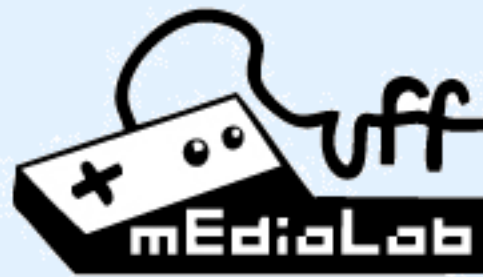




uff

Universidade
Federal
Fluminense



Provenance in Games

Troy C. Kohwalter

tkohwalter@ic.uff.br

Esteban W. Gonzalez Clua

esteban@ic.uff.br

Leonardo G. Paulino Murta

leomurta@ic.uff.br

G E M S

Software Maintenance and Evolution Group





© Ron Leishman * www.ClipartOf.com/1046195



© Ron Leishman * www.ClipartOf.com/439904



Wolfi Korn

free cartoons © www.dercartoon.de



PROVENANCE

“Refers to the documented history of an object's life cycle and is generally used in the context of art or digital data.”

PREMIS Working Group, 2005. Data Dictionary for Preservation Metadata, Preservation Metadata: Implementation Strategies (PREMIS).



GOALS

- INTRODUCE PROVENANCE IN GAMES
- CREATE A FRAMEWORK FOR PROVENANCE
- ANALYZE GAME FLOW
- IMPROVE UNDERSTANDING OF EVENTS



PROVENANCE MODEL

- DOCUMENTED HISTORY
 - OBJECT'S LIFE CYCLE
 - PROCESSES
- *OPEN PROVENANCE MODEL*
 - *International Provenance and Annotation Workshop, 2006*
- *PROV MODEL PRIMER*
 - *WC3 Working Draft 10 January 2012*



