Motivation and Goals

The summer project 2011 goal was to develop the engine and the game into Dynamic System Strategies

SEArı Constructs

The following constructs form the core "elements" for the project:

1. Design "ilities" for each era
2. Goals and Constraints
3. Methods and Metrics
4. Epochs
5. Eras
6. "ilities"

Software Architecture

The high level architecture consists of the game, engine, and database:

Game

Engine

Database

Learning Objectives

In order to appeal to a broad array of possible "players," the following set of game learning objectives were proposed. Subsets of these objectives would relate to particular player "types" (e.g., graduate student or sponsor):

- Familiarity with SEArı constructs
- Basic understanding of dynamic relationships among constructs
- Advanced understanding of dynamic relationships among constructs
- Familiarity with SEAri constructs
- Basic understanding of dynamic relationships among constructs
- Advanced understanding of dynamic relationships among constructs

It often takes graduate students a year to understand and apply SEArı methods and metrics.

Game Outline

Game Architecture

Hit the Pareto

Results and Evaluation

Goal: Propose a design as close as possible to Pareto Frontier, within constraints

Gameplay: Make a design given an epoch

Scoring

Destroy Your Design

Goal: Design a three-epoch era with your initial design as close as possible to the Pareto Frontier for that era

Gameplay: Constraints

Game Level Flow

Destroy Your Design

Survivability

Lessons Learned

"ilities" perspective shift within SEArı
- "ilities" as outcomes
- "ilities" interaction
- Future research area
- Clarified change mechanisms and path enablers

Game Scoring

Scoring scheme allows players to receive targeted feedback on mastery over learning objectives

Accomplishments

- Integrated several distinct lines of research
- Multi-Attribute Tradespace Exploration (MATE), descriptive tradespace metrics
- Experienced teaching SEArı concepts to a non-SE, younger audience
- Developed a first iteration of a serious game that looks at complex systems engineering from many perspectives
- Tradespace Exploration – Hit the Pareto
- Era Patterns
- Era Analysis: Operations Mode
- Experienced using game constructs to illustrate SEArı constructs
- Developed extensible architecture (engine) for future game development

Next Steps

- Six construct format is an effective method for quickly teaching SEArı concepts, even to students not familiar with systems engineering
- Since development is in demonstration, low level of maturity
- Perform additional development with skill playing
- Demonstrate additional "skins" (i.e., "SpaceTug") that can be applied to the engine using the reusable database
- Propose and develop additional minigames
- Perform further work to improve gameplay experience (including usability)
- Verify learning objectives are met for both developers and players
- Refine first pass of "meta story"

For more information, please visit: http://seari.mit.edu

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