Health Workforce Modeling: Past, Present and Future Challenges and Opportunities

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UNC
THE CECIL G. SHEPS CENTER
FOR HEALTH SERVICES RESEARCH

THE PHYSICIANS FOUNDATION
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Improving Healthcare

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Presentation

- A sandbox approach to this presentation
- Limitations of past models
- Overview of our physician projection model
- Challenges
  - Geography
  - Utilization
  - Supply
  - Plasticity
  - Accounting for error
  - Dynamism and relevance
  - User interface

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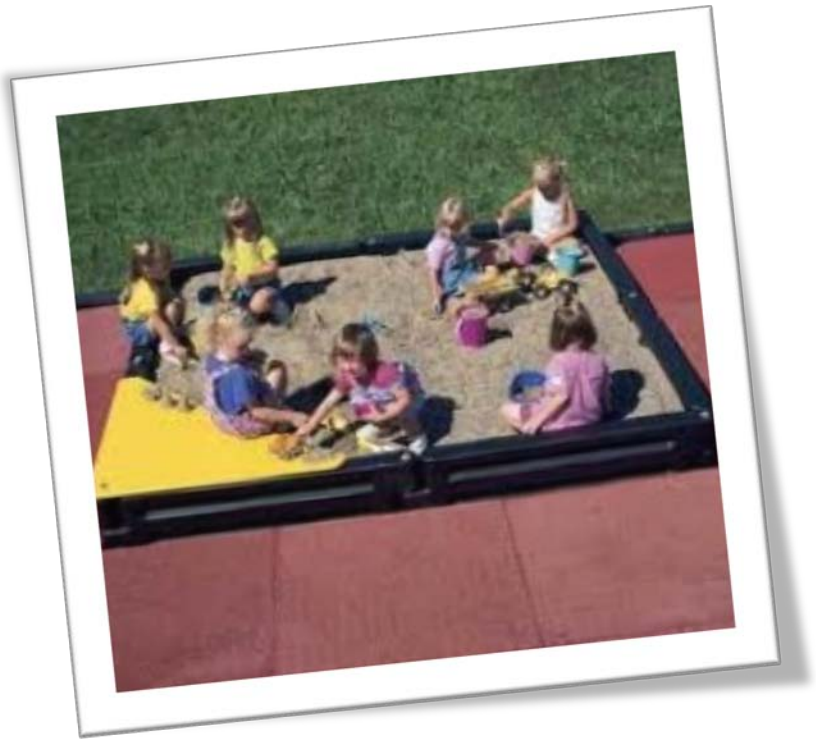
Improving the science of workforce modeling by collaboration in the "sandbox"



http://chrislincoln.hubpages.com/hub/Playing-Nice-In-The-Sandbox

It is important to abide by the rules of the sandbox:

- Throwing sand is never OK.
- Being mean will eventually result in you playing, unhappily, on your own.
- No taking other people's buckets without asking
- No kicking or breaking other peoples sandcastles

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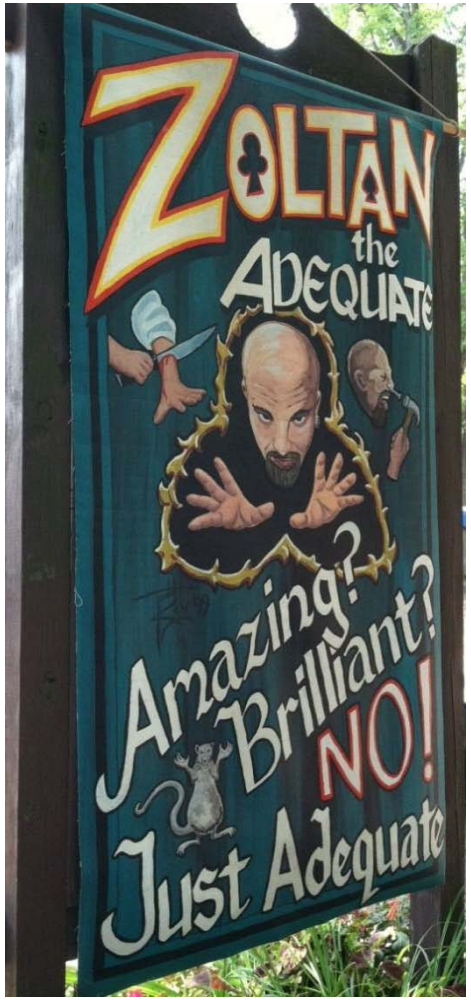
Critiquing Current Models

(a partial list of overgeneralizations)



- Silo-based projections by physician specialty
- Most are national or state-based models
- Focus on generating one "right answer"
- Inability to evaluate and compare scenarios
- Lack clinical and health system input
- Proprietary (read: black box) & uncustomizable models
- Lack friendly (and sexy) user interface

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UNC's Physician Projection Model Aims to Build, and Improve, on Past Models

- **Main objective**: Create "open source" model to project physician shortages and surpluses
  - Version 1.0 that can be built upon

- **Additional goal**: Promote dialogue about need to:
  - Engage clinicians in planning for the future workforce
  - ***Not*** generate a single "right" answer
  - Develop scenarios to allow users to simulate policy effects
  - Create "sandbox" to improve "science" of workforce projections

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At what unit of geography should, and can, we do projections?

