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Improving Cost Estimates in a Medical Acquisition Environment

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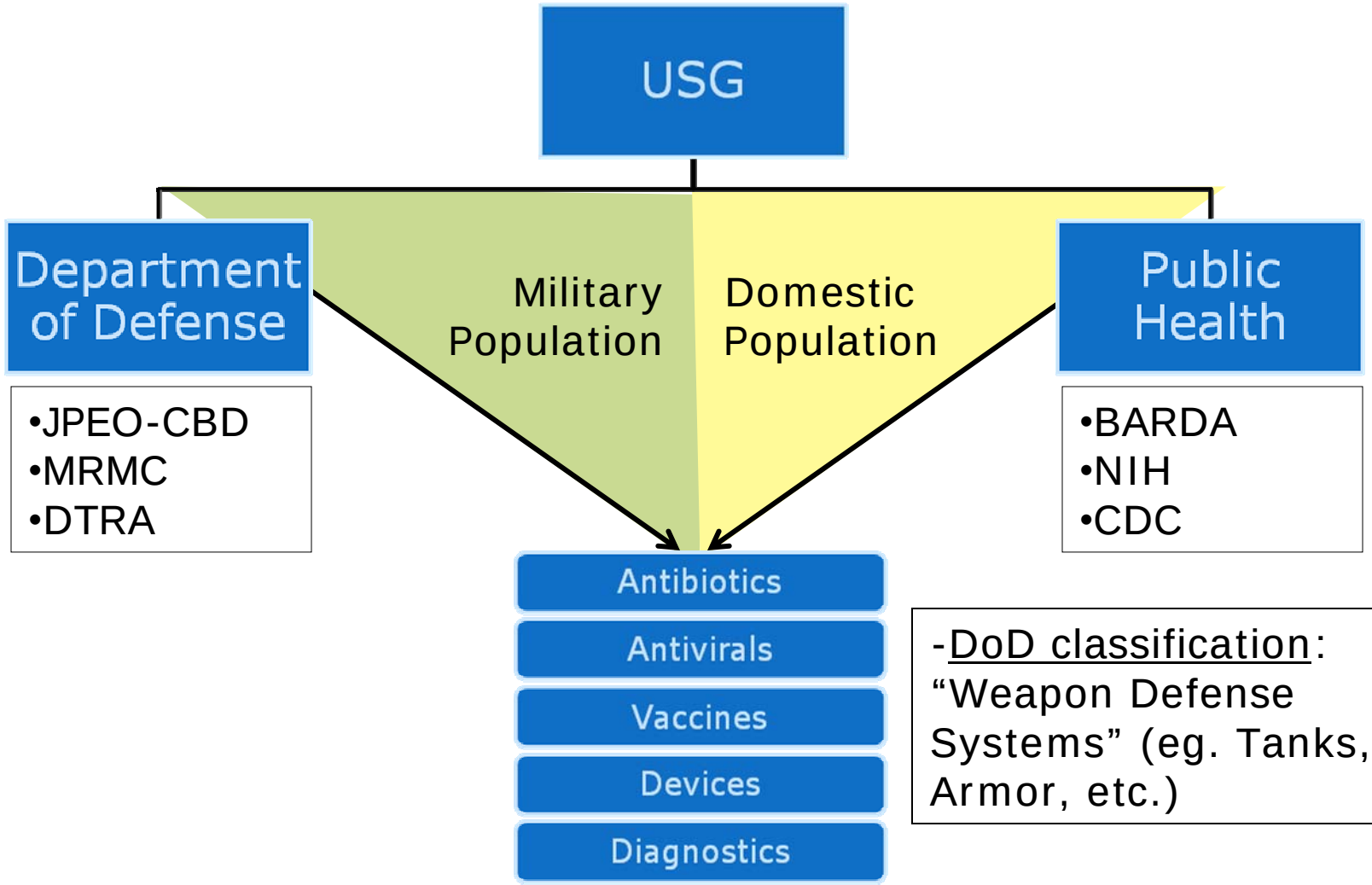
Abstract

Estimating costs for drug development has proven difficult over the years. Difficulties stem from the overlapping of the Department of Defense (DoD) acquisition process and the Food and Drug Administration's (FDA's) review process, small data pool, industry close hold of cost data, the inherent difficulties in the drug development process, and the lack of using best practices in cost estimating. Over the past couple of years the medical cost community has been working towards improving their cost estimates. These efforts included the establishment of a standard drug development work breakdown structure to ensure that data could be collected and compared in a standard way. A medical cost model was then created in order to use the available data to develop program estimates. Additional efforts have begun to join with agencies outside of the DoD to increase the size of the data pool. This presentation will detail the difficulties of estimating the cost of drug development activities and review the efforts that have begun to improve cost estimates.

