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Ludologia, Engenharia e Simulação

Games as Information Systems

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LUDES

- Ludology, Engineering and Simulation
- LUDES is a laboratory created to research Games and Simulations with the tools of Engineering, aiming to understand:
  - What is a game
  - Why people play games
  - What is quality for games
  - How to develop games
  - What are the impacts of games

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Summary

- Introduction
- What are Information Systems?
- Theories from Games Studies
- Defining Games as IS
- Examples
- Using IS in Game Design
- Conclusion

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Introduction

Motivation

- Game design and development turned out to be a legitimate profession and industry.
- There are undergraduate and graduate courses in Game Design, Art, Programming and all others related to this subject.
- New knowledge is being defined by borrowing from other areas such as administration, management, art, narrative studies by creating new models, tools and practices both from empirical evidence and scientific investigation.
- Game industry has been using many elements from Information Systems (IS), but without any formal or theoretical approach.

Problem

There is not yet a set of widely accepted standard of practices for game conception, development, maintenance and study (Aleem, 2016) (O'Hagan2014)

Software engineering techniques may help game development to achieve maintainability, flexibility, lower effort and cost, and better design.

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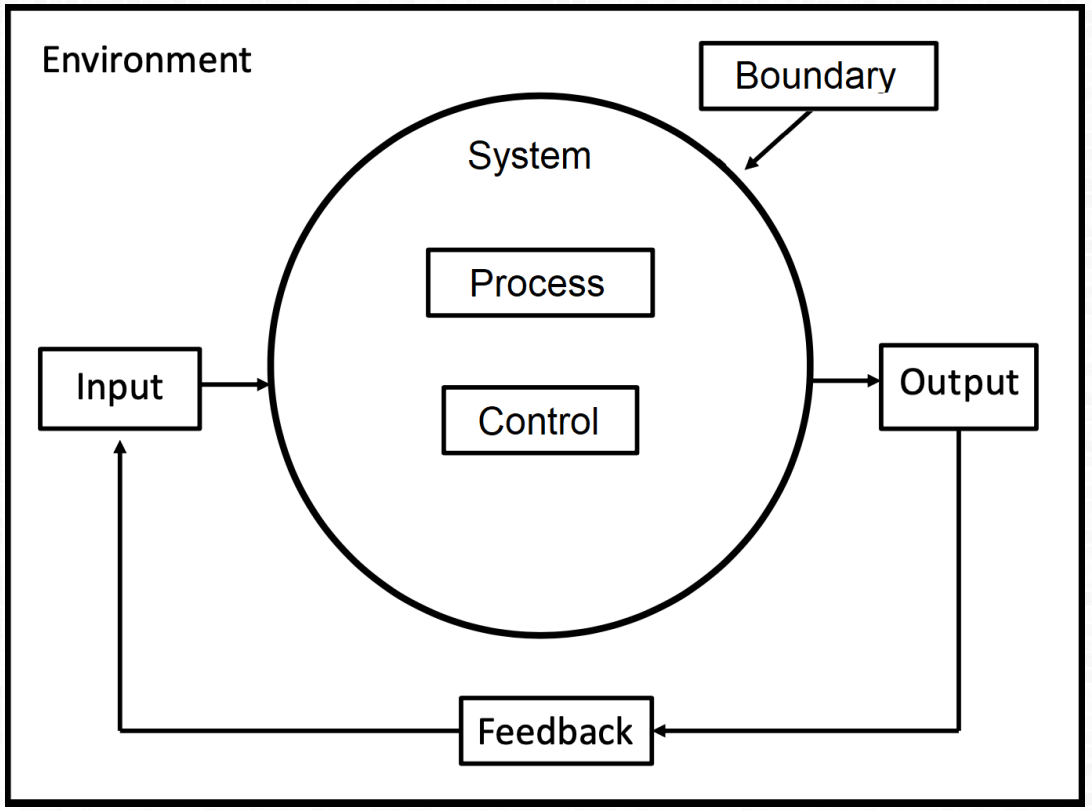
What are Informaition Systems?

What is a System?

- Set of interrelated components that function together in a meaningful way (Davis,1988), in which the whole system is greater than the sum of its components, since new properties emerge from the actions and interactions among them.
- These properties do not exist in the parts when isolated (Bunge, 1979)



Information Systems

- Arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as output the information needed to support an organization (Whitten and Bentley, 2007)

