

**RULE CAPTURE AND
DYNAMIC ANALYSIS FROM
DIVERGENT STAKEHOLDERS
BY MEANS OF SIMULATIONS,
RULE BASED GAMING AND
RULE REPOSITORIES**

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EL COLEGIO DE LA FRONTERA SUR

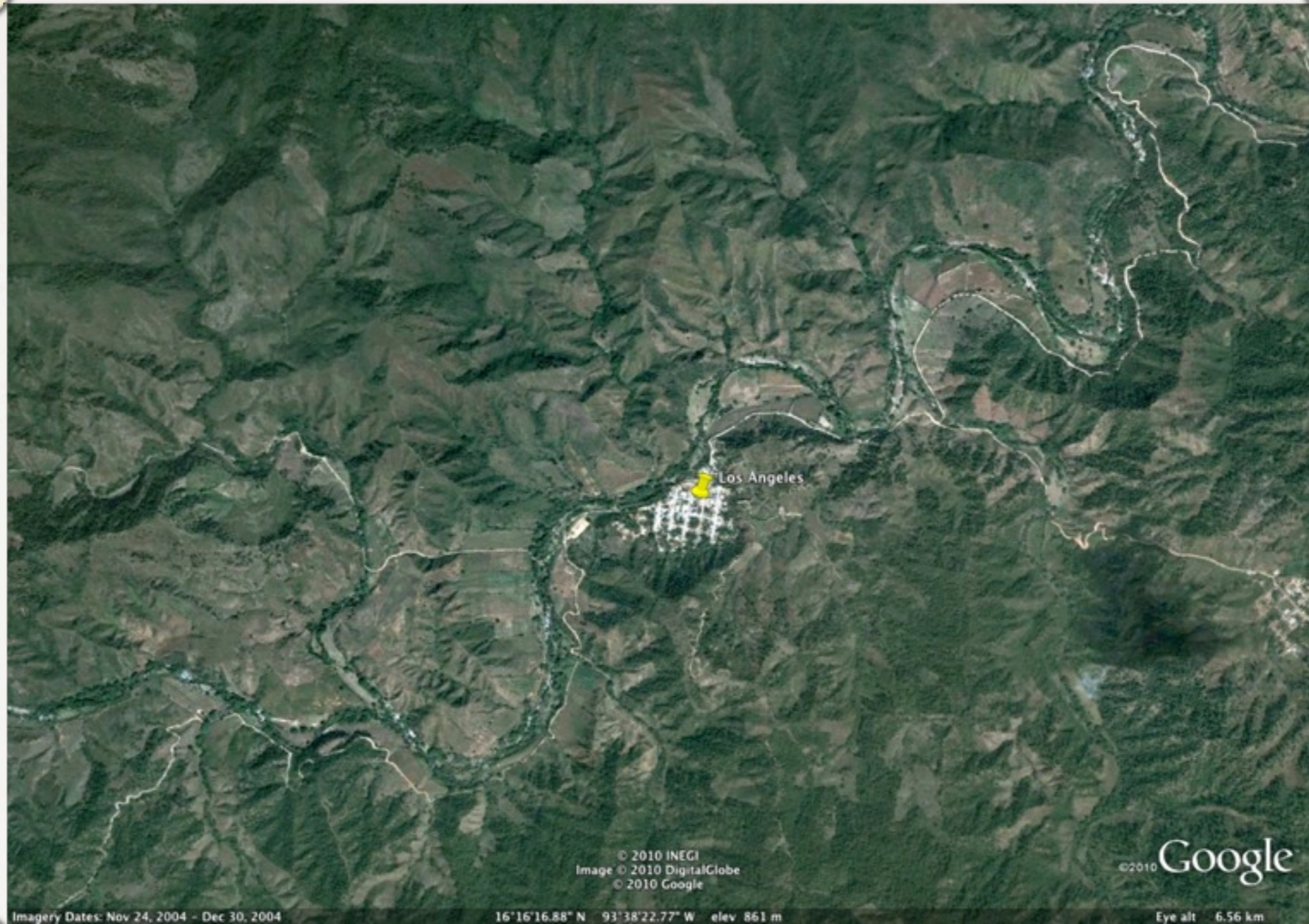
SAN CRISTÓBAL DE LAS CASAS, CHIAPAS

WHERE WE WORK

- La Sepultura
- UNESCO site
- Mixed land-use surrounding protected watershed
- History of government, NGO and academic involvement