Outline

- Challenges of cost estimation for government medical programs
- Improvements to previous government cost estimation methods
- Future efforts of government medical programs for cost estimation and analysis

Introduction to Medical Structure



-DoD classification: "Weapon Defense Systems" (eg. Tanks, Armor, etc.)

Average out-of pocket clinical costs for investigational compounds (BY00$M)

Testing Phase	Mean Cost	Median Cost	Standard deviation	Probability of Entering Phase
Phase 1	15.2	13.9	12.8	100%
Phase 2	23.5	17.0	22.1	71%
Phase 3	86.3	62.0	60.6	31.4%
Long-Term Animal	5.2	3.1	4.8	31.4%

Source: *J.A. DiMasi et al./Journal for Health Economics 22 (2003) 151-185*

Probability of Successful FDA Licensure/Approval

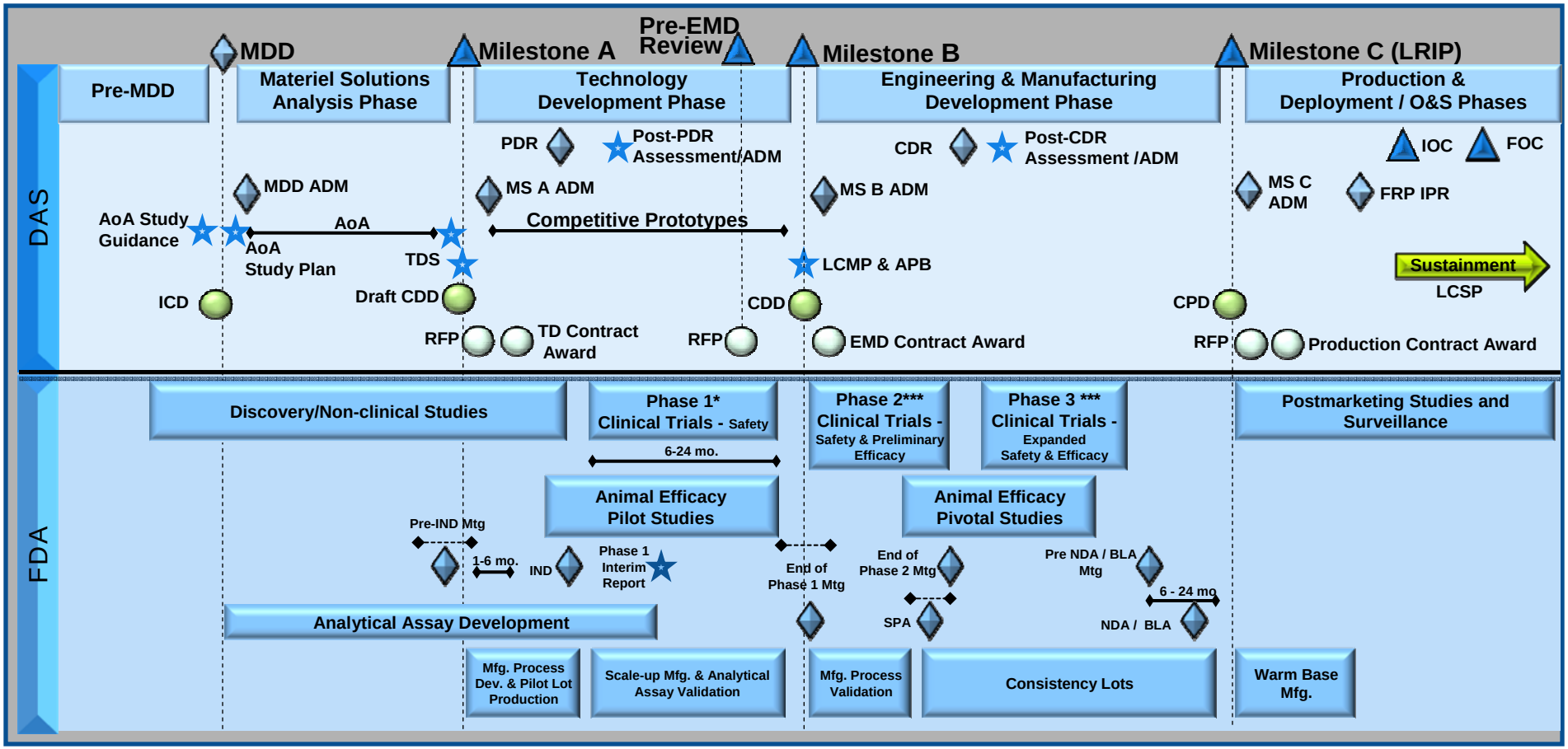
Phase	Probability of Success	Candidates Needed for Success
Preclinical	69%	12.4
Phase 1	54%	8.6
Phase 2	34%	4.6
Phase 3	70%	1.6
Licensure/Approval	90%	1.1
1 Successfully Licensed / Approved Candidate		