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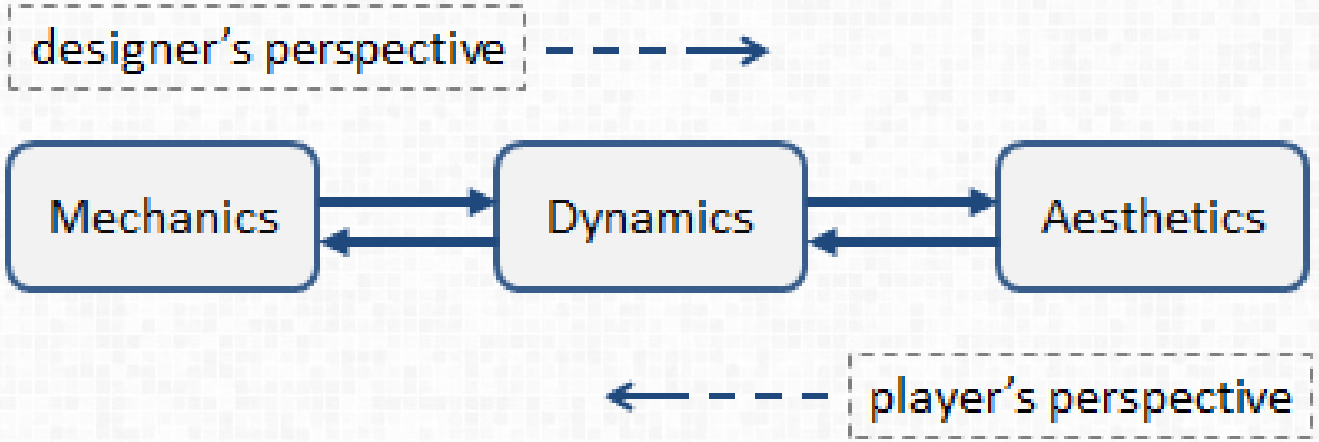
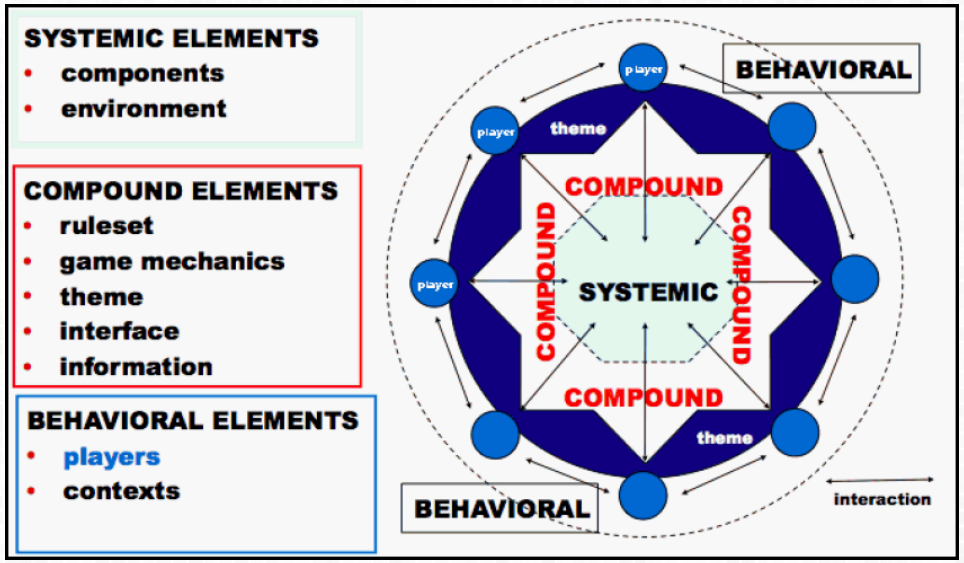
Theories From Game Studies

Theories from Game Studies

- MDA framework
- Järvinen Elements
- Classical Game Theory
- Procedural Rethorics





