



Evolving Toward an Integrated Urban Simulation Model

September 11, 2007



Assess Current Capabilities and Desires

- What must your models do?
- Current model strengths, weaknesses?
- Dependencies and constraints?
 - e.g. activity-based transportation model
 - e.g. restrictive land use policies
- Unmet modeling needs?
- Prioritize “must haves” and “high wants”

Assess your Resources

- What are your current models?
- Modeling staff: how many, what skills?
- Budget?
- Adequate time?
- Can you firewall yourself and your team?

Review the Modeling Landscape

- Learn what's out there
 - Review literature
 - Modeling workshops
 - Peer recommendations
- What's the best model for your region?
- SANDAG participated in CA Statewide Integrated Model Evaluation (2005)
 - Focused on PECAS and UrbanSim

Model Selection Criteria

- Assess the strengths and weaknesses of each model
- Assess your own strengths and weaknesses
- Select the model that compensates for your weaknesses

Validate your Assumptions Regarding the Models

- Identify peer agencies
- SANDAG Communicated with
 - Baltimore (BMC), Oregon (ODOT), and Sacramento (SACOG) regarding PECAS
 - Houston, ODOT, Seattle (PSRC) regarding UrbanSim

Why PECAS for SANDAG?

- Most consistent with SANDAG's current regional model, DEFM
- Flexible and scalable in its geographic, economic, and household coverage
- Modular design
- Synergies, shared resources, and expertise already exist

Establish Contractor Rapport

- Hold exploratory meetings
- Are they enthusiastic about your model plans and region?
- Can they actually implement their ideas?
- Trust and confidence in contractor's abilities

Due Diligence

- Who else has worked with them?
- What worked well, what did not?
- What would they do differently?
- Division of labor?
- Team composition/skills?
- Contractors' project management skills?
- Firewall: 1 to 3 rule

Conceptualizing your Model

- What do you want to obtain from the experience?
 - at least as functional as its predecessor
 - knowledge transfer
 - new and evolving capabilities
 - modular, fit within existing model framework
- Don't want today's model three years from now
- Develop realistic expectations

Creating your Contract

- Challenge is to balance flexibility with accountability
 - Minimize rigidity, retain agility
- Focus on WHAT you want and require, not the HOW
- Flexibility to support agile development

System Requirements Specification (SRS)

- Forces you to establish features desired in the model
- Establishes the “must haves” and “high wants”
- Raises issues of
 - risk management (fail early, not often!)
 - validation requirements
 - performance, and usability
- Comprehensive: solicit input from key team members

SANDAG's Contract Goals

- Three to four year time frame
- SANDAG staff will be able to independently operate and modify model
- Learn how to interpret and communicate results

Contract Deliverables

- Task-specific development plan
- Ongoing Technical Memoranda
- Three to four model iterations: increasing scale and complexity
- Thorough documentation
- Programmers' reference manual
- Policy simulation modules

Interaction with Contractors

- Meet every six weeks for three to five days
- Weekly teleconference
- Day-to-day interaction via e-mail, instant messaging, and Skype
- Quarterly Progress Assessment

Development Process

- Agile
- Process and tasks broken into six week segments
- Share tasks and responsibilities
- Weekly coordination

Development Roadmap

Phase 1

Design, develop, calibrate, test, and interpret coarse detail model

Specifications

- Seven zones
- Eight to ten household types
- Eight to ten industrial sectors

Phase 2

Expand upon the first model, adding greater complexity and increased scale

Specifications

- 40-50 zones
- 12-16 household types
- 15-20 industrial sectors
- +Capable of some simulation

Phase 3

Refine the second model, and shape for a finalized, full-featured San Diego model

Specifications

- 150 zones
- 20-30 household types
- 80 industrial sectors
- +Full simulation capability