Source: Paul et al./How to Improve R&D Productivity *Nature Reviews Drug Discovery* (March 2010)

Challenges- Regulatory

- Integration of the DoD Acquisition Process and the FDA Review process is inherently difficult and has not been completely defined, which leads to inconsistencies and changes
  - Animal Rule
  - Establishment of DoD Milestones
- DoD medical products must be FDA approved but DoD has no input into FDA decisions or processes
- FDA guidance can add additional clinical trials/tests and add years to drug development cycles

Integration of DoD and FDA Schedules



Challenges- Cost Estimation Best Practices

- No standard WBS/CES structure used between government agencies for costing programs
- No standard for documentation of cost estimation methodologies and sources
- Cost risk analysis was immature
- Minimal available data points preclude the use of sophisticated cost estimating methodologies
  - Cost data from industry is proprietary and protected
  - Publicly available cost databases are not relevant to specialized government programs
  - Public cost data is generally not useful due to lack of detail
  - Contract values become best available option for budget development

Challenges- Medical Development

- Drug development is inherently difficult to model
  - Does not fit linear costing practices because it is not a linear process
  - Technical development metrics are not standardized
  - Highly unpredictable, with high risk of changes to cost, performance, and schedule
- Fluidity: as medical technologies evolve, the drug development process changes
- Each DoD has their own language and business processes to define the drug development process

Improvements- Cost Estimating Best Practices

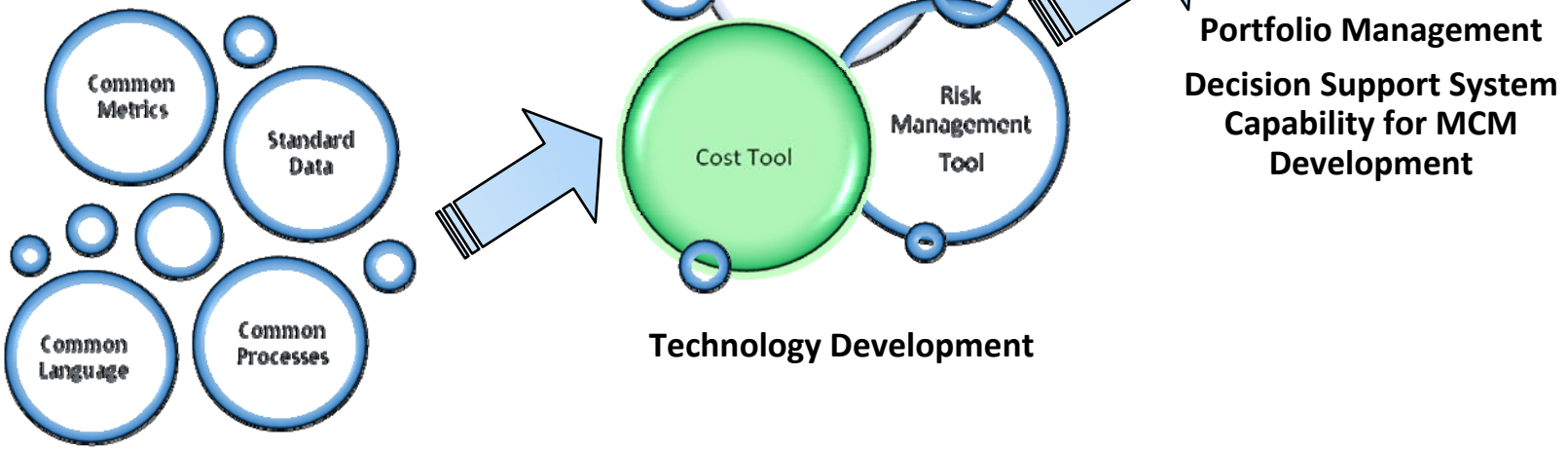
- Identifying a more robust standardized WBS/CES
  - Implemented a crosswalk of standardized medical WBS/CES to the Army CES
- Improved documentation and sourcing
  - Implemented use of Cost Estimating Methodology Matrix (CEMM)
- Begun to conduct cost risk analysis using SME opinion and other available data sources
- Data collection efforts to determine best methodologies
- Development of the Small Molecule Integrated Cost Model (SMICM) and the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) cost model