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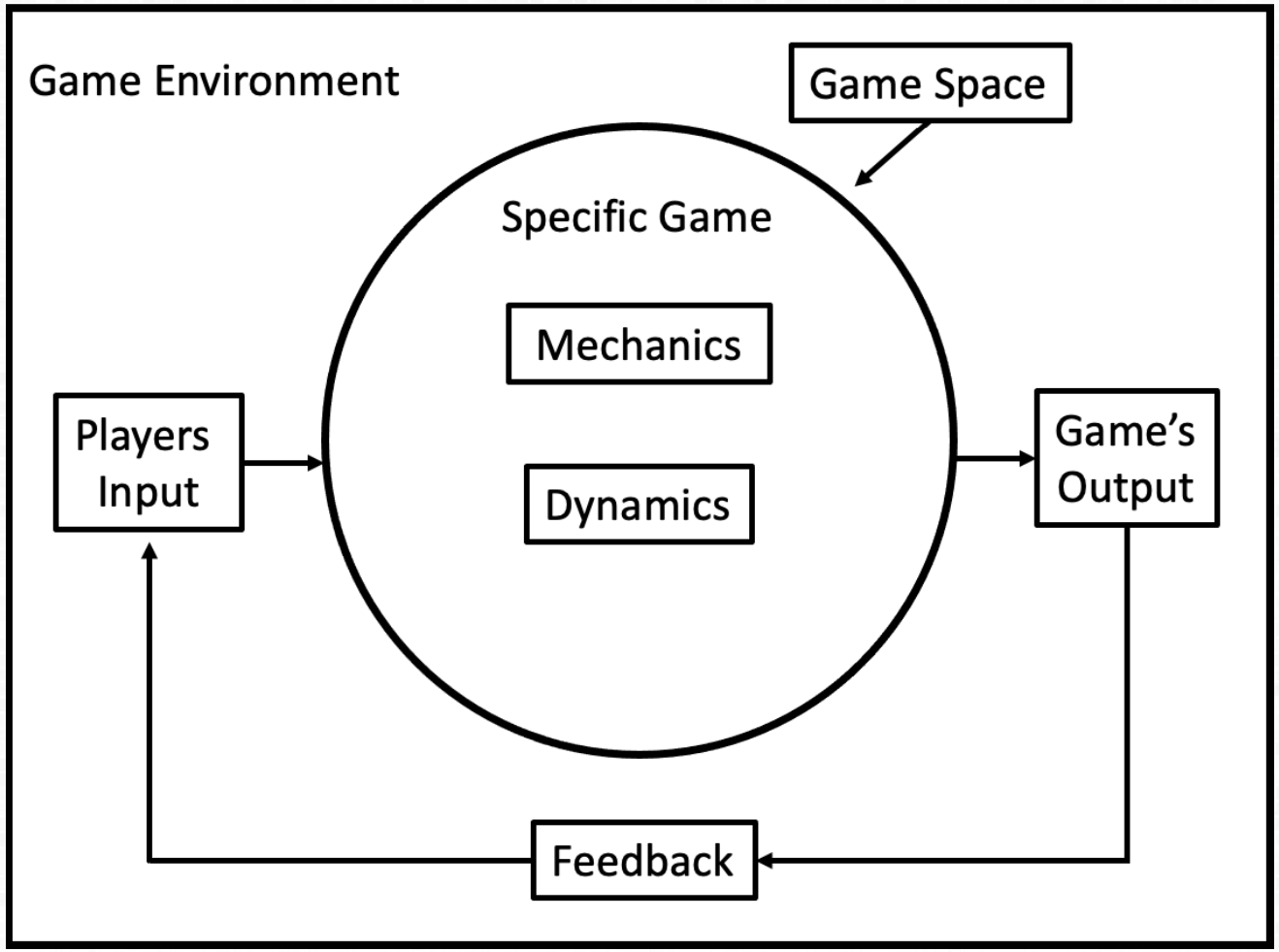
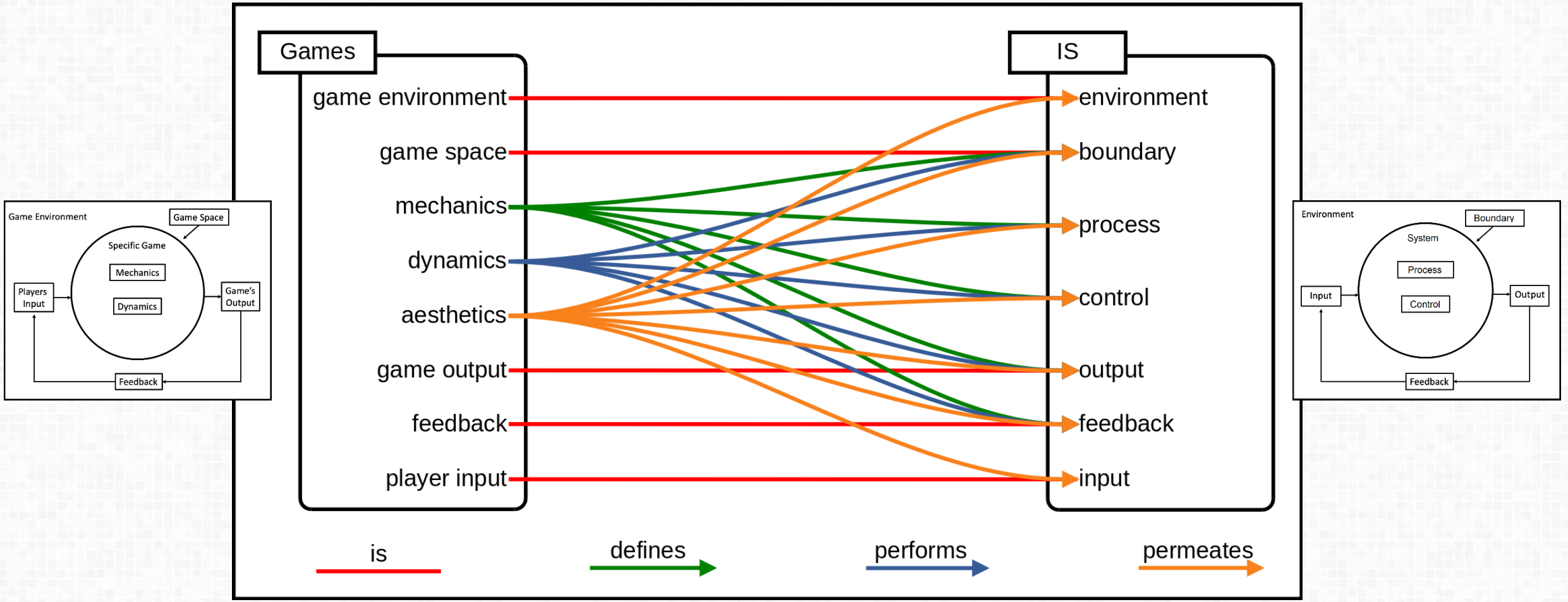
Defining Games as Information Systems