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Factors influencing unit of geography for workforce projections: conceptual issues

- **Utilization/Supply**: What is service area? What services do we need to plan for locally versus regionally?
- **Audience**: Who is using model and what types of decisions and policy actions are made at each level?
  - National
  - State
  - Sub-state
  - Sub-county

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Factors influencing unit of geography for workforce projection: practical considerations

- Data availability. County-level data are generally available for most data
- ***BUT*** predicted supply and utilization at the county level may be "lumpy" for counties with small population
- **Our approach**: model at the county level, but *report* only at larger units. Our unit is a "tertiary service area" – based on Dartmouth's Hospital Referral Region but "snapped" to county boundaries
- Health system consolidation and move toward ACO and ACO-like structures argue for larger planning units

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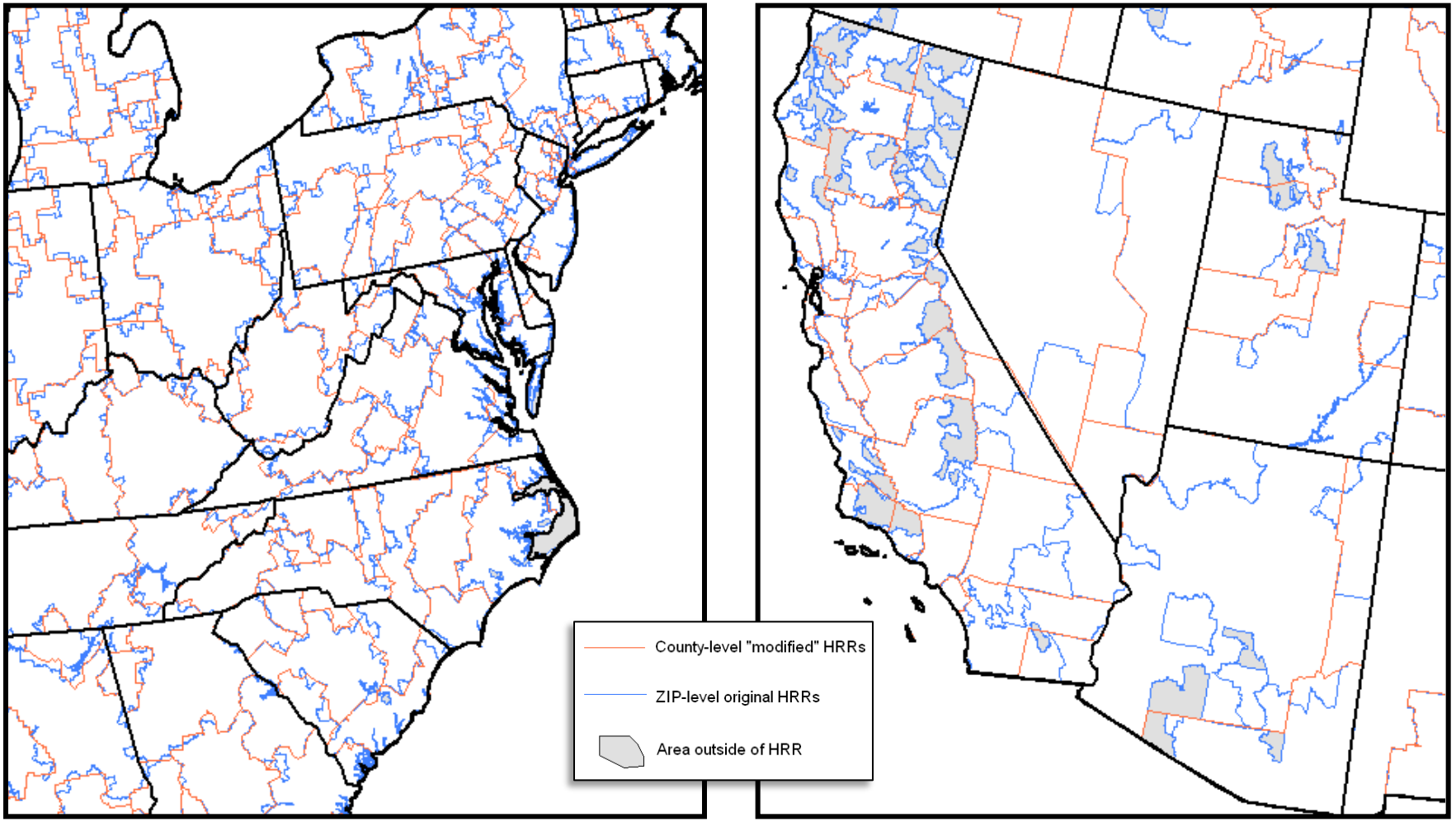
Our "TSAs" align pretty well with HRRs, although closer in East



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Modeling utilization

- Should we model utilization, demand or need?
- How to categorize types of care people are seeking?
  - created 19 “buckets” of Clinical Service Areas (e.g. respiratory conditions, circulatory conditions, endocrinology, mental health, preventative care etc.)
- How to model where people seek care?
  - modeling utilization in 4 medical settings: physician offices, hospital inpatient settings, hospital outpatient settings and emergency departments

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But that's just the baseline— how to model changes in utilization?

- Bundled payments, readmission fines and shared risk models will shift health care and health workforce to community-based settings. Can we model this shift?
- New payment and care models will also:
  - **incentive task shifting**: Will this actually reduce utilization of physician services? Will effect vary by clinical service area and geography?
  - **change types of services for which people seek care**: model for more prevention and fewer inpatient services?
- Are we harvesting knowledge about workforce implications of CMMI's innovation pilots to redesign health care system?