WHERE WE WORK



Imagery Dates: Nov 24, 2004 - Dec 30, 2004

16°16'16.88" N 93°38'22.77" W elev 861 m

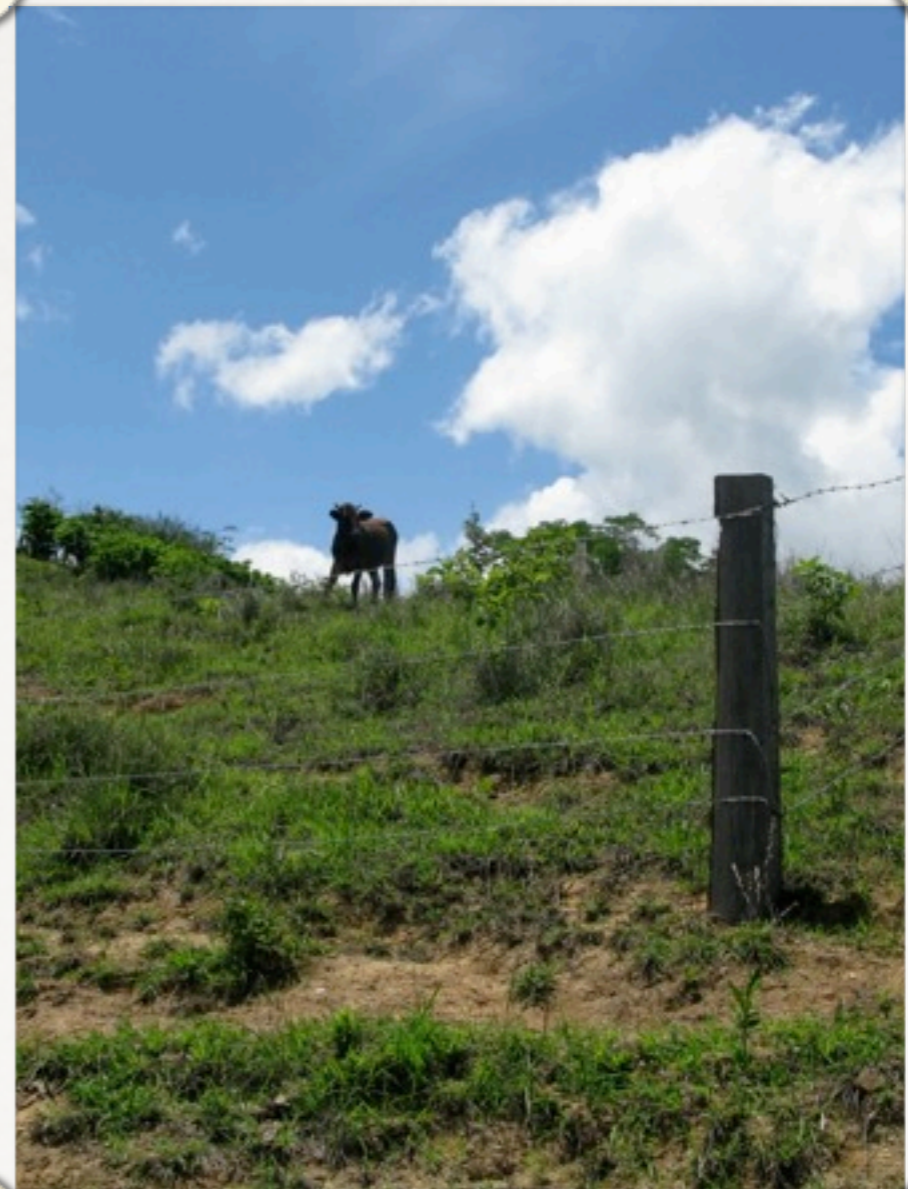
Eye alt 6.56 km

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ISSUES IN THE RESERVE

- Mis-management
- Over-population
- Desertification
- Deforestation
- Waste




STAKEHOLDERS

- Landholders
- Government Agencies
- Campesinos
- Academics
- Conservationists



GAMING

- 
- Brings divergent groups together
 - Allows for simulation of problems in the reserve
 - Play can illustrate how stakeholders relate
 - Observation of social strategies to simulated natural problems

MODELS



- Different Types:
 - Type I Models: Generality is sacrificed for precision and realism
 - Type II Models: Realism is sacrificed for generality and precision
 - Type III Models: Precision is sacrificed for generality and realism

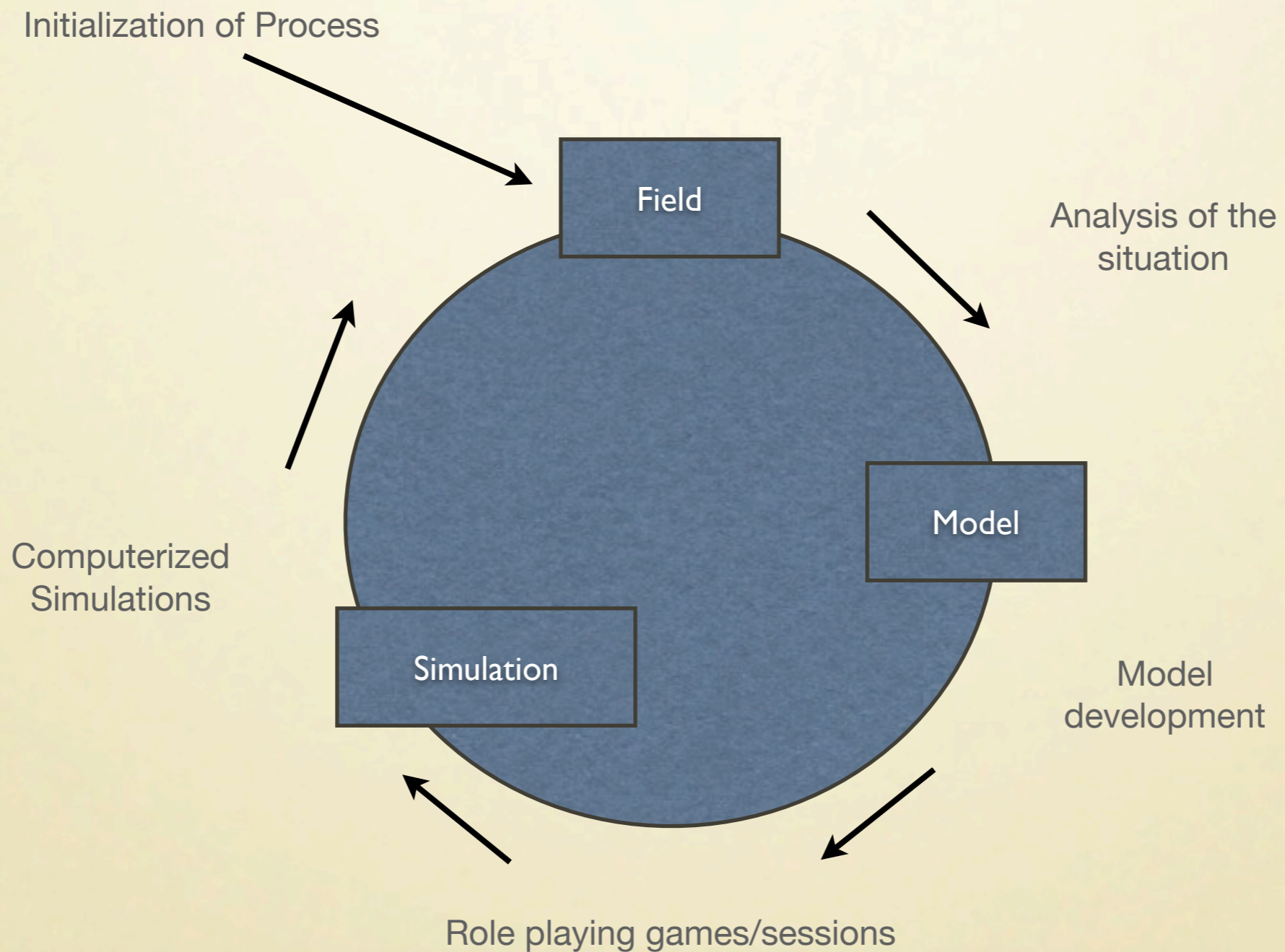
SIMULATION GAMES

- Type III Models
 - Sacrifice of precision for realism and generality
- Offer playable experimental games
- Can allow for the development of “social rules” that govern play (and reflect on resource usage)

