

Cost-Efficiency Through Reproducibility: The Hidden Economics of Transparent AI Workflows in Radiology

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Purpose

To highlight the economic advantages of reproducible, version-controlled AI development in radiology and to propose reproducibility standards as a cost-saving, sustainable component of departmental and grant-funded AI research.

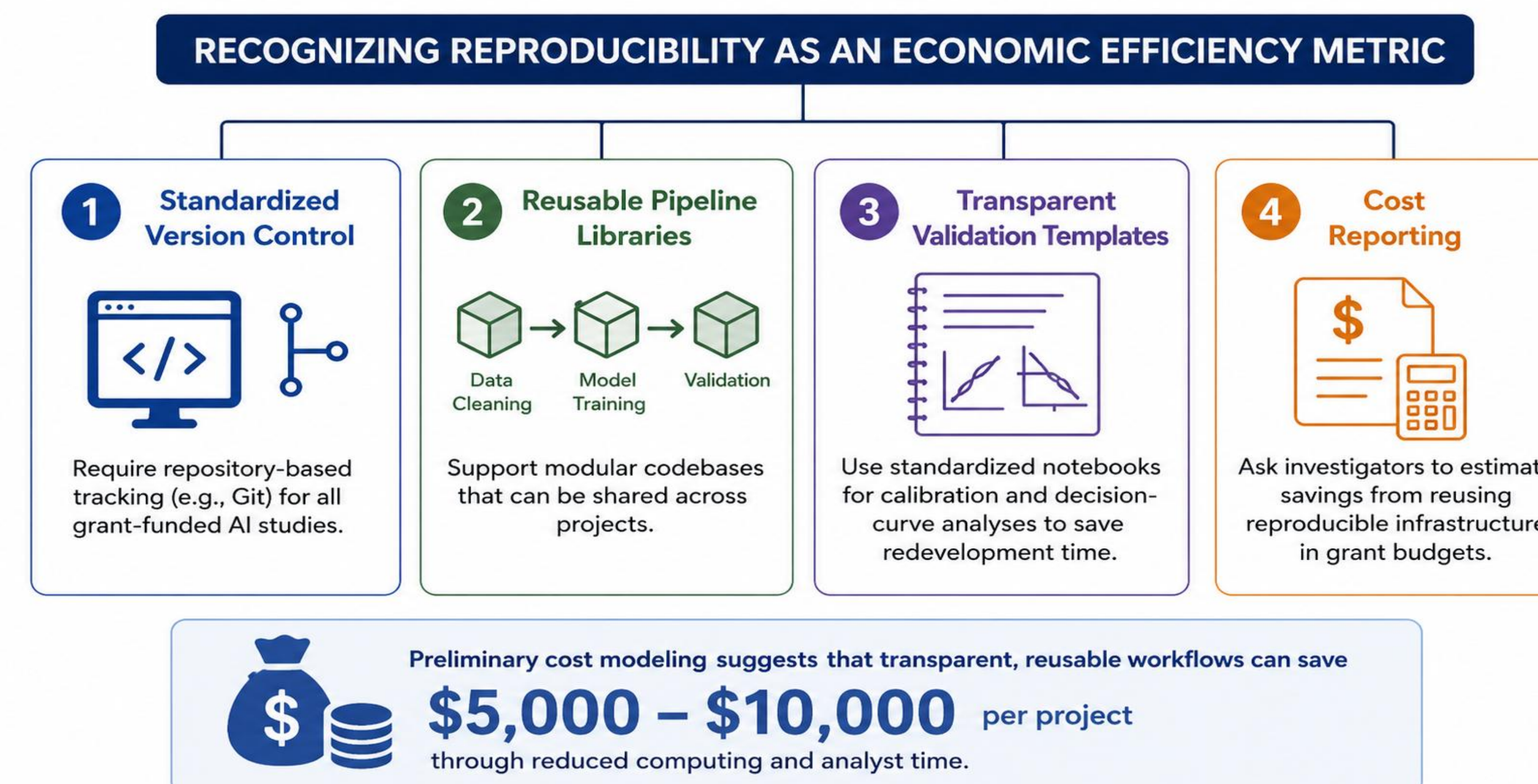
Methods/Materials

AI projects in radiology often rebuild the same data cleaning, feature extraction, and validation pipelines from scratch. Without shared, version-controlled workflows, research teams repeatedly spend time and funding on redundant preprocessing, software setup, and computing resources. These inefficiencies inflate the true cost of AI innovation and limit scalability. Transparent, modular workflows already emphasized by the ACR Data Science Institute and NIH Bridge2AI provide a more sustainable approach.

Results

We advocate for recognizing reproducibility as an economic efficiency metric. Key recommendations include:

1. Standardized version control: Require repository-based tracking (for example, Git) for all grant-funded AI studies.
2. Reusable pipeline libraries: Support modular codebases for data cleaning, model training, and validation that can be shared across projects.
3. Transparent validation templates: Use standardized notebooks for calibration and decision-curve analyses to save redevelopment time.
4. Cost reporting: Ask investigators to estimate savings from reusing reproducible infrastructure in grant budgets. Preliminary cost modeling suggests that transparent, reusable workflows can save \$5,000 to \$10,000 per project through reduced computing and analyst time.



Conclusions

Embedding reproducibility into radiology AI can reduce waste, improve collaboration, and strengthen the return on research investment. Departments and funders that adopt reproducibility metrics can reinvest savings into clinical validation and patient-centered innovation. Reproducibility is not just good practice, it is smart economics. Treating transparent, version-controlled AI workflows as shared infrastructure allows radiology's AI ecosystem to grow with both fiscal discipline and scientific integrity.

References

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