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Importance of clinical and health system input

- Need dynamic, relevant workforce models
- Health system input—these are the folks making workforce employment and training decisions!
- Clinician leader input
  - Check “face validity” of data, assumptions, outputs
  - Provide “best clinical guess” when data lacking
  - Identify and prioritize scenarios to model
  - Input on model interface and outputs

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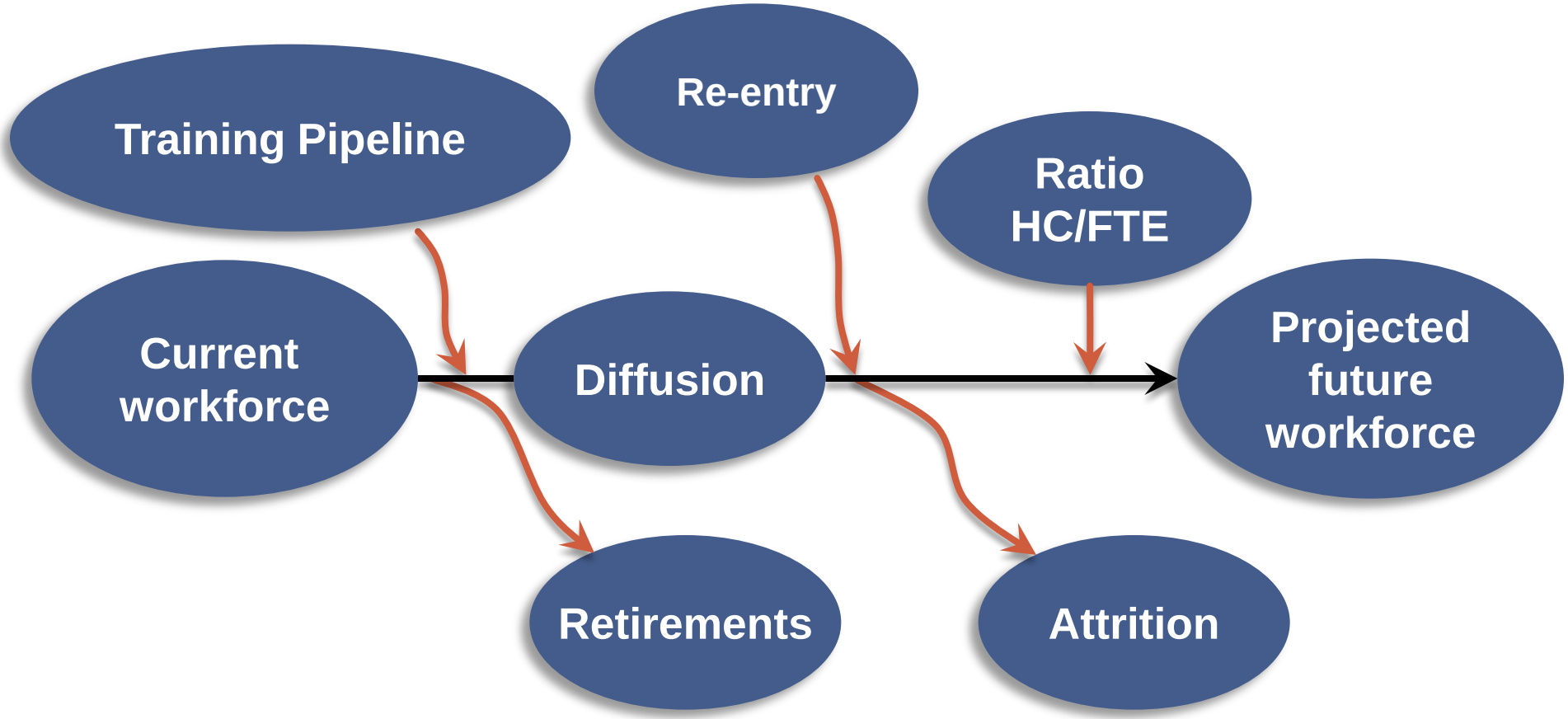
Forecasting the Supply of Physician Services in Headcount and FTE



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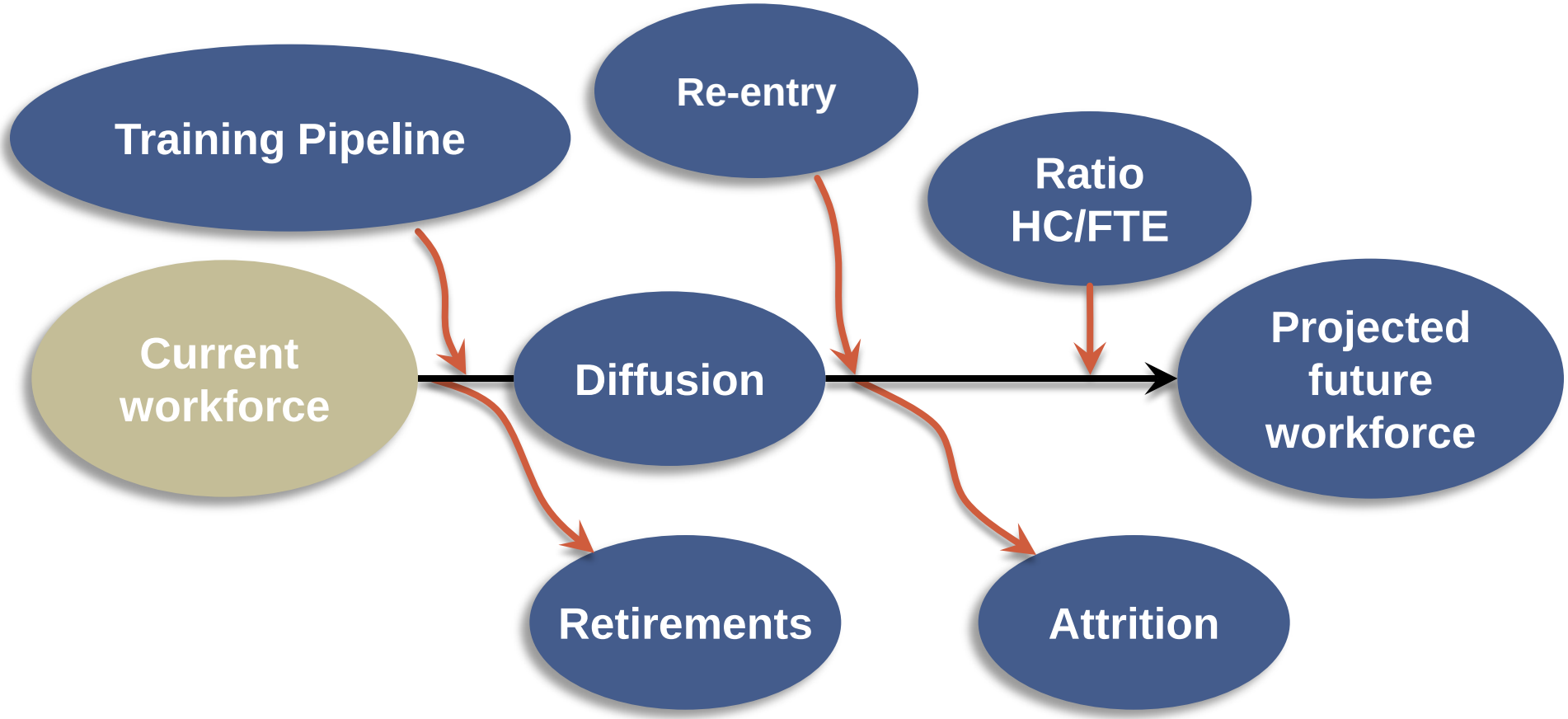

