Measuring, Modeling & Managing Massively Interacting Systems

Christopher L. Barrett

Executive Director, Professor
Virginia Bioinformatics Institute
Virginia Tech

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Massively Interacting Systems

- Modern "bioinformatics" is growing to encompass interactions among many levels and properties of individuals, groups and environments
- It is computationally enabled science
  - increasingly blurring the distinction between social, environmental, socio-technical and biological domains
  - uptake of diverse unstructured information
  - in-silico generation of detailed extreme scale interaction dynamics
- Relevance to policy and science

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Unencapsulated Self: Inside/Outside Problem

- Who are "You"? Where is this You active?
- Example: B-12 and the microbiome
  - Acts like an organ; not your DNA but is "you"
  - "tuned" to matrilineal heritage, that is "you" too
- Example: Distributed selves and thinking
  - Bees, ants
  - Neurons don't know what they are thinking
  - Distributed cognition; you may not know what (or how) you are thinking either
- Example: The molecular multispecies
  - Phenotypic plasticity and modes

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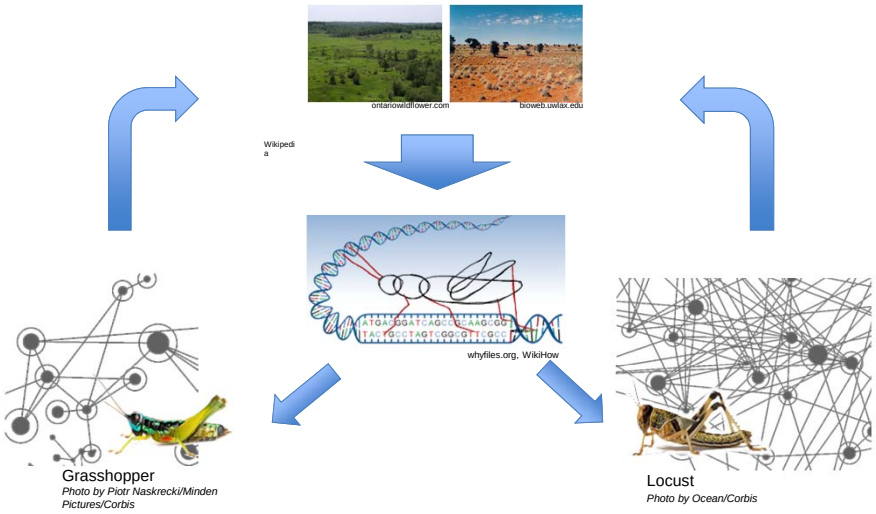
Expression of the hopper is distributed: DNA is just "middle ware"



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Unencapsulated agency

- Interactions + media concretely shape individuals
  - Where is your money?
  - Where is your debt?
  - Where are your actions?
  - Where is your accountability?
  - Where is your identity?
  - Etc
- In what forms are populations of "You" to be represented and analyzed?
  - We know granular detail can often matter

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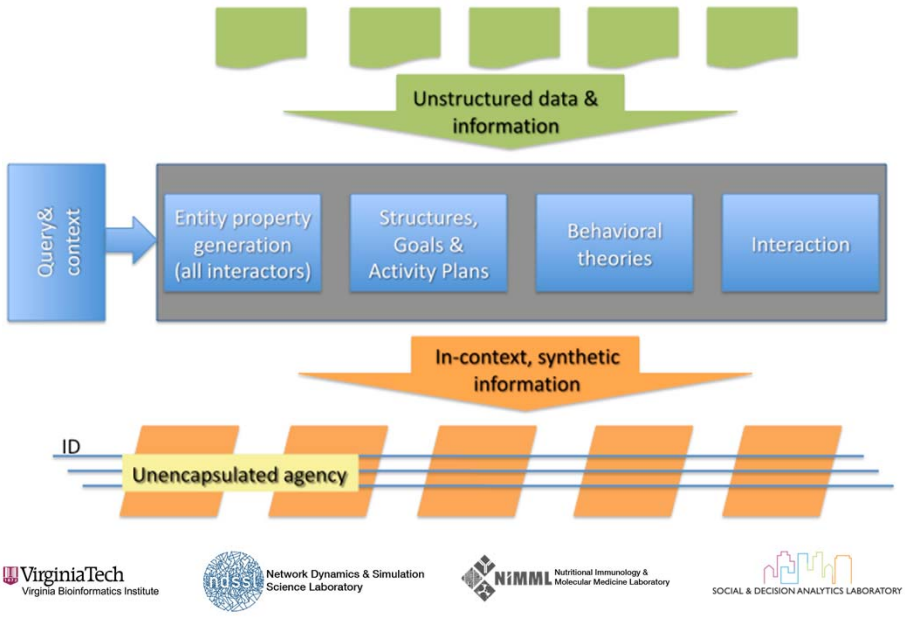
Beyond Modeling: Synthetic Information Platforms