COMPANION MODELING

- All Stakeholders Participate
 - Greater buy-in from all parties
- Areas of mutual concern may be included
- Field Workshops
- Conference Workshops

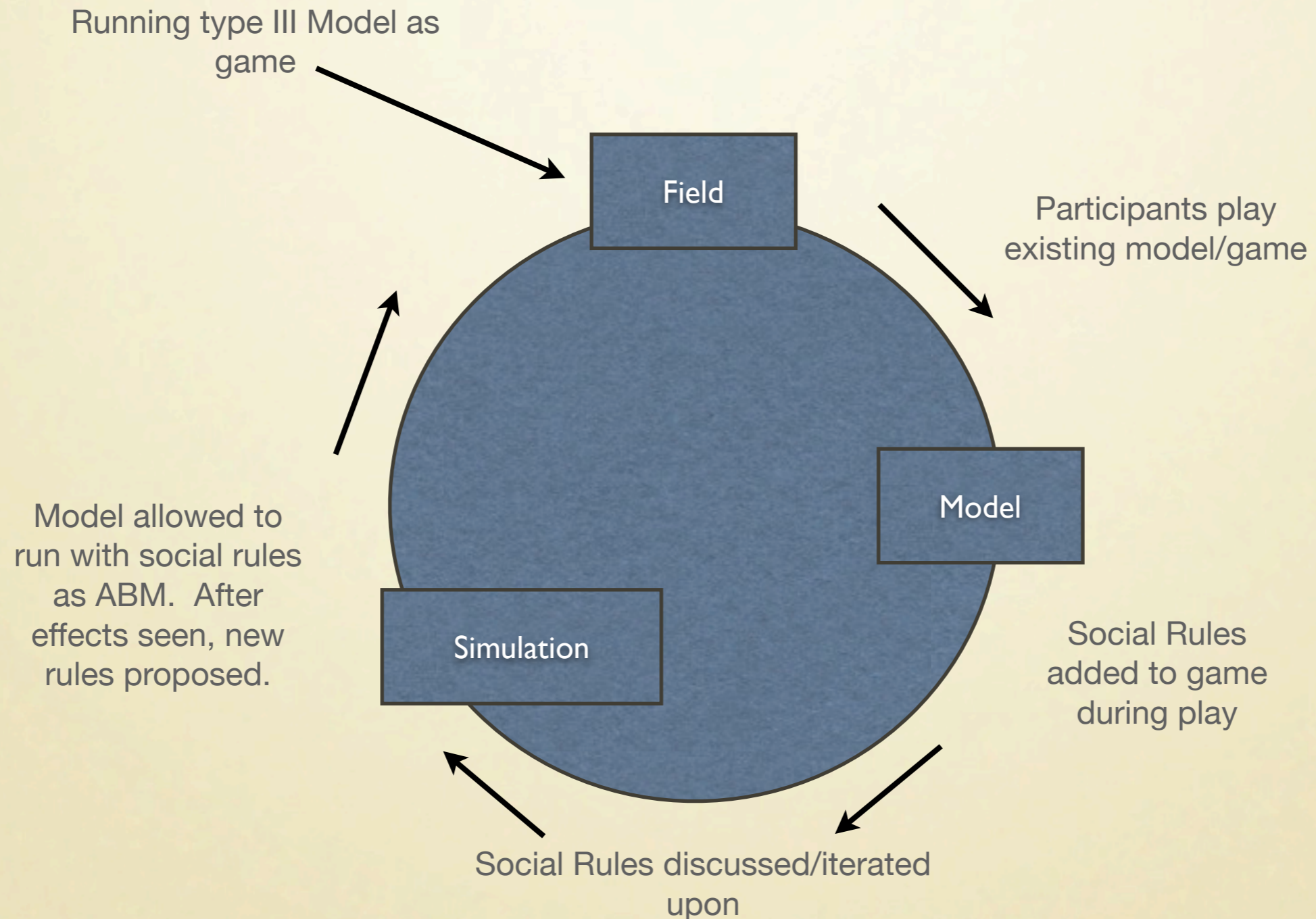
COMPANION MODELING



COMPANION GAMING

- Use a Type III model for realistic ecology
 - cascading collapse
 - interaction of earth/water/development
- Social Rules
 - players can add social rules to gameplay