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How to create a manageable number of workforce specialties to model?

- **Need to**
  - reduce the number of specialties to a manageable number
  - assign single specialty to each physician
- **Modeling 36 specialties in 5 "buckets"**
  - Adult Medical Specialties
  - Adult Surgical Specialties
  - Adult Primary Care Specialties
  - Pediatric Medical and Surgical Specialties
  - Other Specialties
- **Assigned physician specialty using AMA and ABMS data**

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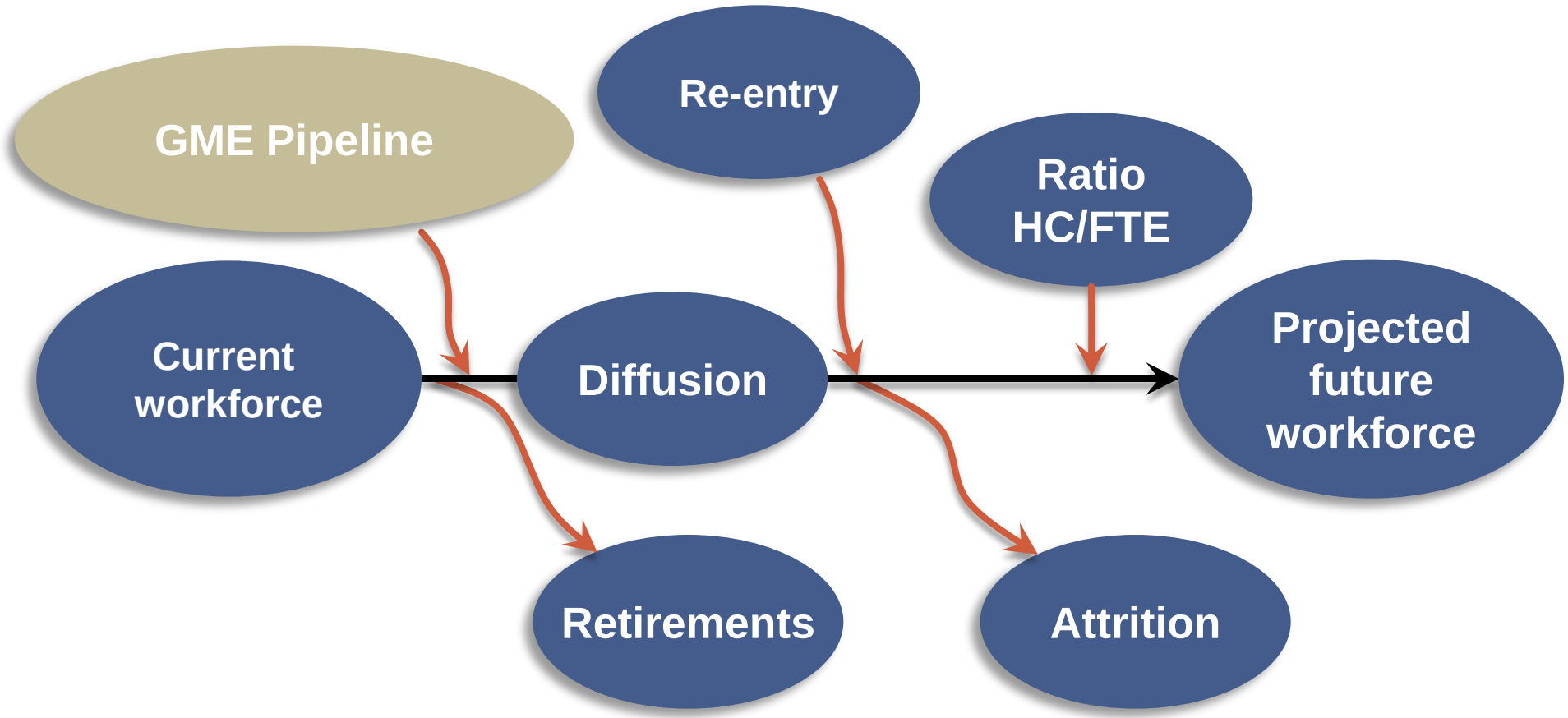

