Start-up Seminar

Leveling Up the Indie Scene:

Automatic Play Testing and Quality Assurance

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Department of Computer Science and Society
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GAME TECH ACADEMY

About me

- Andreas Jonasson
  - 31 years old
  - Father of one (soon two)
  - Married – Support deluxe
- Master in Science and Engineering: Game and Software Engineering
  - Blekinge Institute of Technology 2018
- Previously affiliated with:
  - Blekinge Institute of Technology (2018-2020)
  - University of Skövde (2020-2024)

Me holding a rubber duck – a programmer's best friend.

The short version

- Supervisors:
  - José María Font Fernández (Main supervisor)
  - Alberto Alvarez Uribe
  - Raquel Robinson
- Game Tech Academy

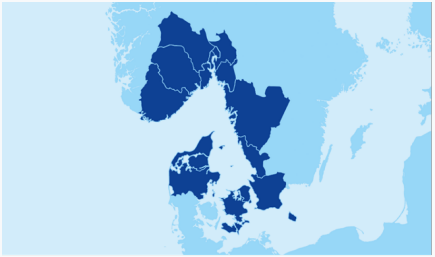
GAME TECH ACADEMY

Game Tech Academy helps you explore the potential of game technology

- Looking at:
  - Automatic Game Play Testing
  - Automatic Quality Assurance
- Focusing on:
  - Democratizing processess
  - Informed by AAA-research
  - Indie Game Developers
- Design Science Research
  - Wicked problem
  - Development of Software
- End goal
  - Tool (suit)
  - Easily integratable
  - Open up testing

Game Tech Academy

- 3 year project
  - Interreg Öresund-Kattegat-Skagerrak
- Partnership between
  - Business Aalborg, Aalborg muncipality
  - AAU Innovation, Aalborg University
  - Dania
  - University of Skövde
  - Malmö University
  - Science Park Skövde



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Game Tech Academy

Game Tech Academy is a collaborative project which aims to discover synergies and showcase the potential of game technologies to tackle a growing number of complex challenges beyond the entertainment industry.

A Definition of Digital Games

Half-Real refers to the fact that video games are two different things at the same time: video games are real in that they consist of real rules with which players actually interact, and in that winning or losing a game is a real event. However, when winning a game by slaying a dragon, the dragon is not a real dragon but a fictional one. To play a video game is therefore be interact with real rules while imagining a fictional world, a video game is a set of rules as well as a fictional world

Jesper Juul, Half-Real: Video Games between Real Rules and Fictional Worlds

Quality Assurance (QA)

- Finding bugs/exploits
- Software-oriented
  - "Does the game behave as expected?"
  - "Does the game fulfill the requirements?"
  - "Does the game fulfill the non-functional requirements?"
- Focus on:
  - Unit tests
  - Integration tests
  - Code coverage
  - Functionality tests

Note!

This is a quick overview and many different aspects of the Quality Assurance process is not dwelled on – most of you probably know this one better than me!

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Automatic Quality Assurance

- QA automatization
  - Buildsystems
  - Static code analysis
  - Auto-running test-suits
  - “Camera on rail”
- Part of Continous Integration (CI)
  - Test fail → Merge rejected
- Test everything?

Different from Software Development?

This looks like regular “best practices” for CI, and a lot of it is based in Software Development. This is one of the reasons to why Game Development is often seen as a techincall endevour. Truth to be told, not all companies (regardless of size) deploys more than a few of CI techniques for QA automatization.

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Game Play Testing

- Two flavours
  - Looking for bugs → QA
  - Evaluate gameplay experience
- "Is the game fun?"
  - Subjective
  - Reliable feedback?
  - Source problem?
- Costly
  - Manual work
  - People playing
  - Data collection
  - Data analysis

Play-personas

Play-personas is a way to model the "ideal" user of a game, including:

- How they traverse the world
- How they interact with the world
- How they interact with the mechanics
- In what order they traverse through different points

Multiple personas → multiple ideas, play-styles and player "clusters".

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Automatic Game Play Testing

- R&D departments
  - EA Seed
  - Ubisoft La Forge
  - Sony AI
  - Cygames Research
- Environment exploration
  - Curiosity-driven frameworks
  - Behavioural preferences
  - Play-personas and play-styles
- Through
  - Modify existing AI-systems
  - Integrating planners
  - Machine-learning technologies

What about academia?

Frankly speaking, a lot of work done in academia is either: a toy example; done in an "unusable" framework; does not scale; narrowed-to-unusable "proof-of-concept"; or is behind a paywall.

Furthermore, these techniques generally needs either: to be used on a specific game genre; changes in how game logic is written; or a lot of hands-on implementation.

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Whelp, that was a hot-take!

- Value of academia
- Value of practice?
- What is knowledge?
- Black and white?

Master of Science in Engineering

One of the knowledge requirements for receiving a Master of Science in Engineering diploma is to be able to "Demonstrate knowledge of the scientific foundations and established practices within the chosen technical field, as well as an understanding of current research and development activities." (Translated used ChatGPT with "dry academic English as prompt").

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Knowledge Creation

As such, I think it is important to look past academia, in part, and see what is happening in an industry we rarely get to look into. The vast knowledge created there by engineers, scientists, and hobbyists is a well of information and new possibilities.