COMPANION GAMING



COMPANION GAMING

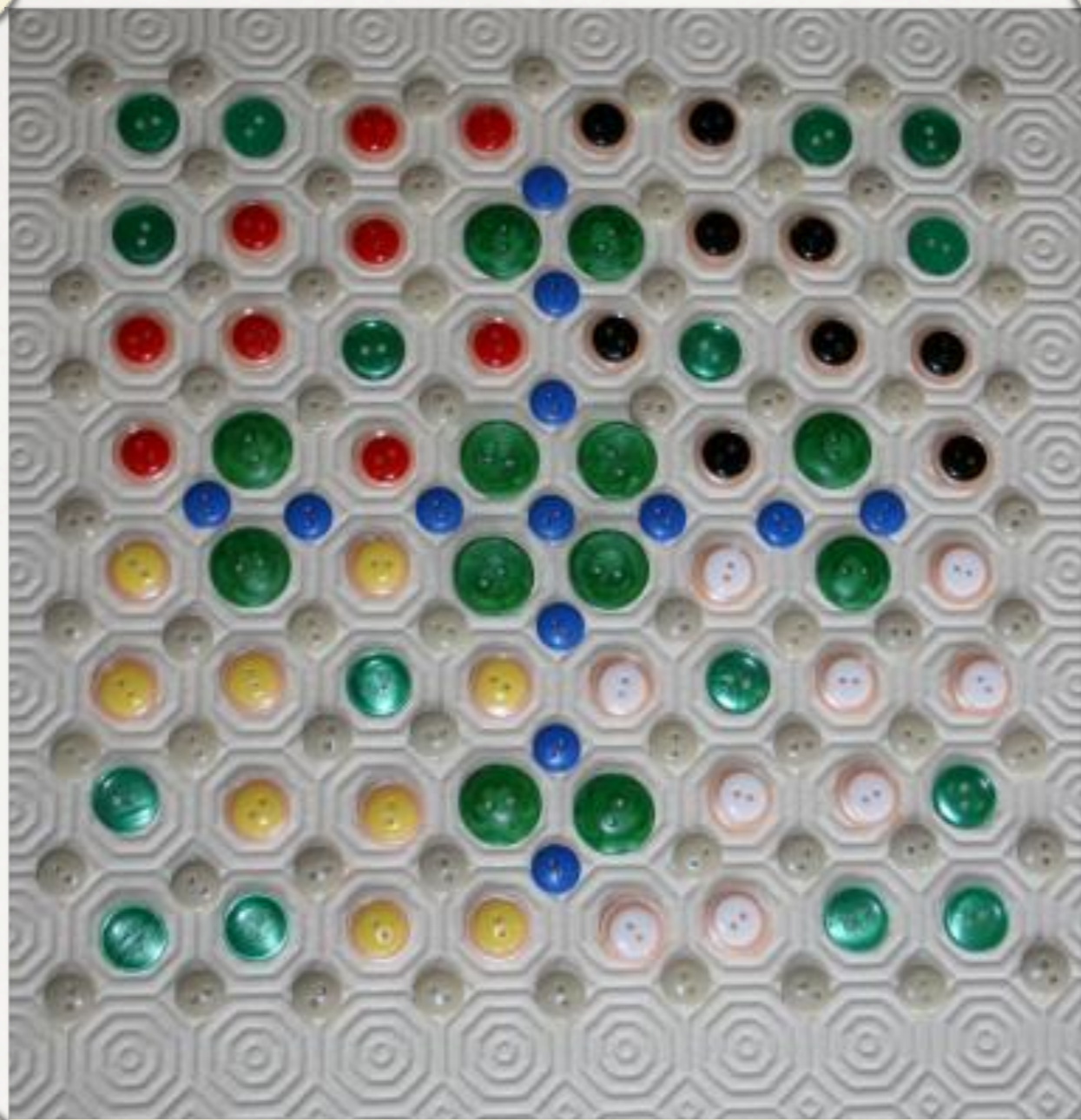


COMPANION GAMING



TECHNICAL RULES

- A Potrero token must be supported by 2 soil tokens in its SQUARE
- A Potrero token must be supported by 1 forest token in its CROSS
- A soil token must be supported by 1 forest token in its SQUARE
- A water token must be supported by 2 forest tokens in its SQUARE
- A forest token must be supported by 2 forest tokens in its OCTOGON
- Edges of the board do not collapse