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GME Pipeline

For each year, each specialty, need numbers entering training by:

- Gender
- Location
- Age
- Length of training
- Annual attrition
- Branching and switching

- **NRMP data limited, need full census from GME Track**

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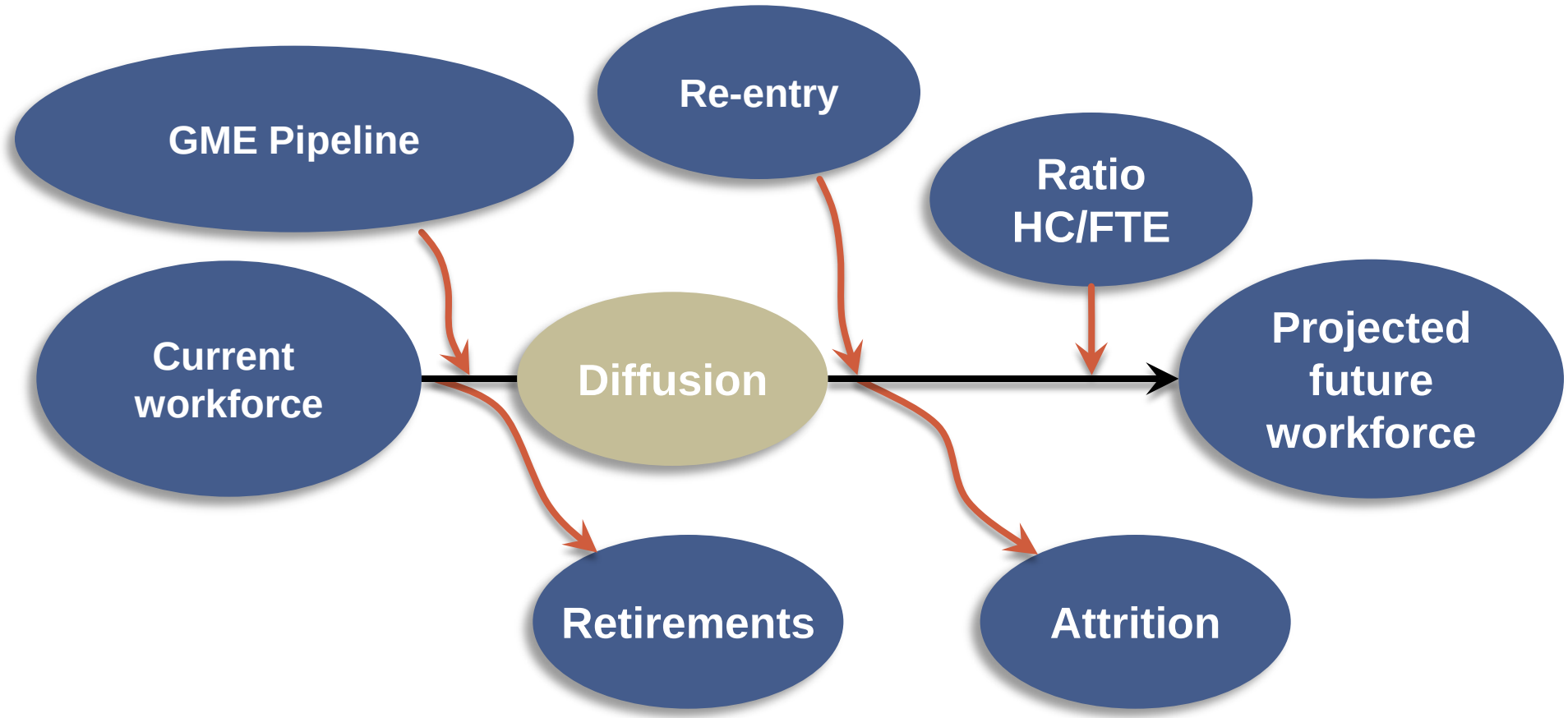