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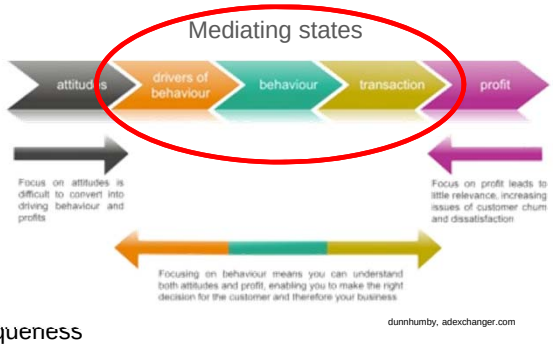
The trouble with prediction as the only purpose



- Branching
  - "doors close"
- Arbitrage law-style effects
  - Inherent non-predictivity
- Mediated states
  - Non-invertibility, non-uniqueness
  - Wrongness/ temporary confirmation
    - Deception
    - Lack of usual simplicity critera
- The perfect model that requires impossible data
- Still, there are obviously places for prediction

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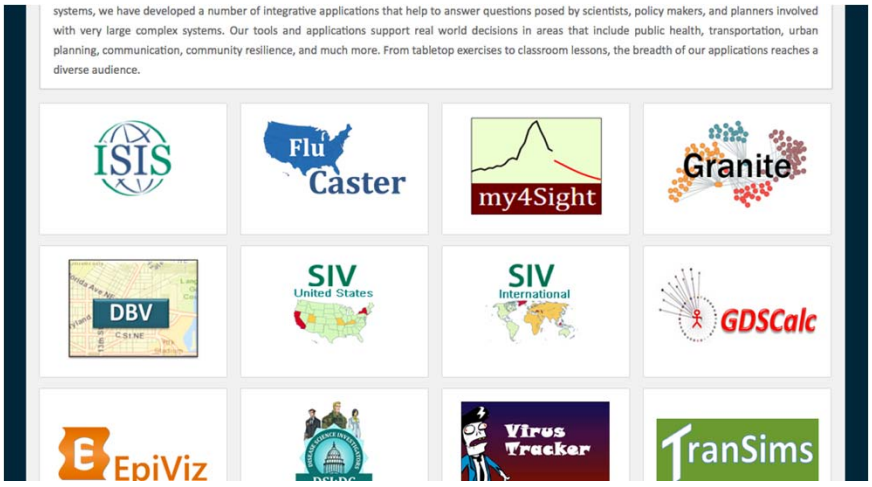
Example: Integrated Synthetic Information Apps



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my4Sight: a multi decision-maker synthetic information application platform

Captures and Includes intuitive judgment to improve analytical forecast methods in complex social contexts

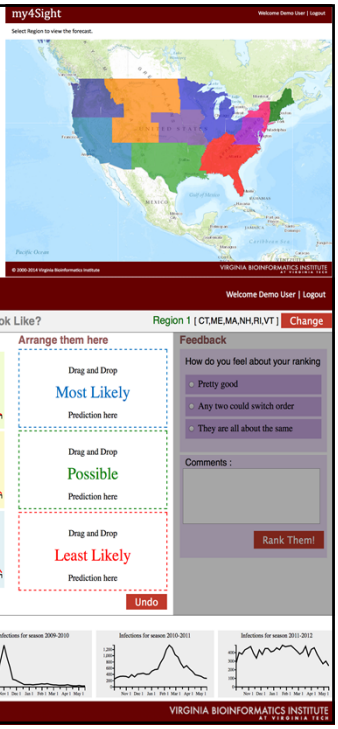
Deployable on various resources: stand-alone, Facebook, Turks, etc.

Specialized applications (e.g. military units, medical professionals)

Multiple model generated forecasts are shown; user can vote to select the most likely forecast

Extension to individual behavioral forecasting and analysis

Can combine forecast components



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Human situations and complex agency: many challenges to policy and to science

- Epigenetics of juvenile exposure to violence
- Influence networks
  - incarceration rates
  - and personal success
  - and smoking
  - and stopping smoking, etc
- Human distributed computing
- Market based pricing,
  - e.g., the Indian rice markets in 2009…..
    - famine without food shortage or plan
- Resilient interdependent societal infrastructure

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What's the point of Synthetic Information Systems?

- ICT layered into society, guiding state assessment, decisions and actions at all levels
- Scales to the natural size and richness of society
- Evolves with ICT and focuses on ecologies of needed applications and specialized methods
- It changes how to think about computationally-enabled social decision making

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So…

- Increasingly the ICT world is a large part of the lab and computer model; people/tech are embedded enactively rather than observed and managed
- New ICT methods are the *only* way to deal with this
- Scalable ecologies of synthetic information applications replace monolitic models for "deciders"
- Unstructured data upends a lot of scientific thinking about status of "data"
- Non-demonstrative methods and use of all this data as *evidence* must be carefully introduced to practice
- Prediction *per se* is diminished in purpose and plausibility

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Thank you

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