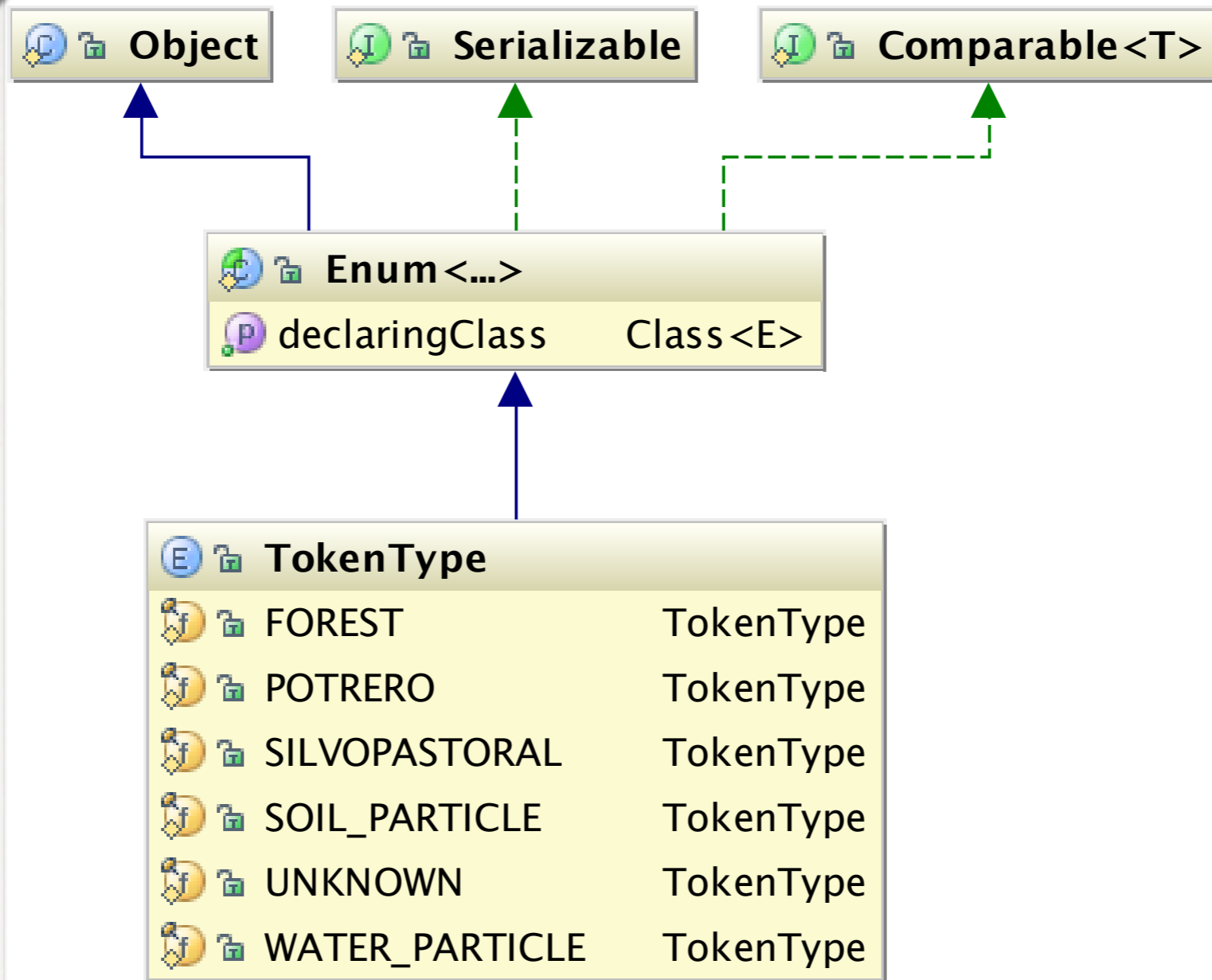
So

BACK TO
THE
LAB AGAIN

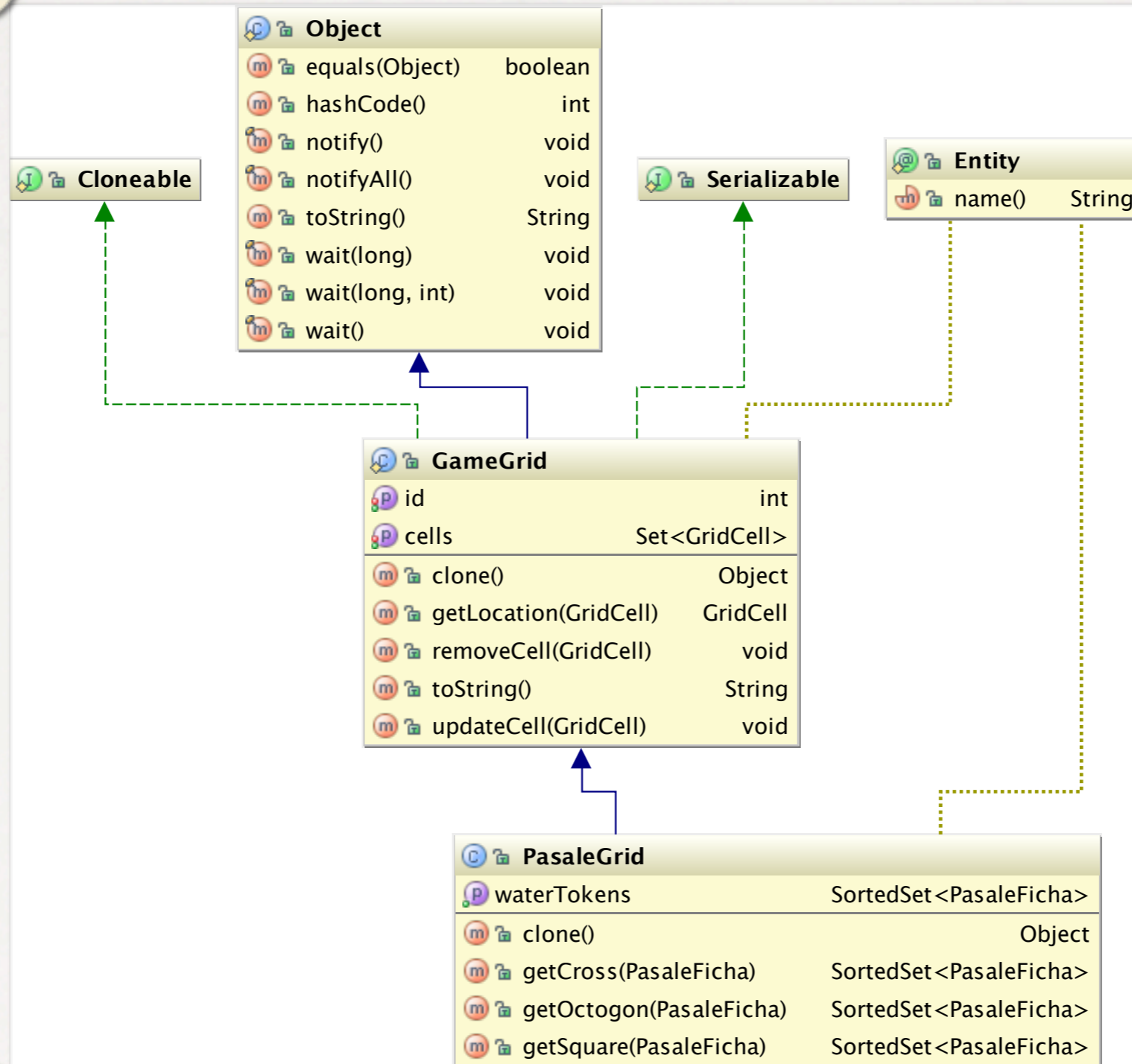


Illustrated by Thweatt, E. D.