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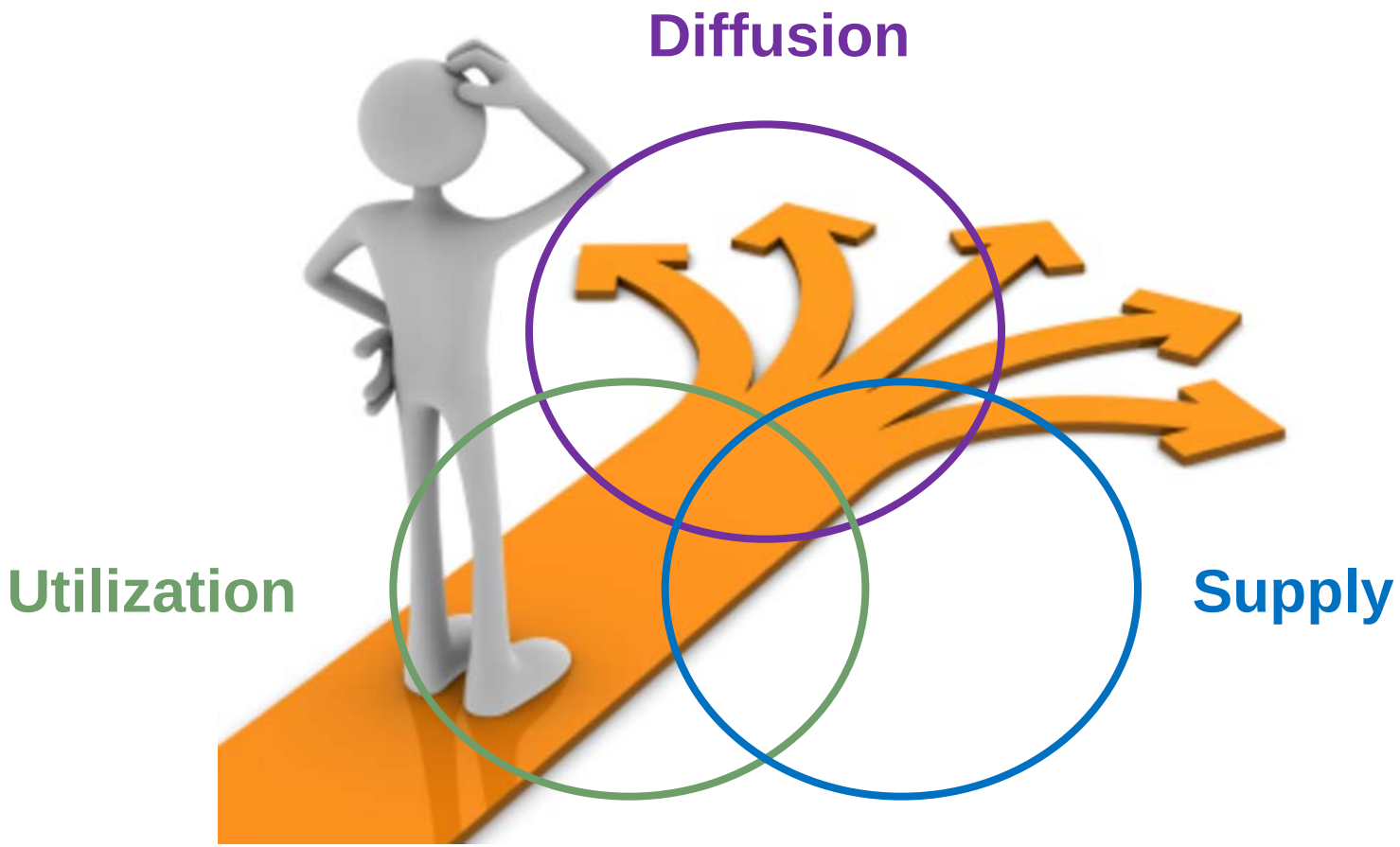
Modeling Diffusion: Newly trained and existing workforce need to be diffused out to different geographies according to "push" and "pull" factors



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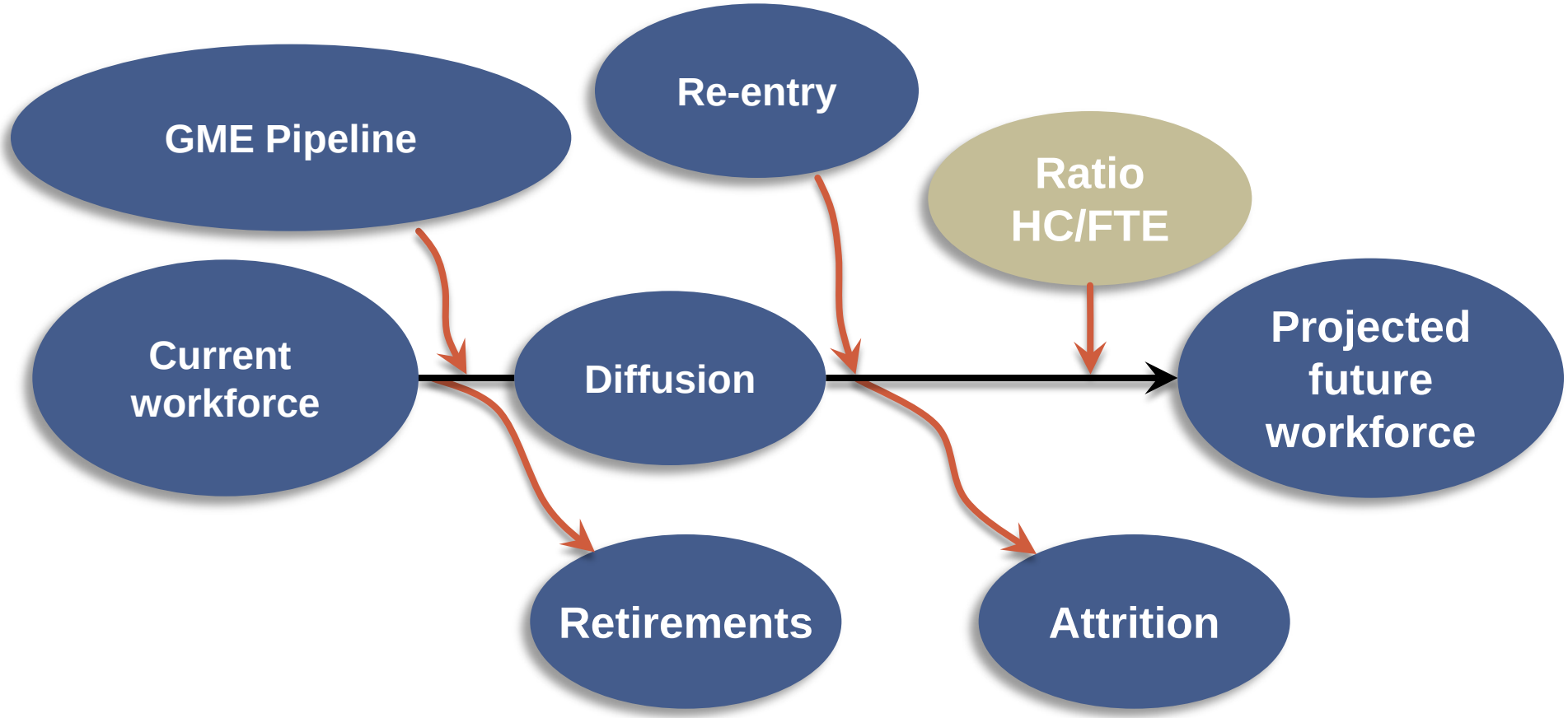