Improvements- Cost Model

- Summer of 2010: Transformational Medical Technologies Initiative (TMTI) had no way of costing out early Science and Technology projects
- Built an Excel-based structure for cost data collections and analysis
- Developed associated Excel-based tool used for estimation and analysis of project costs
- Cost tool scope was extended through advanced development
  - Created a beginning to end cost model

June 2012- Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) expands cost tool for interagency use

Standardizing business processes across the USG and developing tools for interagency portfolio coordination

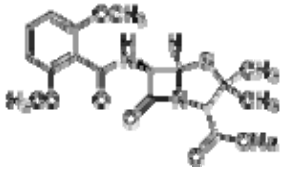


Improvements to Structure (WBS/CES)

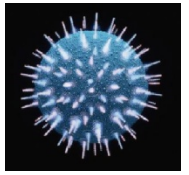
QTRL	Subtask	
3-E1: Select type strain candidate(s) or physical/physiochemical forms of challenge agent.	**3.1.2**	**Model Development Studies**
	3.1.2.1	**Studies for infectious challenge agents**
	3.1.2.1.1	Pathogen comparison (LD50/LD90)
		GLP/non-GLP, animal species, route of infection, route of administration, numbe of days, number of animals, number of observations, challenge agent, add-on list
		Aerosol Delivery Systems Qualification
		GLP/Non-GLP, Aerosol particle size, Exposure time, Quality and quantity of viable pathogen delivered (impinge or lungs)
		Aerosol Consistency Study (Includes mice & NHP)
	3.1.2.2	**Studies for chemical challenge agents**
	3.1.2.2.1	Compound Comparison (LD50/LD90)
		GLP/non-GLP, animal species, route of infection, route of administration, numbe of days, number of animals, number of observations, challenge agent, add-on list
		Aerosol Delivery Systems Qualification
		GLP/Non-GLP, Aerosol particle size, Exposure time, Quality and quantity of viable pathogen delivered (impinge or lungs)
		Aerosol Consistency Study (Includes mice & NHP)

Improvements to usability

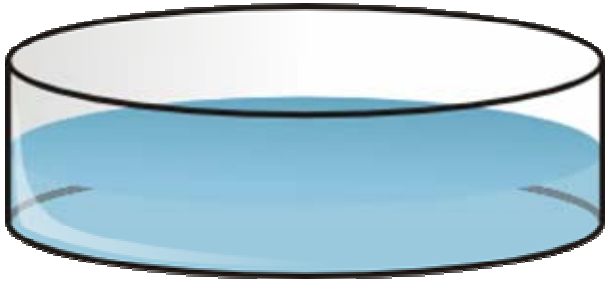
2: Treat cells with drug compound



3: Challenge treated cells with virus to see if they survive



1: Grow up human / animal cells in a petri dish



- What host cell lines will they use?
- How many compounds will they test?
- Which viruses will they use to infect the cells?
- How many bottles of media? Cell scrapers? Pipette tips? Paper towels, etc.?
- How many controls will they run?
- How many times will the experiment be reiterated?

Improvements- Example in vitro challenge model

- How many host cell lines will they use?
- How many compounds will they test?
- How many viruses will they use to infect the cells?