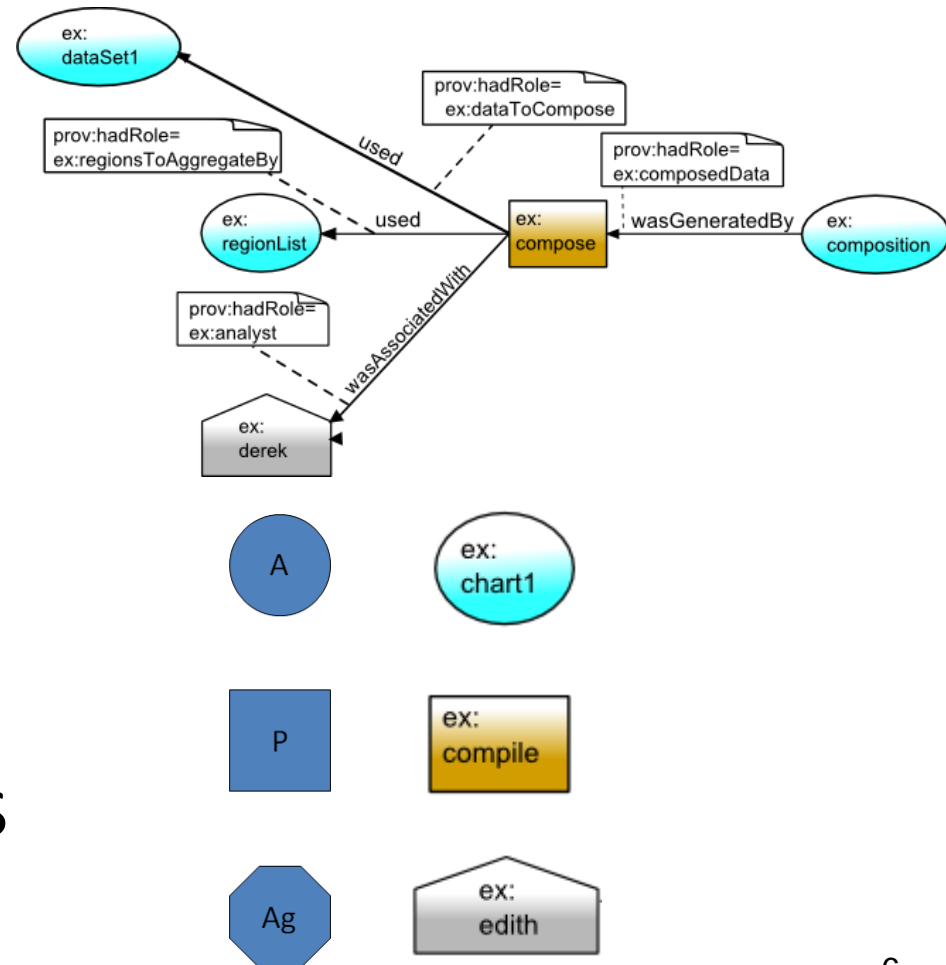
PROVENANCE MODEL

- PROVENANCE GRAPH

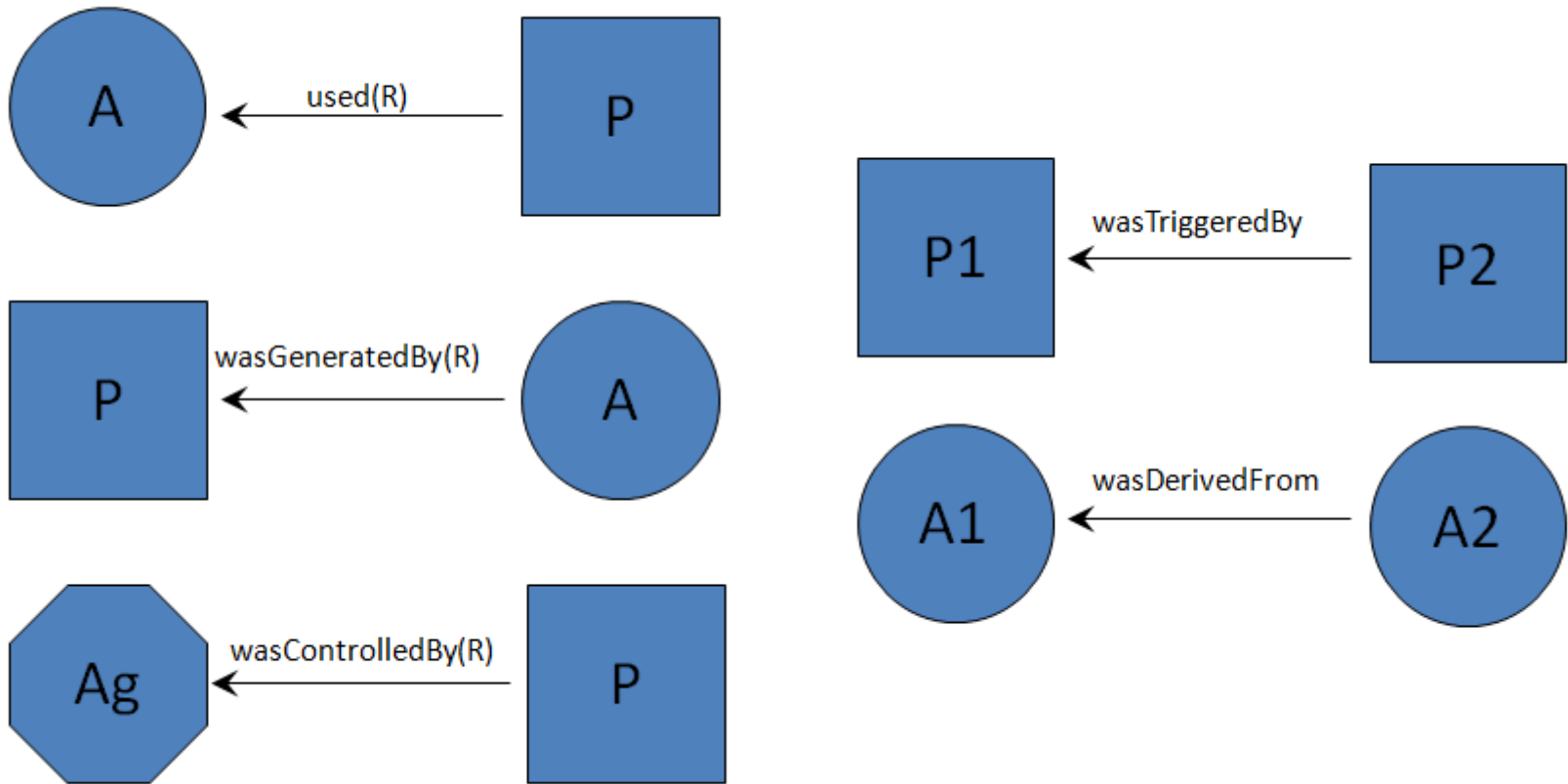
- CASUALTY GRAPH
- RECORD OF PAST OR CURRENT EXECUTION
- NOT A DESCRIPTION OF WHAT MIGHT HAPPEN