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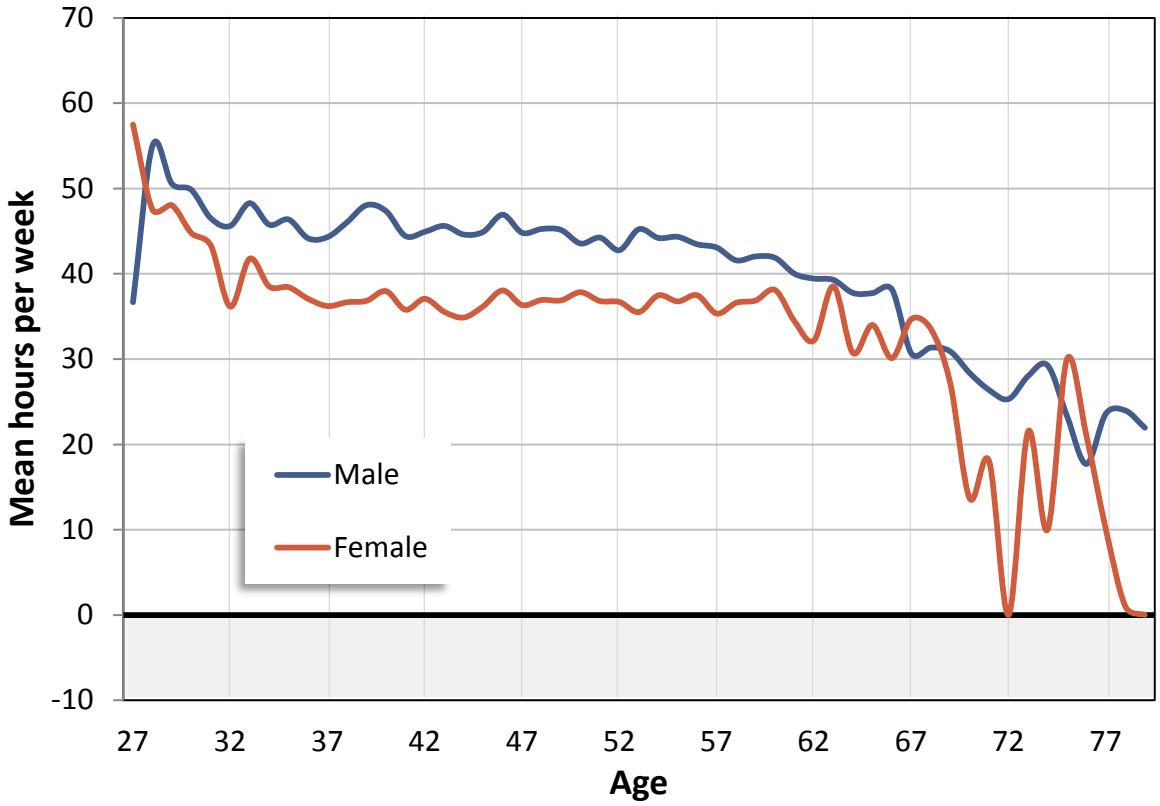
Modeling Patient Care FTE

- **Model variation by:**
  - Gender
  - Age
  - Specialty
  - Generational effects?
- How do hours worked relate to productivity?
- How to model retirement and re-entry?



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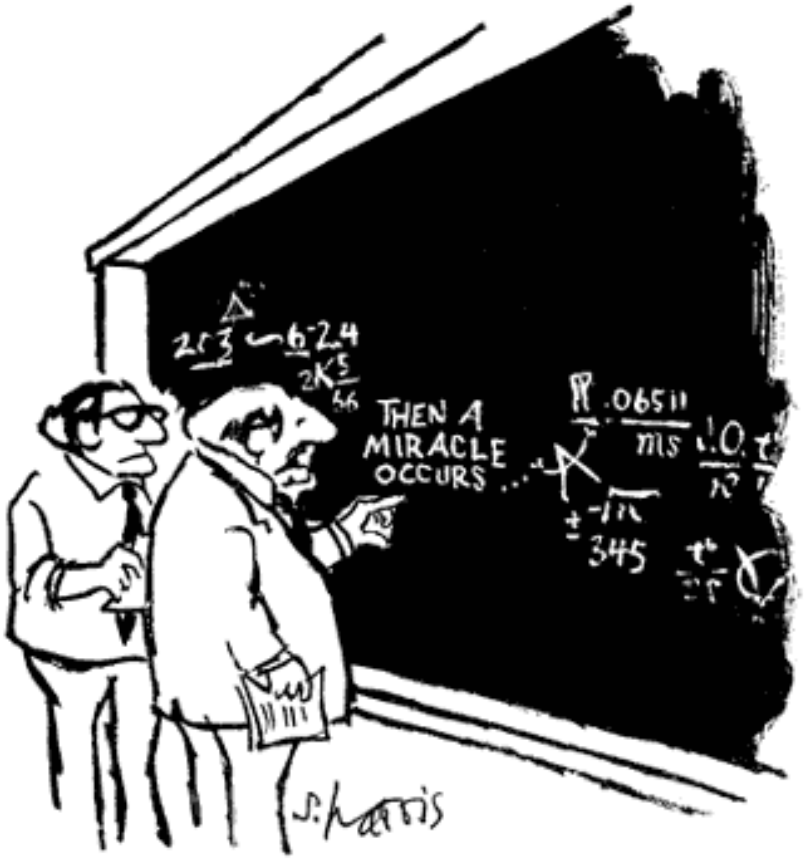
Once you've produced an estimate of utilization and supply, you have to map *services* to *providers*



"I think you should be more explicit here in step two."

