



# Value-centered Information Theory for Adaptive Learning, Inference, Tracking, and Exploitation

## Wrapup

PI: Al Hero, Univ of Michigan





# What have we learned so far?

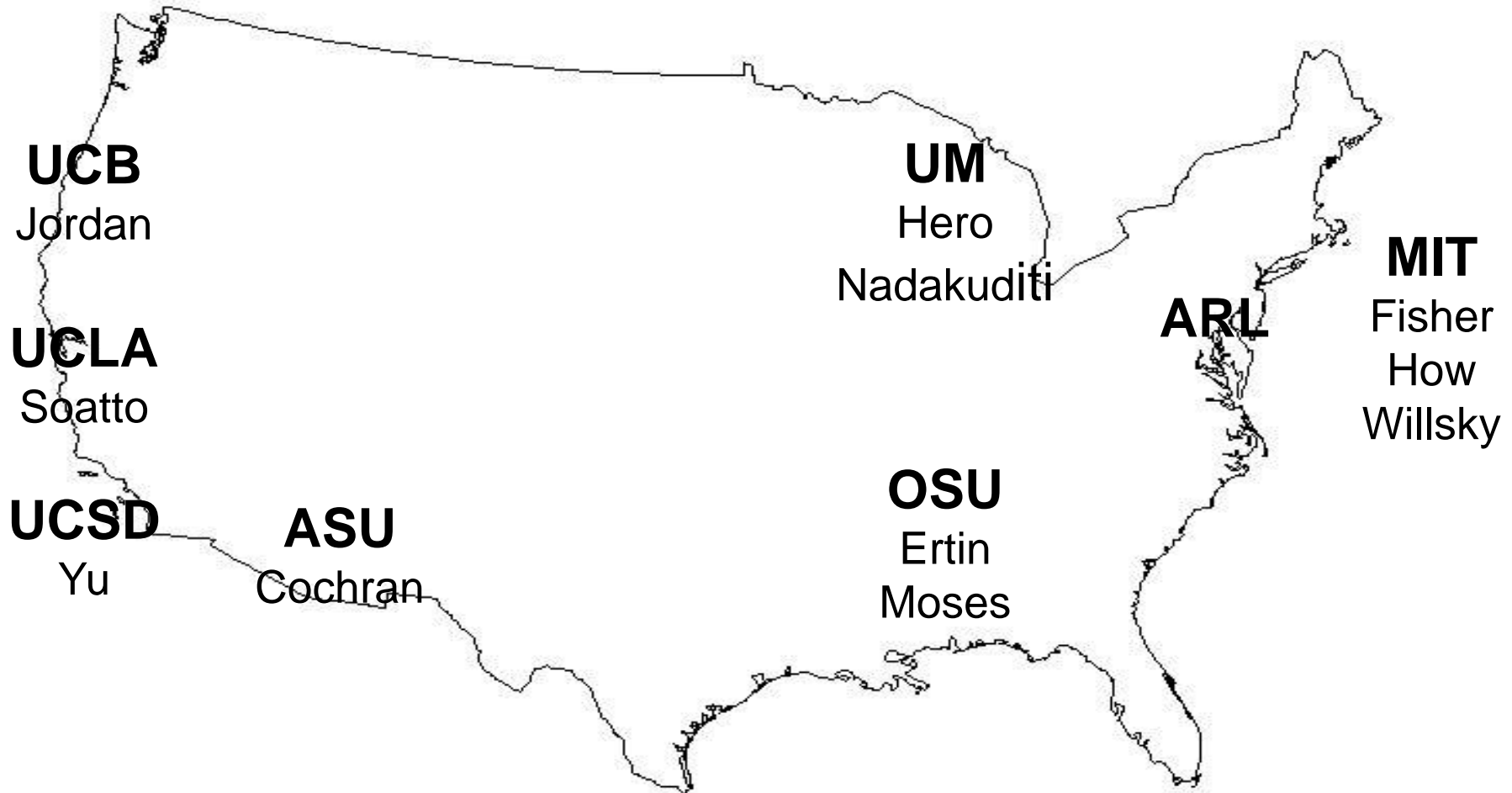


- There are important fundamental Vol tradeoffs
  - Model vs sample complexity for fusion (Hero 12, Nadakuditi 13)
  - Computation vs sample complexity for fusion (Jordan 12, Fisher 13)
  - Energy vs geometry in active vision (Soatto 12)
- Computational bottlenecks can be overcome by using good proxies
  - Information theoretic surrogates (Soatto 12, Fisher 12, Cochran 12)
  - Convex and concave-convex proxies (Hero 12-13, Ertin 12, Cochran 13)
  - Submodular myopic strategies (Fisher 12)
- Distributed processing framework can benefit from Vol perspective
  - Second order marginal MLE for SN (Hero 13)
  - Vol-aware censoring for tracking in sensor nets (How 12, Moses 12)
  - Cooperative human-machine interaction (Hero 13)