Foundations

- State-of-the-art?
  - AAA-studios
  - Research
  - Knowledge/Technology/Applications
- Indie developers
  - Constraints?
  - Requirements?
  - Expectations?

Hypothesis

While Gameplay testing and QA is as important for Indie developers, the way it is conducted – and the view of the neccisity for testing – is different. Most notably, AAA studios seem to have (at least partial) in-house solutions; something indie developers will not have. Thus, the direct applicability of "state-of-the-art" will be narrow to begin with.

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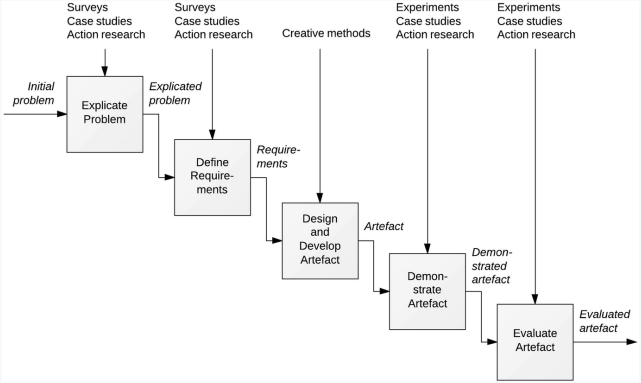
Design Science Research

- Wicked problem
- Plan for Design Science Research
- Five phases:
  - Explicate Problem
  - Define Requirements
  - Design and Develop Artefact
  - Demonstrate Artefact
  - Evaluate Artefact
- Goal: Develop a tool (suit)
  - What are the actual needs?

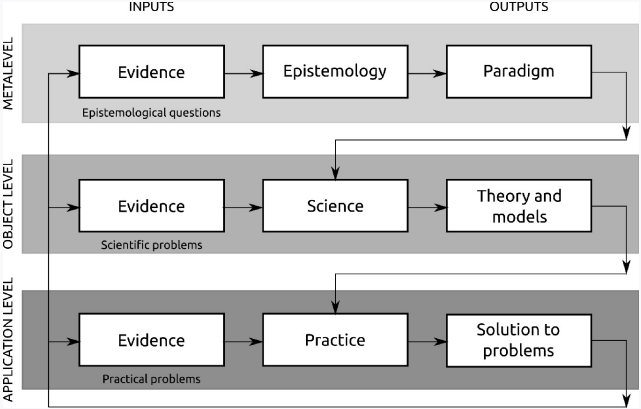


Stolen (with love) from: An Introduction to Design Science [Johannesson, P. & Perjons, E. (2021)[a]]

[a] https://doi.org/10.1007/978-3-030-78132-3

The M³-Model

- M³ → Meta-Modeling Methodology
  - Meta Level → Investigates source of knowledge
  - Objevt Level → Theories and models
  - Application Level → Apply tools and models to solve problems
- Interconnected
  - Informs upstream and downstream



Stolen (with love) from: Classical to Contemporary: An M3-Based Model for Framing Change in Information Architecture [Resmini, A. (2021)[a]]

[a] https://doi.org/10.1007/978-3-030-63205-2_2

On the Subject of Explainability

- Explainable AI (XAI)
  - Machine Learning → Black box
  - Transparency, Understandability, Interpretability
- Explain to:
  - Justify → Why this outcome?
  - Control → Understand the system
  - Improve → Easier to understand, easier to improve
  - Discover → Use to gain new knowledge

Research Questions

RQ 1) How does the game play testing and quality assurance work differ between indie game developers and AAA developers?

RQ 2) How does the needs on an automatic system for game play testing and quality assurance differ between indie game developers and AAA developers?

RQ 3) How can the current research and development from game industry and academia be translated into tools for non-technical game developers without access to technical personnel?

RQ 4) How can an automatic game play testing and quality assurance system present recommendations and actionables in a way that gives non-technical game developers confidence in what action to take?

RQ 5) How does access to and usage of this system affect the development process of a non-technical game developer and the reception of the developed product?

RQ 6) How can the developed system become self-iterating, learning and enhancing both recommendations and actionables based on data from users both locally and globally

What I Don't Want

- "Information gathering"
  - Surveys
  - Shallow interviews
  - What is done in academia?
- "Academic centric" framework
  - Grounded, but divergent
  - Unusable without modifications
  - "Only for this narrow application"

Hubris speaking?

Yes, very much! Aim for the stars and all of that!

I see a possibility for active inclusion of developers, rather than using them as test subjects or informants. And that will be my aim, to bring academic practice to them, make them interest – and active participants of – research based development aimed at solving their problems.

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Challenges

- Access to companies
  - GTA
  - Former students
  - Former colleagues
- Meaningful participitation
  - Time window?
  - Costs?
  - Time?
  - Usability?
- Technically
  - Time - Cost - Reliability
  - Feasability?
  - Training data?
  - Explainability?

Current Progress

- Courses
  - Course for Doctoral Students within Game Development
    - Council of Swedish Games Researchers
  - Research in collaboration: theories, methods, practices and ethics
- Conferences
  - Sweden Game Conference, Skövde (3 - 4 October)
  - AI and Games Conference 2024, London (8th of November)
- Survey
  - “AI Tools in Game Development”