Bringing Big Data to Neural Interfaces

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A Decade of Progress

- Over $200M spent by NIH & NSF alone on "neural engineering" and "brain computer interfaces"
- Significant additional investment from DARPA, military, state, international agencies
- Over 1,700 peer review journal papers
- Conferences, book chapters, etc
- Excellent academic output

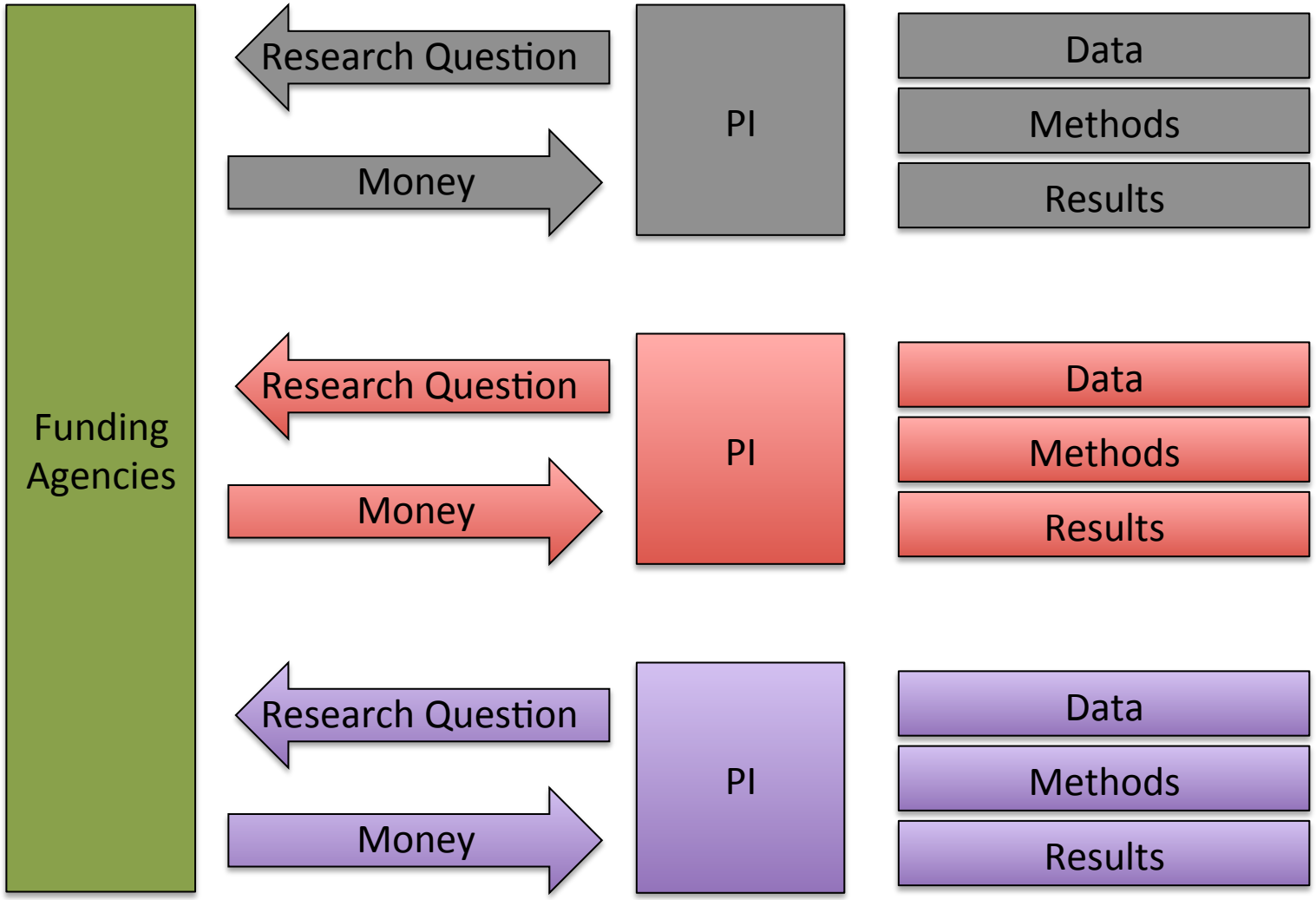
Translation to Marketplace

- Relatively little commercial technology development
- Relatively little translation from well-controlled lab environments into general use

- Signal processing isn't sufficiently robust
  - Insufficient training data
- Lack of common benchmarks
  - Need for community standards

Is there a better way of investing resources?