July 2007

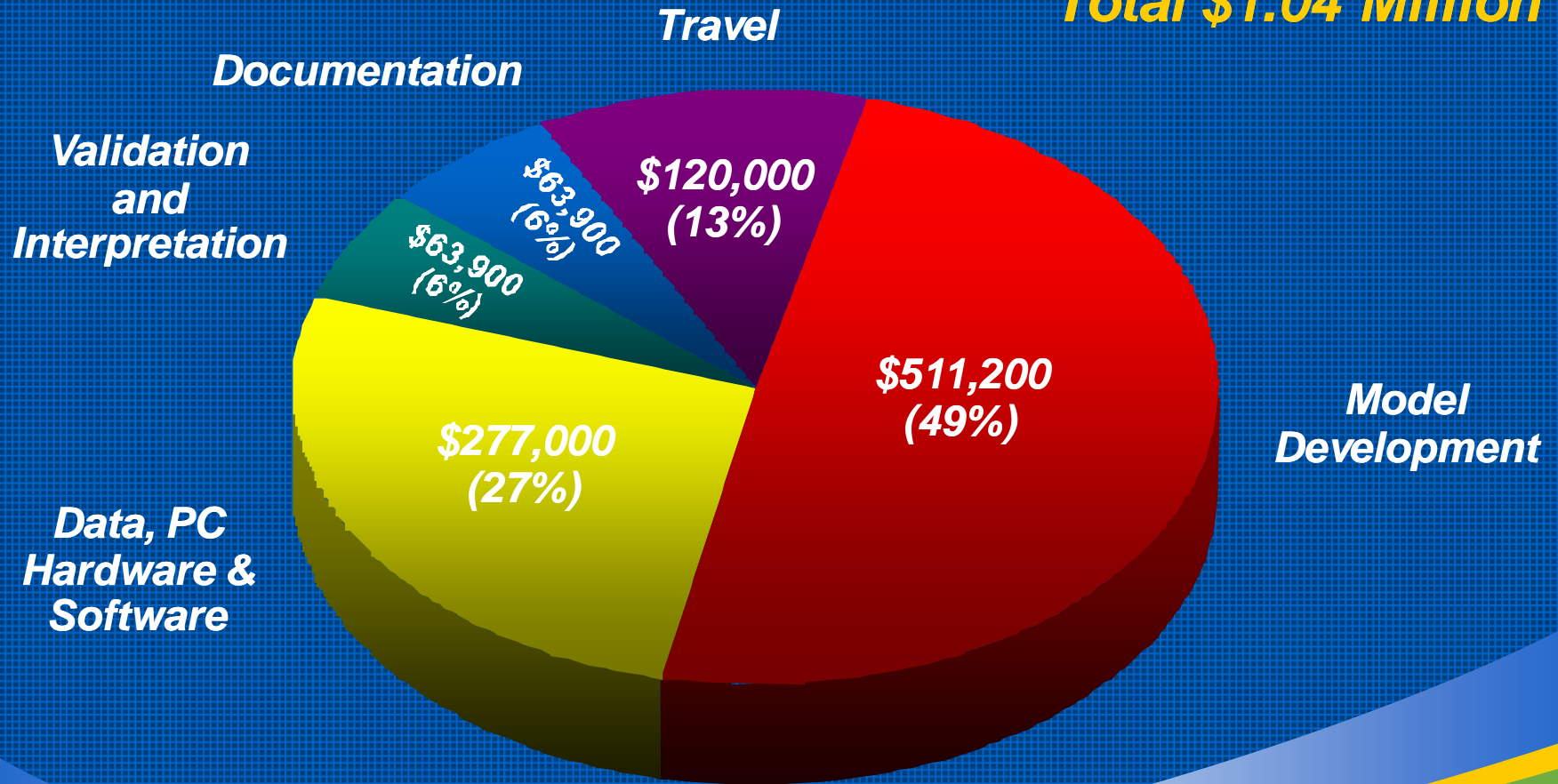
Jan 2008

Jan 2009

Fall 2010

SANDAG PECAS Budget

Total \$1.04 Million



Testing and Validation

- PECAS Technical Advisory Committee (TAC) to assist in evaluating the model
- TAC approval required to move from one iteration to the next
- Criteria
 - reasonableness of outputs
 - performance of sensitivity
 - theoretically consistent

Summary

- Do you have the capability to evolve?
- What criteria are important to your region?
- Do you have agency support?
 - Budget
 - Staff
 - Time

Summary (cont'd)

- Do your homework!
- Select the model that works best for your region
- Develop a contract that fits your agency's goals
 - Flexible contract
 - SRS should guarantee minimum requirements



Ed Schafer, PhD
Sr. Demographer
esc@sandag.org

Daniel Flyte
Assoc. Programmer Analyst
dfly@sandag.org