- NODES

- ARTIFACTS / ENTITIES
- PROCESSES / ACTIVITIES
- AGENTS



PROVENANCE MODEL



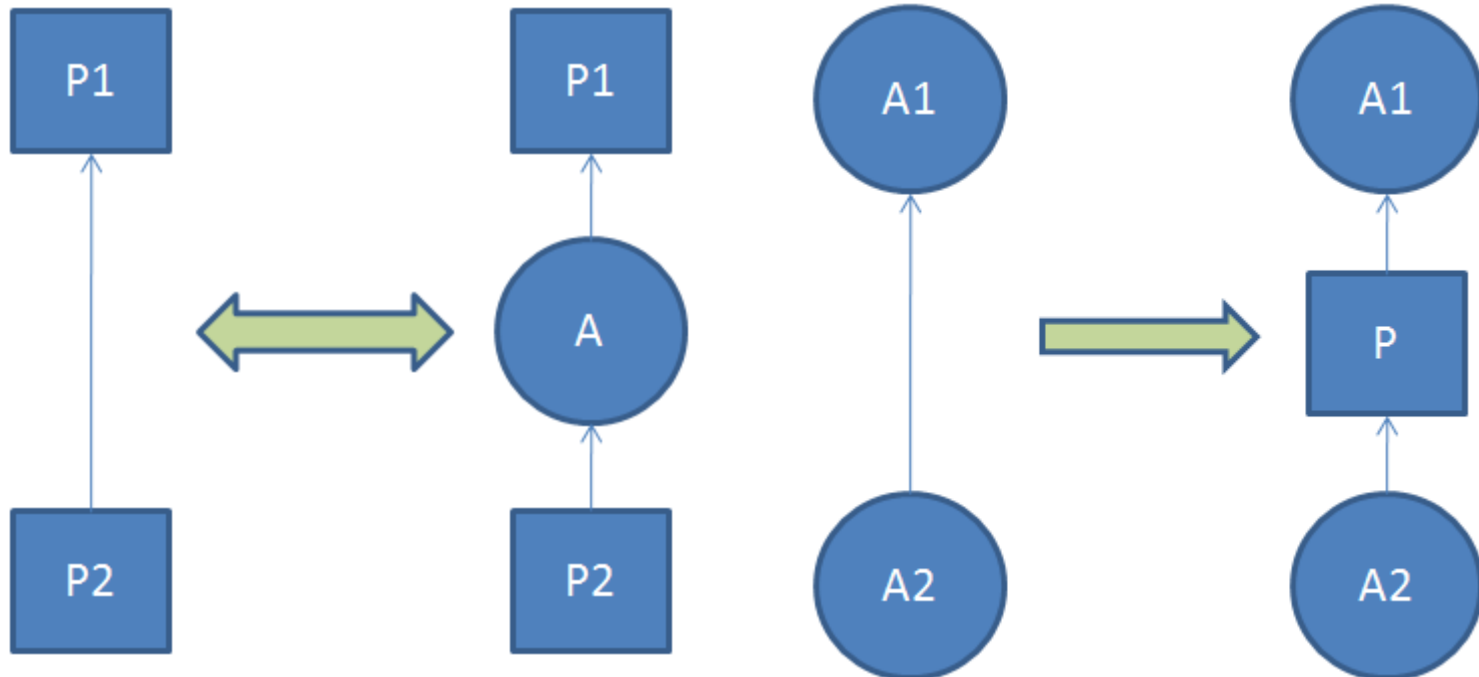
Moreau, L. et al., 2011. The Open Provenance Model core specification (v1.1)