Conceptual Model



Mapping of Elements



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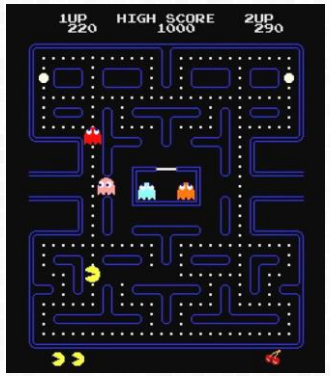
Examples

Modelling Games - Examples

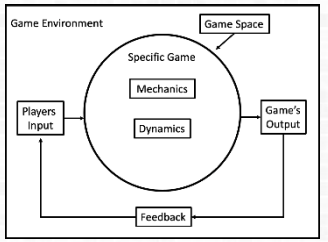
Video Games



Board Games

Card Game

Analysis Results



Game	Type	Player's Inputs	Mechanics	Dynamics	Game Outputs	Feedback
Chess	Board Game	Move pieces, remove captured pieces, choose the pawn promotion piece, return the pawn promotion piece, communicate check and checkmate	Board setup, Move, Castling, Capture a piece, *en passant*, Pawn promotion, Resign, Tie, Fixed Turn Order, Punch Clock, Loss by Clock, Draw rules	Protect/threaten a piece or area, gambit, center control, resign, propose a tie, communicate check and checkmate, x-ray attack, Openning Strategies	Positions of the game pieces on the board, situation of the king (checked or stalemate)	Removal of pieces from the board, verbal communication (not mandatory) of check and checkmate, changing pawn promotion piece
Monopoly	Board Game	Move token, roll dice, draw a card, buy property card, build houses and hotels	Move, roll dice, draw a card, build, trade	Choose to buy or sell a property, pay and receive rent, negotiate	amount of money, number of properties that each player has, position of each token	Chance of landing in an owned or available property and knowing whether the opponents are getting more money and properties
Pac-Man	Video Game	Move character through the maze	Move, eat	Escape, chase, reach, attack	Game score, level, number of lives and the position of pac-man and the ghosts	Best way to eat dots and worry about getting away from the ghosts
Super Mario Bros.	Video Game	Move character, face enemies	Move, attack	Jump, throw fireball, hit and break bricks	Game score, number of coins collected, number of lives and avatar progress	Reveals whether Mario is at a safe distance from enemy attacks and level threats
Uno	Card Game	Draw and discard cards, say UNO	Hand management, losing turn, matching, take that	Accumulate special card powers, create alliances between players, accuse someone of not saying "UNO"	Number of cards each player has in hand, top card of the discard deck	knowing how many card the opponents have

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Using IS in Game Design

Tools and Methodologies

- Method for mapping the elements of business process models using BPMN (Classe, 2018)
- Software Product Line architecture was proposed to support the design of educational games (Martins, 2018)
- UML diagrams to represent game elements: characters, scenarios, actions and so on; and model games as finite state machines (Tang, 2008) (De Lope and Medina, 2016)
- Formal Framework - Machinations - to represent discrete game mechanics, which was inspired by the Petri Nets (Dormans, 2012)

Quality

- Fundamental aspect in the game design process
- ISO/IEC 25010:2011 standard describes a quality model for systems and software that can be applied to games
- Qualinet model for Quality of Experience (QoE) were used to build a taxonomy of factors, aspects, and features that are relevant to games (Möller, 2013)

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Conclusion

Contributions

- Two conceptual models:
  - First model presents game components, which was extended from a conceptual model of systems
  - Second model correlates the IS concepts with game elements from theoretical models of games, for instance, the MDA Framework
- Paper can guide future works that lead towards a better understanding of the game design process and the emerging game engineering

Future Work

- Build a practical framework for analyzing games as IS
- Continue investigating recognized techniques in IS to incorporate them into the game designs developed by our research group

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Obrigado!

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