

Games as a Tool to Understand  
Complexity in Market Competition: An  
Agent-Based Game Theory Simulation Platform

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Tool to Understand Complexity in



# Serious Games as a Tool to Understand Complexity in Market Competition: An evolutionary Game Theory Simulation Platform

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UCLabex - 2014 - Serious Games as a Tool to Understand Complexity in Market Competition





Outline

Part 1: Motivations – Making sense in a complex world

*Is there a better tool than Excel™?*



Part 2: GTES (Game-Theoretical Evolutionary Simulation)



Part 3: SmartGrid Systemic Simulation Example

Part 4: Mass Market Telephony Simulation Examples









# The Search for Nash Equilibriums

- Nash Equilibrium (NE)
  - When each actor is maximally satisfied, w.r.t. each other actor's tactic

$$\forall i, \forall x \in T_i, f_i(x, t_{-i}) \leq f_i(t_i, t_{-i})$$

- The simplest way to find a NE is to iterate the computation of the « Best Response » function
  - An iterative loop that may be nested with the local optimization loop
  - A heuristic version may be derived according to a neighborhood structure V
- There does not necessarily exist a « pure » Nash Equilibrium
  - The loop may not converge ( "destructive war" or "chaos" )
- The convergence rate increases with a « maxmin » approach
  - The valuation function is evaluated one level of feedback

$$f_i^*(t_i, t_{-i}) = \max_{x \in T_i} f_i(x, t_{-i})$$

Hence producing a « Best Response » function

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