TRANSITIVE RULES

ARTIFACT
INTRODUCTION
ELIMINATION

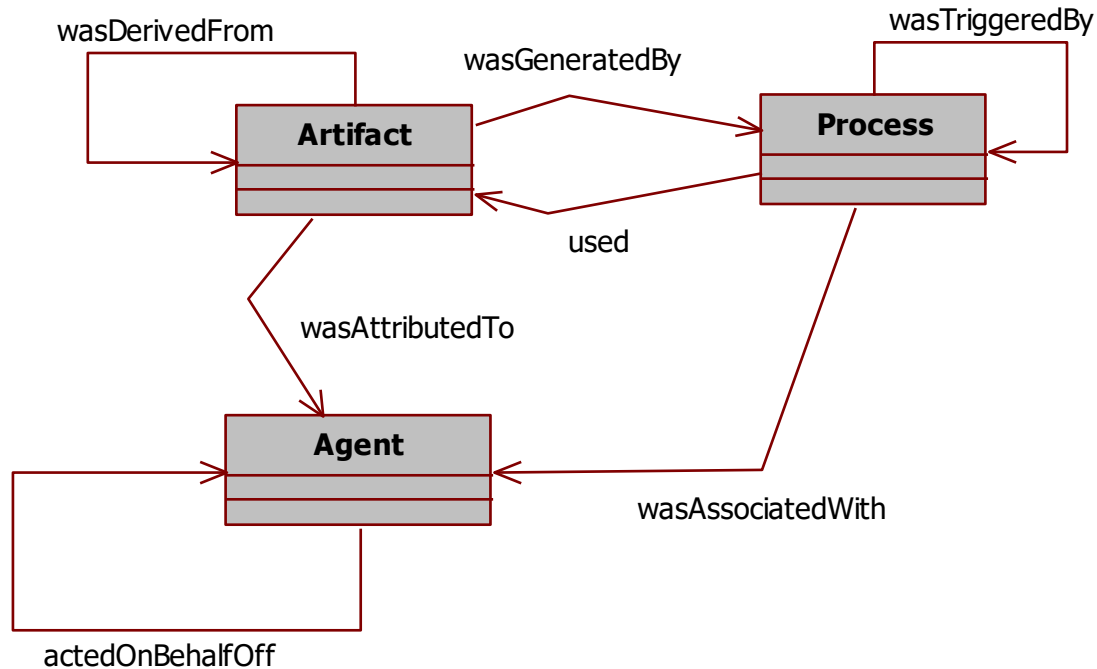
PROCESS
INTRODUCTION



Moreau, L. et al., 2011. The Open Provenance Model core specification (v1.1)