3 host cell lines

50 compounds

4 viral species

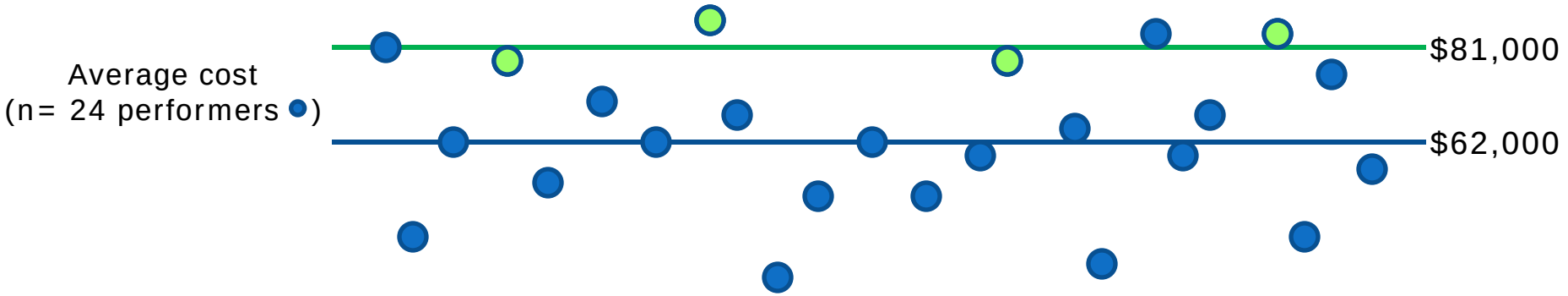
→ 600 experiments X

The average cost of an *in vitro* viral challenge experiment (taken from current proposals $32) = $19,200

The average number of FTEs for an *in vitro* viral challenge experiment (taken from current proposals 0.00465) = 2.79 FTEs

Improvements to Cost Estimating Methodology

Task: Single Dose Toxicology Study
(Animated Slide)

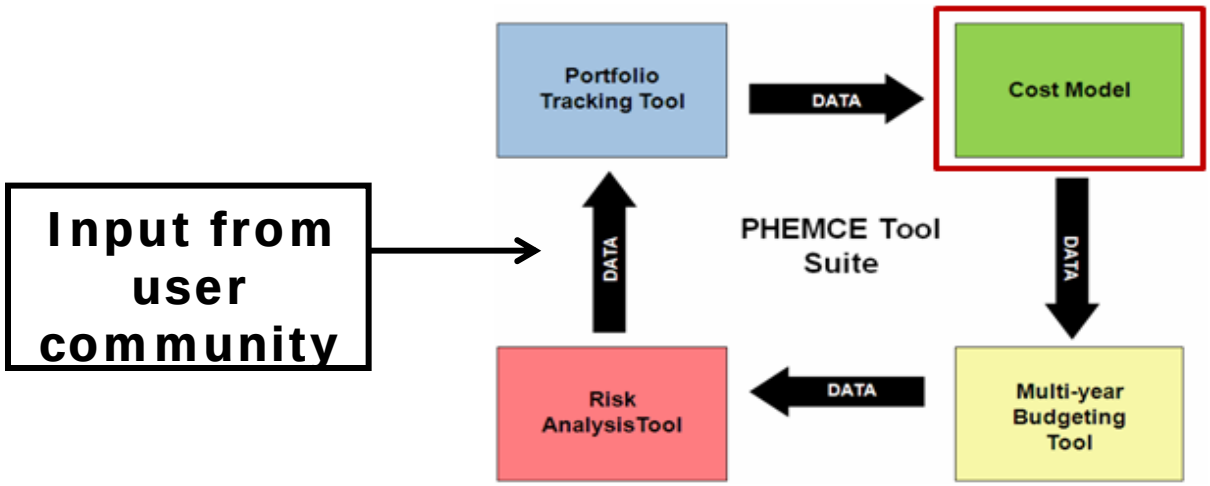


Project Parameters:
Type of MCM: Vaccine
Animal: Mouse
Includes assay testing: Yes

Cost estimations which are accurate and statistically relevant require a sufficient number and the right set of data points.

Improvements to drug development perspectives

- Sharing cost data within the USG allows PHEMCE to build a more robust cost model
- Integration of the PHEMCE cost model with other PHEMCE tools allows comprehensive analysis of drug development
- Standardization of USG business practices streamlines interactions within the PHEMCE



Future Efforts- PHEMCE

- PHEMCE has begun work on creating a series of web tools for interagency portfolio coordination
  - Cost Model (Summer 2014)
  - Portfolio Tracking Tool (Current)
  - Multi-year Budgeting Tool (In early development)
  - Risk Analysis Tool (In early development)
- Standardization of USG drug development business practices will improve interactions with our performers in academia and industry