- Key decision: allow for "**plasticity**" that recognizes the "fungibility" of services between specialties
- How to model a specialist's range of services?

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Our Approach to Modeling Plasticity: A Sample Matrix

Within a CSA, how are visits distributed across specialties

SPECIALTY	Neoplasms	Circulatory	Respiratory	Pregnancy/ch
CARDIOLOGY (HEART)	145,802	34%	593,326	898
DERMATOLOGY (SKIN)	11,913,249	0%	187,179	16,234
FAMILY PRACTICE	1,772,218	38%	19,943,025	1,264,030
GYNECOLOGY/OBSTETRICS	2,575,715	1%	17,533	29,821,750
INTERNAL MEDICINE	4%	54%	40%	3%

Within a specialty, how are visits distributed across CSAs?

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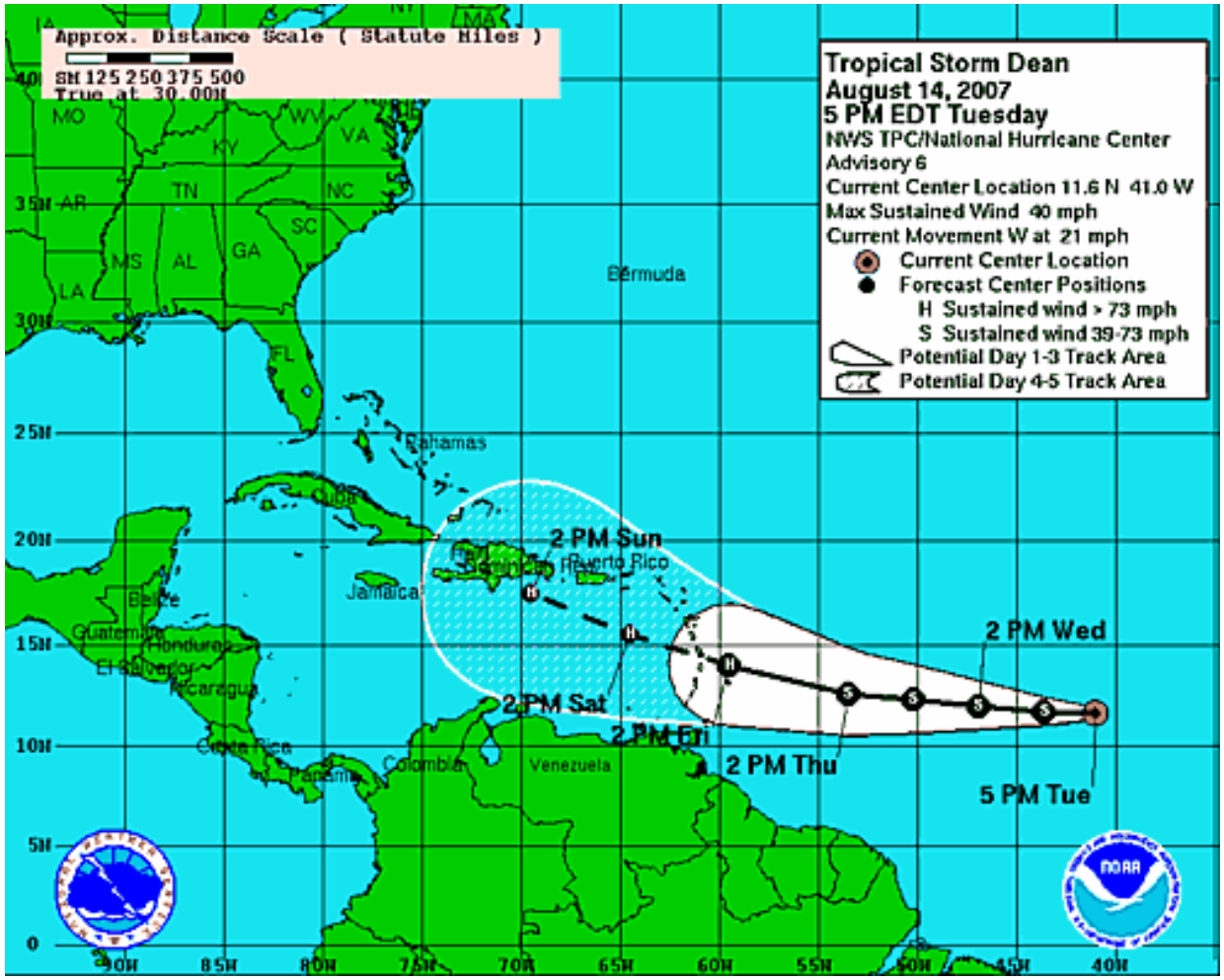
Model has to allow for uncertainty



Why do people accept uncertainty with a hurricane forecast and not with a workforce projection?

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Building a user-friendly sexy interface (1)

Building a user interface that:

- Provides transparent information about data, assumptions, and model design
- Produces useful and interactive data displays:
  - Shows alignment of supply and utilization (~~shortage~~/surplus)
  - Baseline and projected supply & distribution
    - Specialty, Age, Gender, Headcount, FTE
    - Absolute numbers, relative to population, percent change
  - Baseline and projected utilization (# of visits) by Clinical Service Area and setting

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Building a user-friendly sexy interface (2)

Need to build a user interface that:

- Allows user to compare baseline to probable system changes using scenarios
- Allows user to compare changes:
  - Over time
  - Between geographic areas: state to nation, HRR to state
  - Between specialties

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