PROVENANCE MODEL



<http://www.w3.org/TR/prov-n/>

PROVENANCE IN GAMES

- ARTIFACTS
 - OBJECTS
- AGENTS
 - NPC
 - PLAYER
- PROCESSES
 - ACTIONS
 - EVENTS



PROVENANCE IN GAMES

- ARTIFACTS
 - OBJECTS
- AGENTS
 - NPC
 - PLAYER
- PROCESSES
 - ACTIONS
 - EVENTS

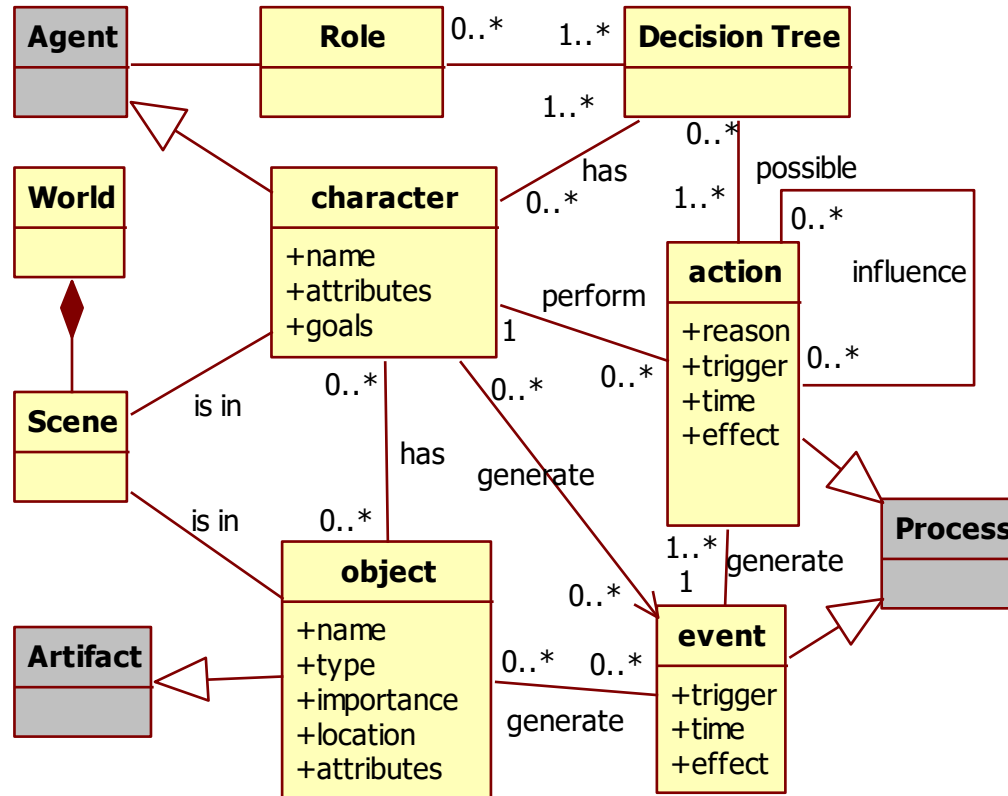


PROVENANCE IN GAMES

- ARTIFACTS
 - OBJECTS
- AGENTS
 - NPC
 - PLAYER
- **PROCESSES**
 - **ACTIONS**
 - **EVENTS**



GAME-PROVENANCE MODEL

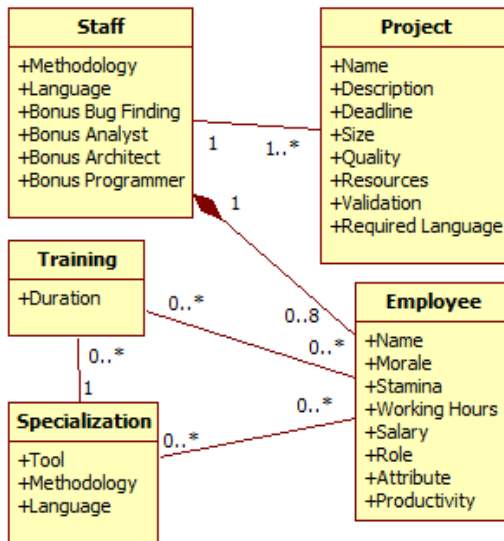


APPLICATION

- INSTANCIATED IN A SERIOUS GAME
- **SDM: SOFTWARE DEVELOPMENT MANAGER**
 - UNDERSTAND EXISTING CAUSE-EFFECT RELATIONSHIPS IN SOFTWARE DEVELOPMENT
- NEW FEATURES
 - EVENT RECORDING
 - DECISION TREES



APPLICATION



The screenshot shows a complex software interface with several panels:

- Staff's Settings:** Includes tabs for Language (java), Methodology (Agile), and staff members (Konrad, Nobert, Fabian, Justin) with their respective settings (None).
- Staff Team:** A 3D-rendered office scene with avatars of staff members.
- Task Configuration:** A control panel for task settings, including Programmer tasks (Repair, Pressure, Evolution, Verification, Integration, Analysis, Balanced), Manager tasks (Autonomy, Aid, Aid Analysts, Aid Architects, Aid Programm), and Analyst tasks (Elicitation, Especification, Quality, Balanced).
- Expenses Table:**