Existing Funding Model



Limitations of Existing Model

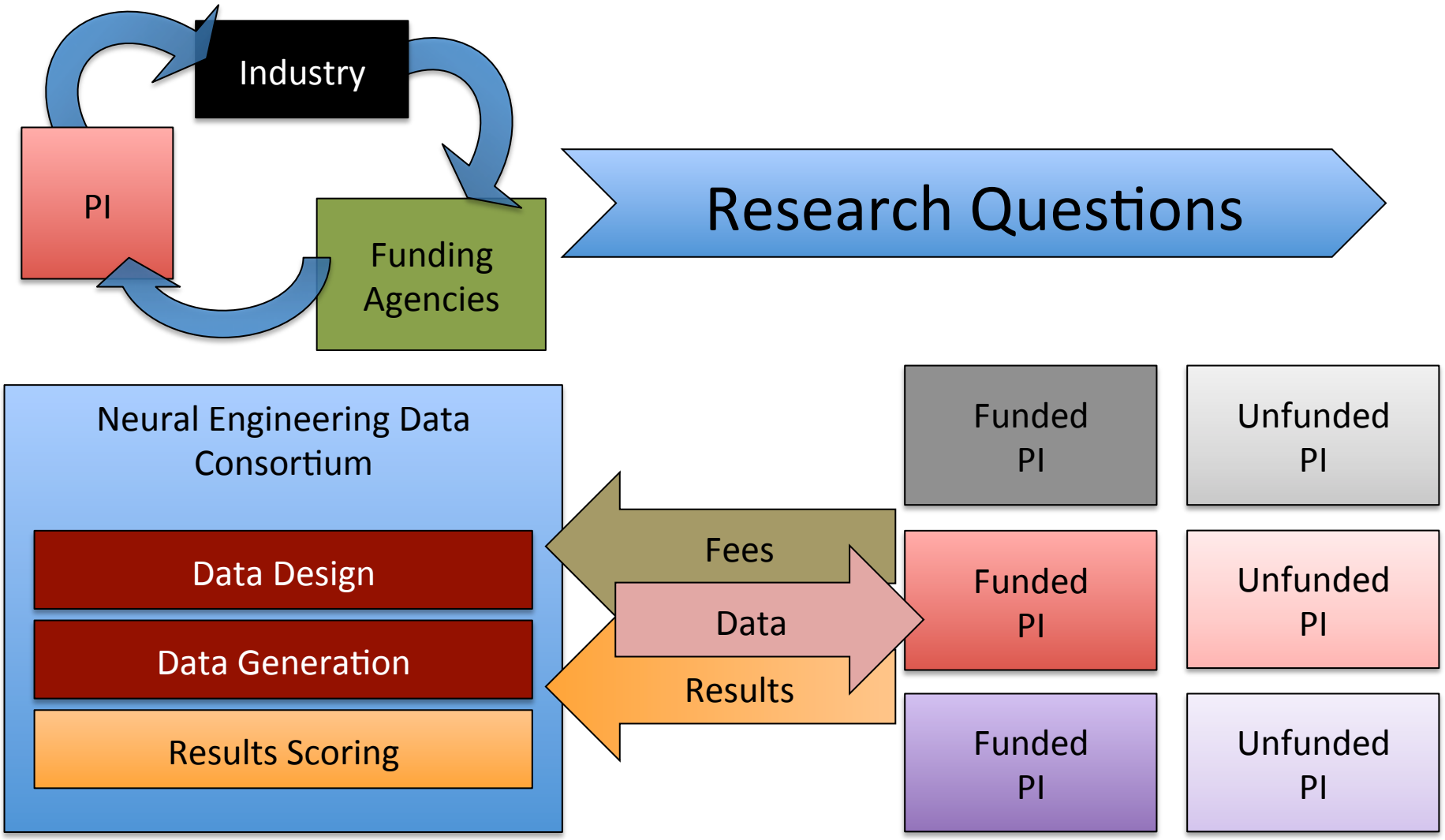
- Each PI creates own data using own protocol to answer own question
- Practically impossible to generate sufficient data to adequately capture signal variability under a variety of experimental conditions
- Lack of common benchmarks
- Hard/impossible to cross-validate results or compare results between groups
- All of these factors impede progress!

