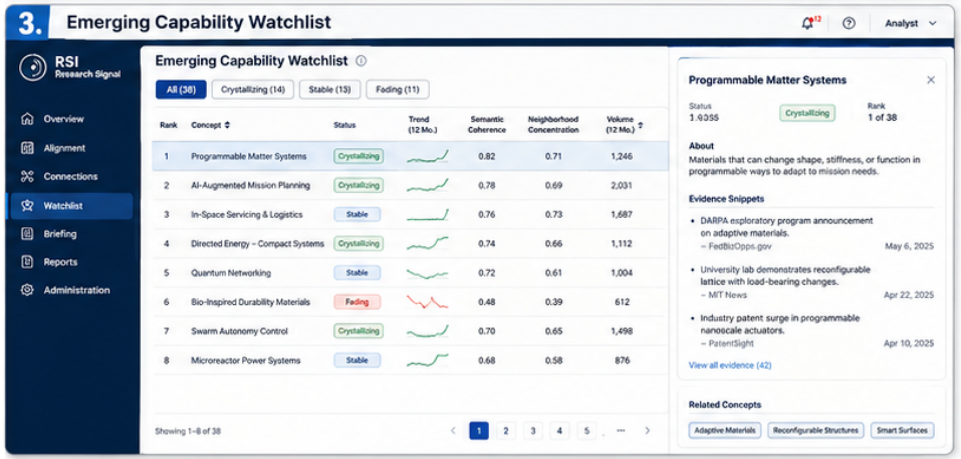
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Research Signal Intelligence

Example capability interfaces for instrumented research steering and observability









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