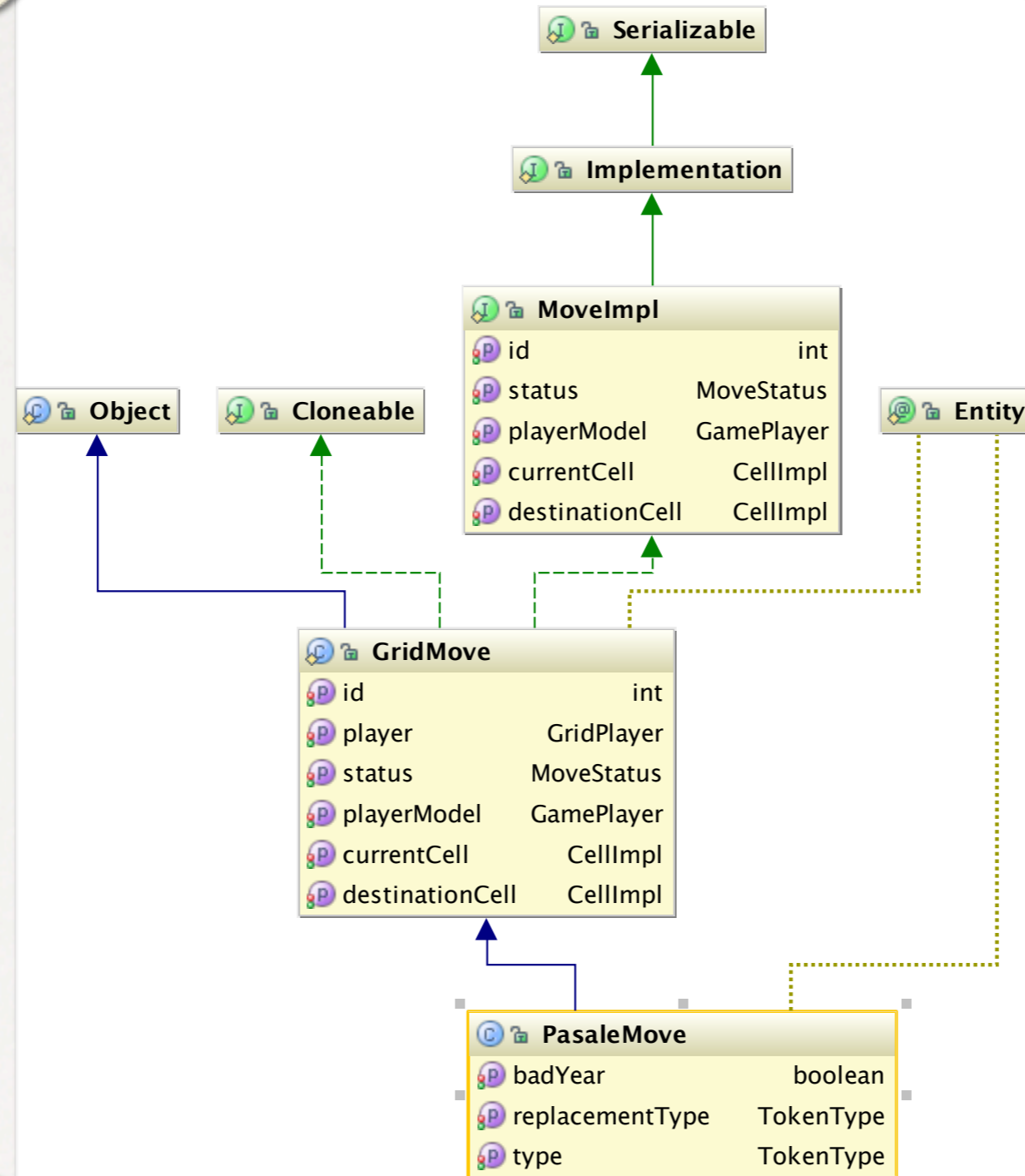
TOKENTYPE ENUM



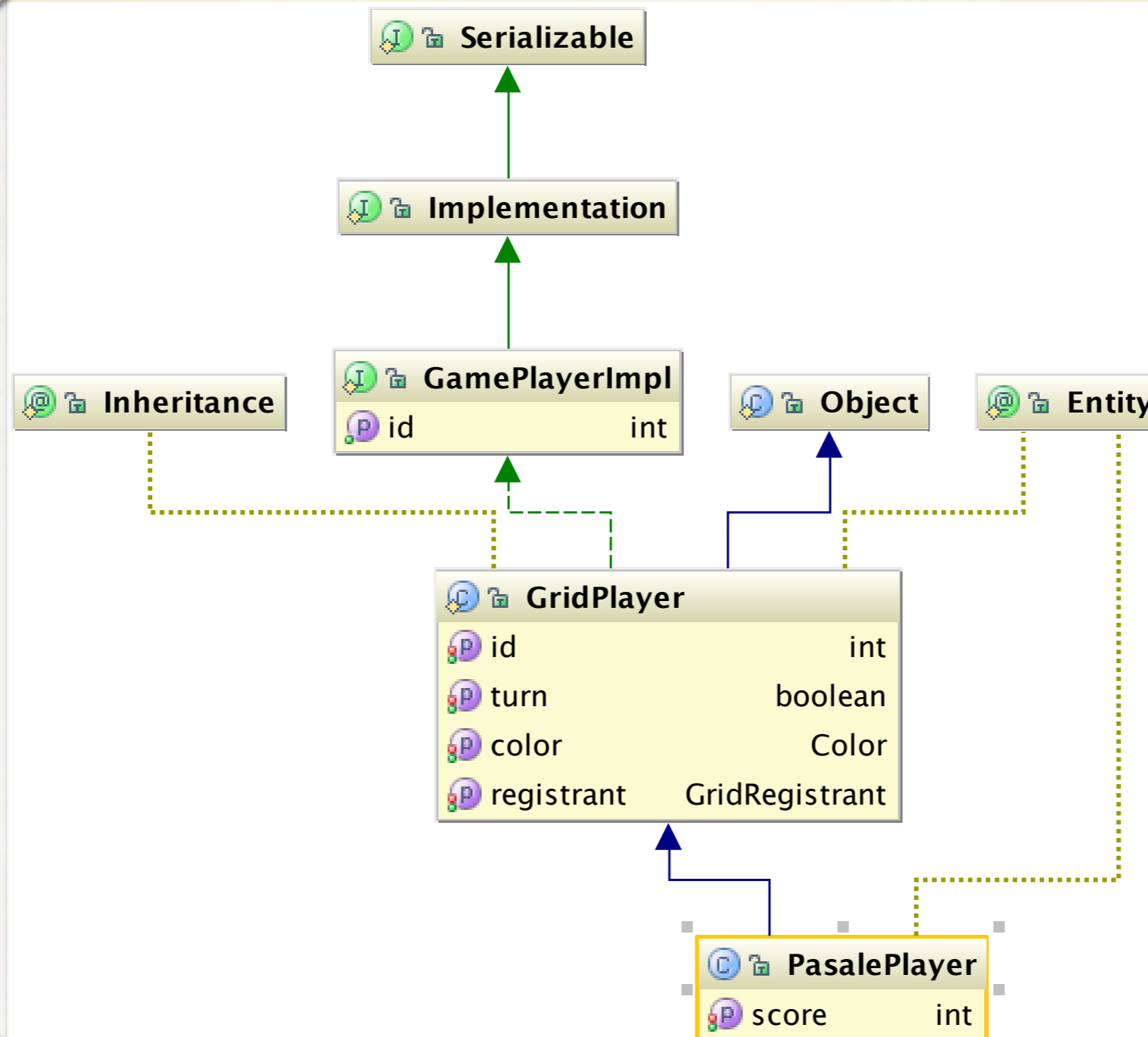
PASALEGRID



PASALEMOVE



PASALEPLAYER



TECHNICAL RULES

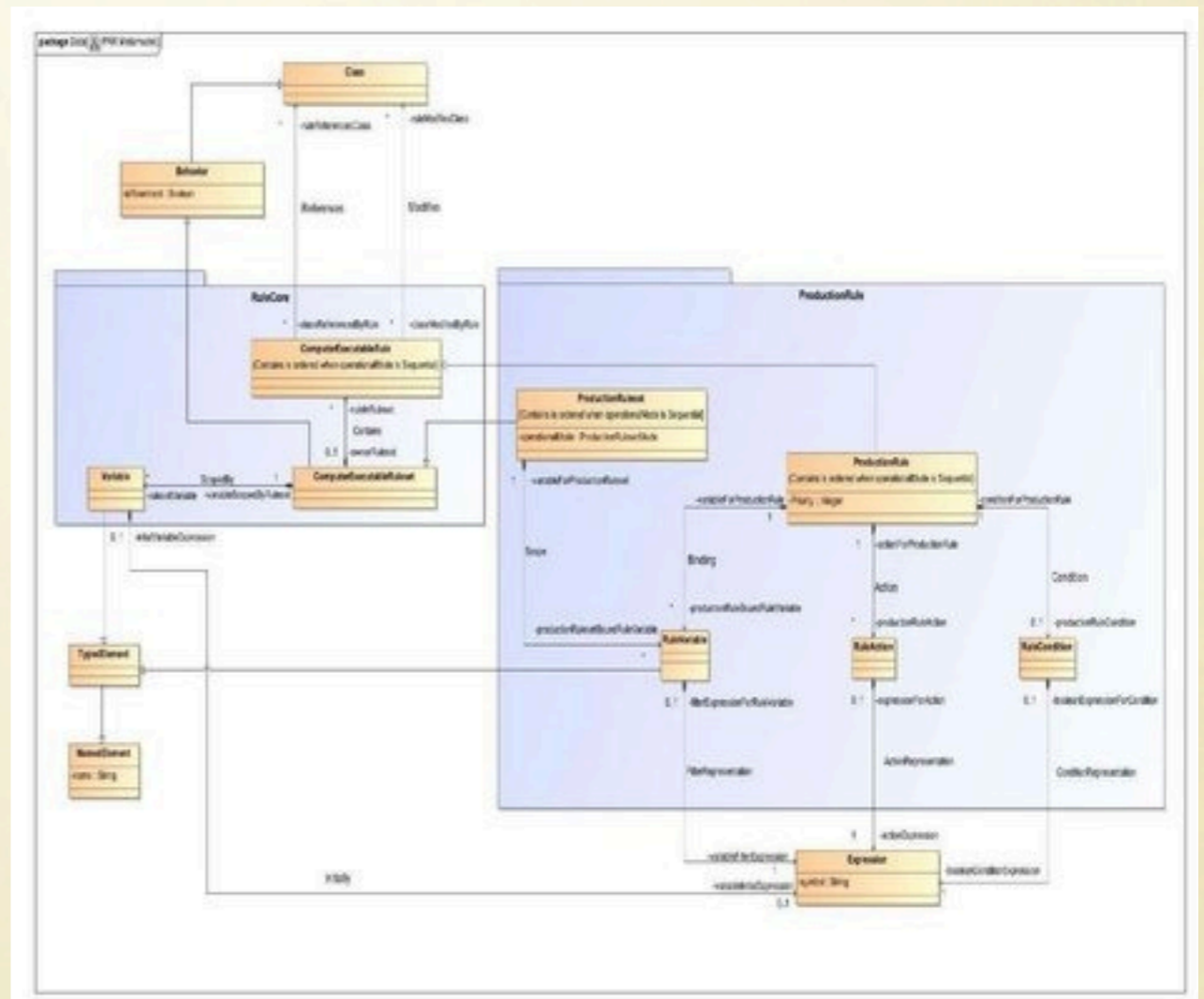
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DETAIL

- Huge lack of detail between UML model and declarative rules
- Makes rules understandable to a non-expert, but where's the precision?
- If simulation/games act as experiments, and governing rules are imprecise, how can they be reproduced?

OMG's PRR?