Neural Signal Databases

- NSF Data Sharing Policy
- Physionet
- CRCNS

*These are good, but they do not address the lack of **massive datasets** collected on **common protocols***

Alternative Model

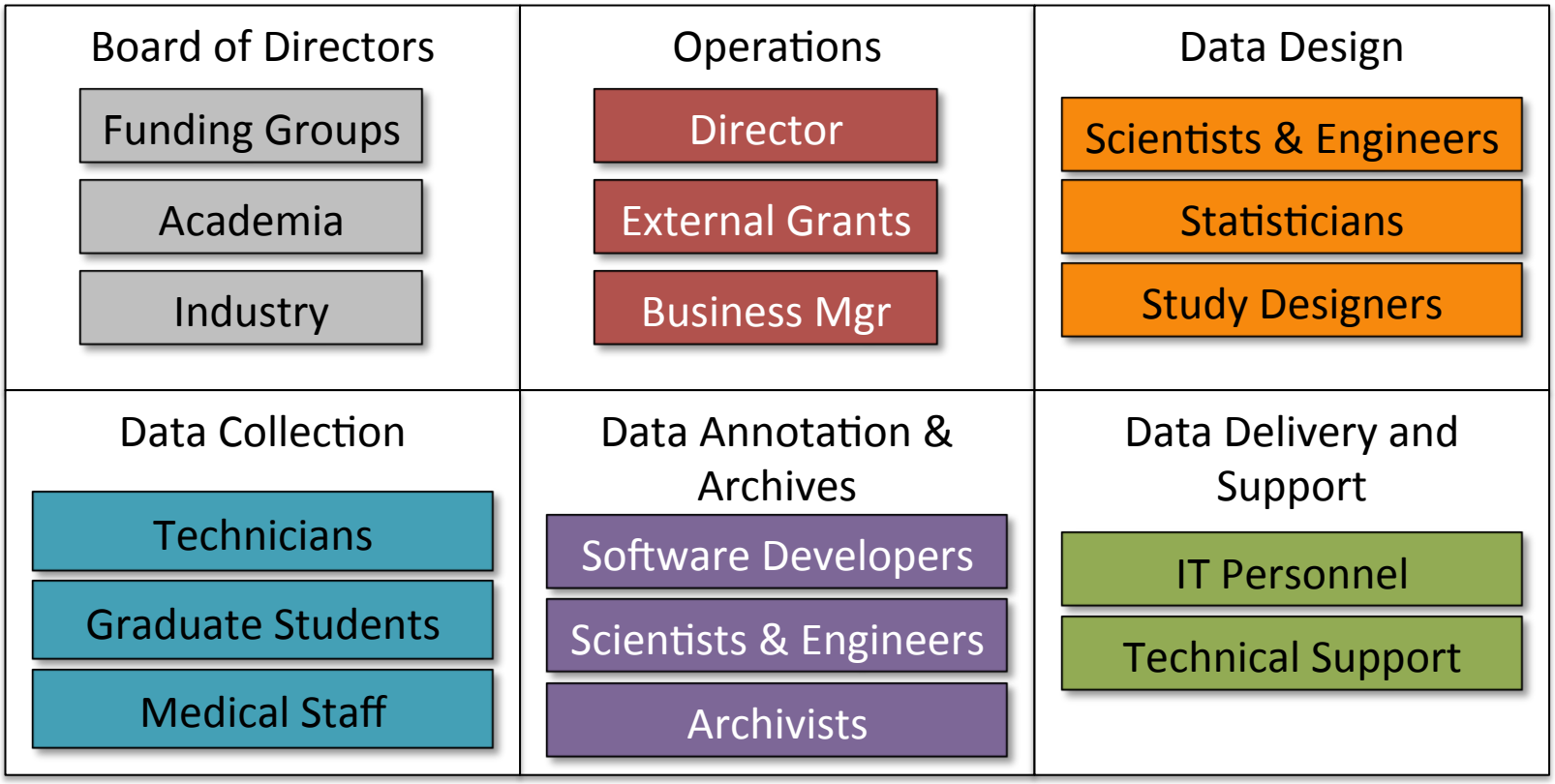


Neural Engineering Data Consortium

- Serves the community (not vice versa)
- Focuses community on common problems
- Drives algorithm development
- Improves amount and quality of data
- Validates performance claims
- Tiered membership fees
- Promotes “technology that works”

Does not preclude PI’s individual work!

Neural Engineering Data Consortium



Neural Engineering Data Consortium

- Phase 1: (2011-2012)
  - Concept development & Fundraising
  - NSF, DARPA, Temple University
- Phase 2 (2012-2013)
  - Proof-of-Concept Data Corpus
  - 20,000 clinical EEGs from Temple Hospital
- Phase 3 (2013-2014)
  - Planning Grant
  - Board of Directors recruitment
  - Fundraising

Proof of Concept Data Corpus

- 20,000 clinical EEG records from Temple University Hospital
- De-identified but fully annotated
- Demographic data, medical history, presenting complaint, medications all included
- Will be made available to the community
- Expected Completion in Early 2014
- Using data to train machine learning algorithms

Interested?

We are seeking collaborators!

Thoughts, input, suggestions, dissents …

IEEE GlobalSIP Conference
Symposium on Big Data – Paper due date 6/15!

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