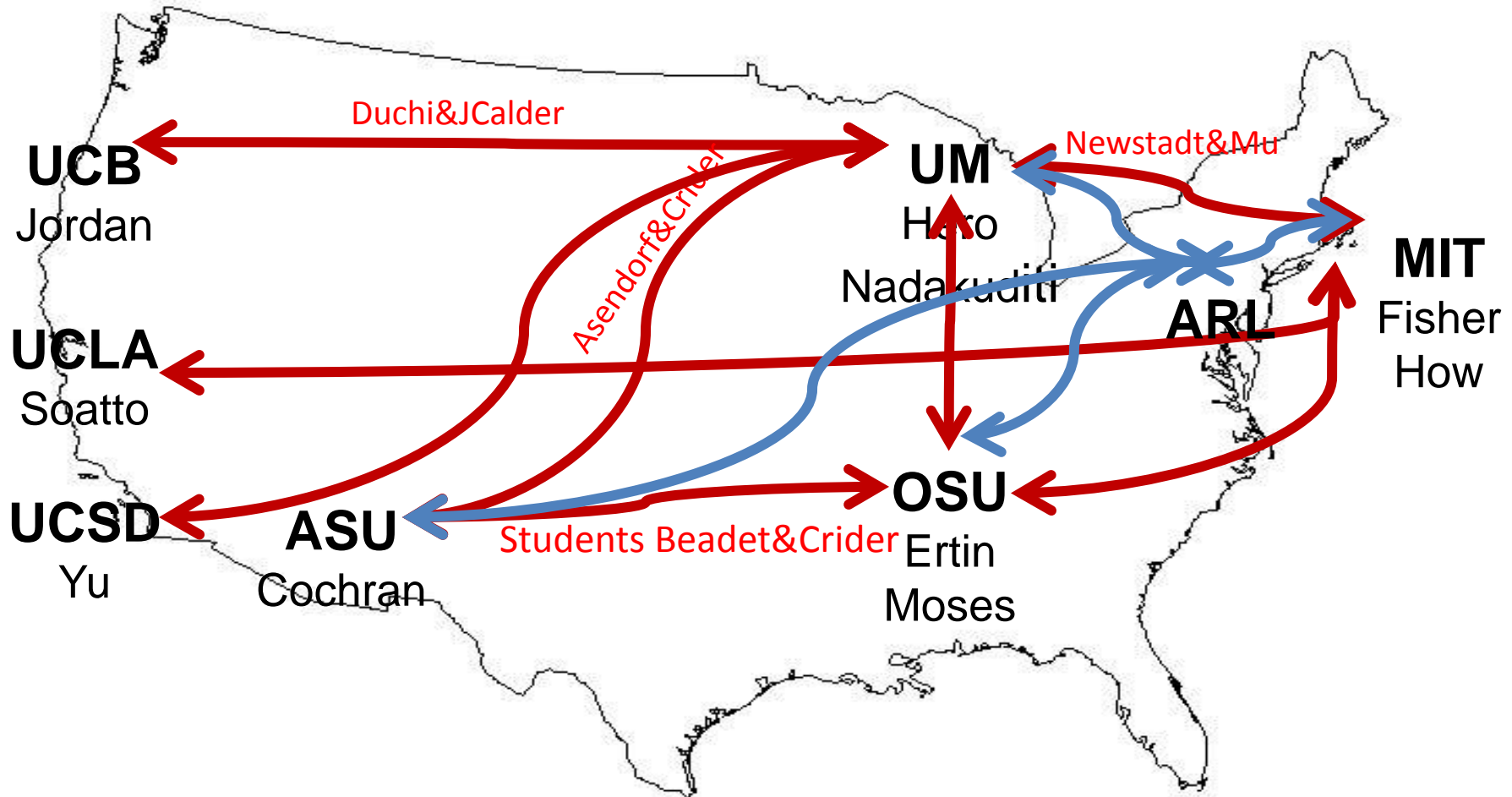


# Our MURI Leverages Collaborations (2013)





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# Education and training in years 1 and 2



- Over 20 Graduate students
- 2 Undergraduate students
- 5 Postdoctoral students
  
- Summer student internships at federal and associated labs
  - 5 students at ARL
  - 3 students at AFRL
  - 1 student at DSTO (Australia)
  
- Dissemination to broader community
  - SIEE Workshop in 2012
  - Special sessions at 2012 IEEE SSP and 2013 SPIE DSS





# Tech transfer in years 1 and 2



- Cochran, Ertin, Fisher and Hero visited ARL in 2012 and 2013
- Co-PI Hero and student Mark Hsiao have transitioned Pareto web image search engine to **ARL** in 2013 for evaluation and adaptation into an in-house interface (ARL POC: Brian Sadler).
- Co-PI Fisher has transferred in 2013 implementations of information planning algorithms to DARPA sub-contractor (**Systems Technology Research**) under the All Source Positioning and Navigation (ASPN) program. The method is being adapted to sensor planning and anomaly detection. STR POC: Joel Douglas.
- Co-PI Hero and student Kristjan Greenwald have worked on transitioning Kronecker sum decompositions to video sources at **AFRL** over the summer 2013.





# Synergistic activities in year 1 and 2



- Service on National/International Advisory Boards
  - Hero serves on NAS Committee on Applied and Theoretical Statistics (CATS).
  - Jordan chaired NAS Committee on Frontiers in Massive Data Analysis
  - Moses serves on NAS Committee on Science and Technology for Defense Warning.
  - Moses serves on NRC ARL TAB for CISD
  - Hero is member of Strategic Advisory Group (SAG) of University Defence Research Collaboration (URDC), U. Edinburgh and Heriot-Watt U. (UK).
- Workshop/session organization on MURI-related topics
  - Hero and Zelnio co-organized special session on Vol at 2013 SPIE DSS Conference
  - Hero and Nadakuditi co-chaired 2012 ARO SIEEE Workshop
  - Fisher and Sadler co-organized 2 sessions on Vol at 2012 IEEE SSP
  - Moses chaired Government Panel at 2012 IEEE SSP





# Statistics



- Technical progress under MURI is reported in over 70 peer reviewed publications (<https://wiki.eecs.umich.edu/voimuri>)
- 10 faculty supported by MURI
- 27 PhD, MS and BS students supported by MURI
- 6 postdoctoral students supported by MURI
- Quality of MURI team's research has been recognized by
  - 1 notable paper award
  - 19 invited talks and distinguished lectures
  - 14 keynote and plenary talks