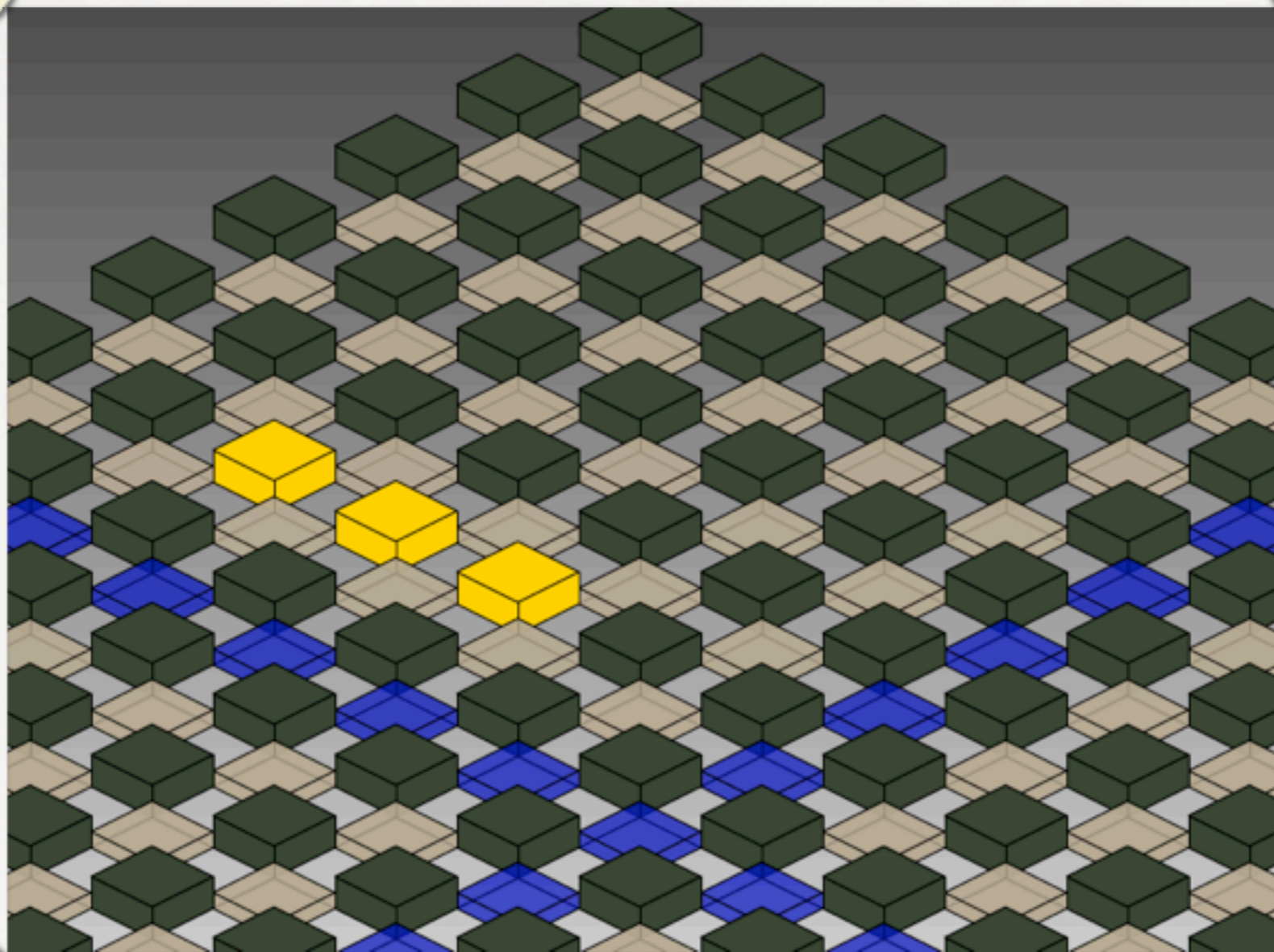
- Production Rule Standard
- Visual and detailed
- Visual modeling can export to multiple formats (ruleML)
- UML is already used by domain experts (COMMODO)



MODEL RULES

- PRR diagram of model rules [MISSING]

VISUAL MODEL / GAME



SOCIAL RULES

- Social rules govern how the social group interacts with the game/model
- Social rules are agreed upon explicitly by participants
- Social rules are proposed query/action clauses:
 - when x is true then do y

SOCIAL RULES

- How do we get individuals/groups to propose social rules?
 - Need a starting point
- How do we express the complexity in the model to non-programmers?
 - Starting point: declarative sentences, domain specific languages.

STARTER SOCIAL RULES

- Players must take turns developing land on the board.
 - When “a move was made whose player does not have the turn”
 - Then: “forget the move ‘move’”

STARTER SOCIAL RULES

- Players must play by quadrant
 - Assigned, Random or by a planned route
 - When “a move is made to an unavailable quadrant”
 - Then “forget the move ‘move’”

STARTER SOCIAL RULES

- Riparians (river trees) can only be harvested on one river bank.
 - When “a move harvests a riparian on the wrong side of the river”
 - Then “forget the move ‘move’”
- Only “x” riparians may be harvested per game

STARTER SOCIAL RULES

- Fines for behavior
 - fine for loss of water tokens
 - fine for loss of earth tokens
 - fine for loss of potrero
- Points for behavior
 - points for established potreros

STARTER SOCIAL RULES

- Fines only work with scoring, hence:

when

```
$game : PasaleGame ()
```

```
$ficha : PasaleFicha ($color : color, type : UseType.POTRERO)
```

```
$player : PasalePlayer (color == $color)
```

then

```
int score = $player.getScore();
```

```
score = score + 1;
```

```
modify ($player) { setScore (score) };
```

```
retract ($ficha);
```

end

SOCIAL RULES

- Domain Specific Language Implementation
 - phrases are expressed in a DSL
 - rules are pre-baked into DSL
 - players choose which apply

GAMING/SIMULATION

- Games played that include social rules defined by playgroup
- Expected impact of such rules discussed before play
- Run-time impact can be observed and discussed
- Games can be run as by “opportunistic” agents to view impact of rules on selfish behavior

DYNAMIC ANALYSIS (QUALITATIVE)

- Counts of new rules in the system
- Counts of change to existing rules in system
- Number of social rules running in a specific experiment (gameplay)

DYNAMIC ANALYSIS (QUANTITATIVE)

- New, Proposed Rules
- (more later)

RULE BASED COMPANION MODELING

- Field Work (late 2010,2011)
 - Pasale Compadre
 - Suggested Social Rules
 - Collaborative Rule Modeling
 - Agent Based Modeling of “opportunistic” strategy executing against social rules

REPRODUCIBILITY

- Interchangeability
 - PRR
 - RuleML
 - URML

FUTURE

- Model driven Architecture
- Exports to standardized formats
- Greater interactive game sets
 - Social rule creation more deeply embedded

Q & A
AND
(POSSIBLE
DEMO)