Expenses:	Morale	Stamina
Konrad :	\$222	100% 100%
Nobert :	\$250	100% 100%
Fabian :	\$230	100% 100%
Justin :	\$239	100% 100%
Vacant :	\$0	100% 100%
Vacant :	\$0	100% 100%
Vacant :	\$0	100% 100%
Vacant :	\$0	100% 100%
Daily :	\$941	
Monthly :	\$26400	
Income in:	28Days	
- PAUSED:** A central panel showing a list of roles (Main Role, Analyst, Architect, Programmer, Tester, Manager, Marketing, None) and their corresponding secondary roles (Sec Role).
- Specializations / Price: 7500:** A grid of skill categories like Programming Language, Tools, Assembly, Analysis Program, C#, Version Control, Java, Debugging, Perl, Project Management, Ruby, Metrics, Agile Methods, Planning, and Test.
- Profile:** A detailed profile for Fabian, including Morale (100%), Stamina (100%), Role (None), Grade (Junior), Weekly Hours (40), Salary/Day (\$230), and various aptitude scores like Adaptability (61) and Logical Reasoning (77).
- Bottom Panel:** A summary dashboard with metrics such as Credits (\$100000), Time (Wk: 000 Day: Mon), Req. Done (0%), # bugs (0), Monthly Inc. (\$24250), Deadline (Week: 080 Day: 1), Req. Modeled (0%), Code Lang. (java), Client's Req. (0%), and Quality (80%).

<http://gems.ic.uff.br/sdm/>



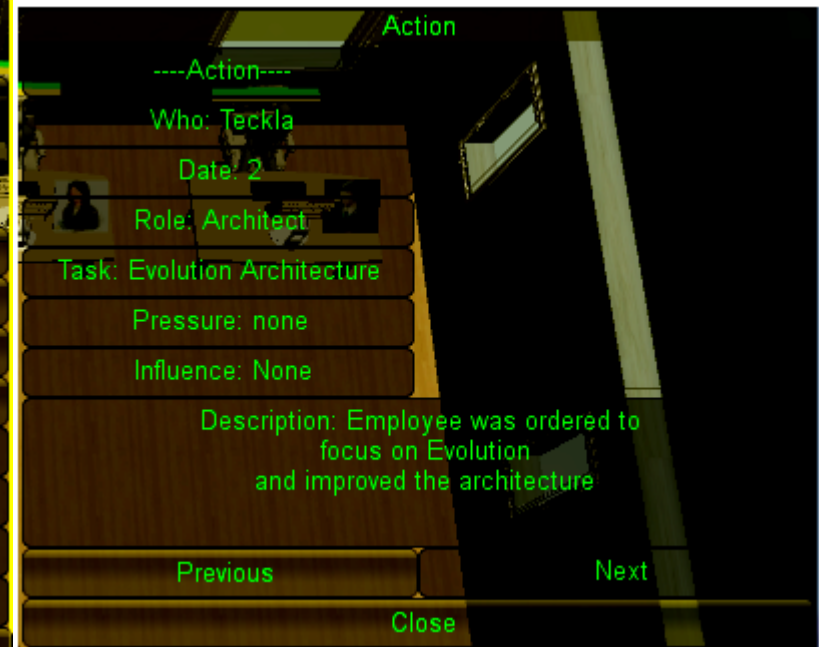
APPLICATION

- INSTANCIATED IN A SERIOUS GAME
- SDM: SOFTWARE DEVELOPMENT MANAGER
 - UNDERSTAND EXISTING CAUSE-EFFECT RELATIONSHIPS IN SOFTWARE DEVELOPMENT
- NEW FEATURES
 - EVENT RECORDING
 - DECISION TREES

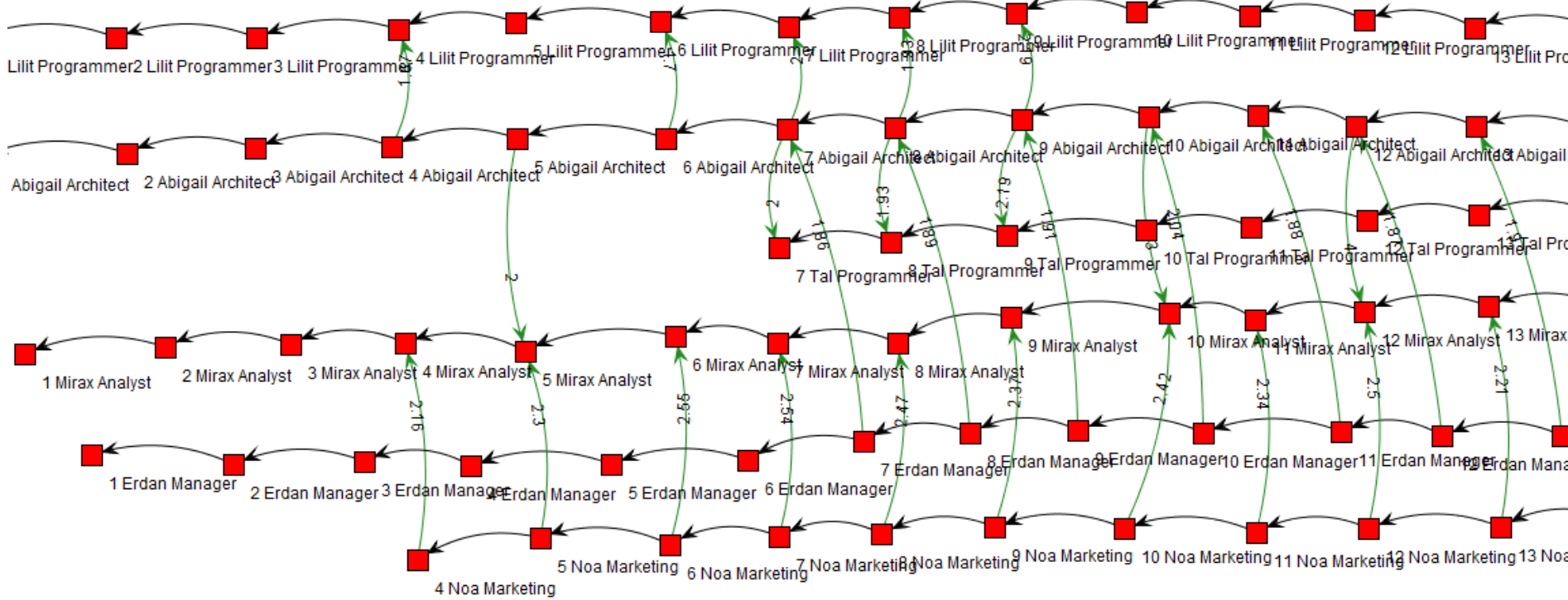


APPLICATION

- INGAME ACTIONS AND EVENTS LOG
 - EXPORTED TO A GRAPH APPLICATION

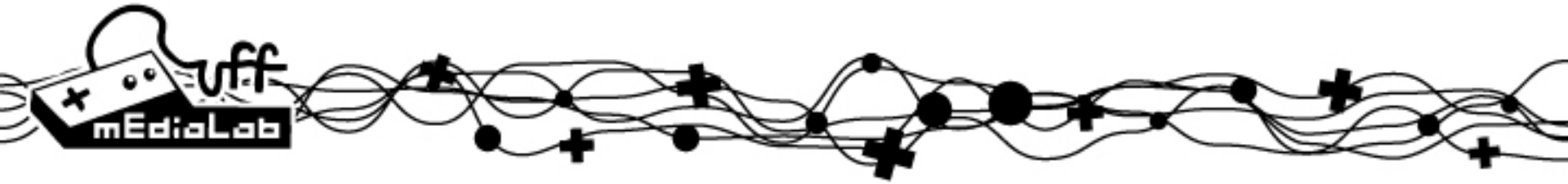


WORK IN PROGRESS



CONTRIBUTIONS

- NEW FRAMEWORK
 - PROVENANCE IN GAMES
- ALLOWS POST-GAME ANALYSIS
 - IDENTIFY DIVERGENCE POINTS
- UNDERSTANDING ANALYSING GAME FLOW
 - IDENTIFY ACTIONS THAT INFLUENCED OUTCOME
 - AID PLAYER UNDERSTANDING



FUTURE WORK

- SDM
 - GENERATE VISUAL GRAPH
 - APPLY PROVENANCE ANALYSIS TECHNIQUES
- GRAPH ANALYSIS
- RUN EXPERIMENTS
 - EVALUATE ASPECTS OF LEARNABILITY





uff

Universidade
Federal
Fluminense



Provenance in Games

Troy C. Kohwalter

tkohwalter@ic.uff.br

Esteban W. Gonzalez Clua

esteban@ic.uff.br

Leonardo G. Paulino Murta

leomurta@ic.uff.br

G E M S

Software Maintenance and Evolution Group