

It's too dangerous to  
go alone! Take this!

Powering up for Videogame  
Preservation

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MITH Digital Dialogues

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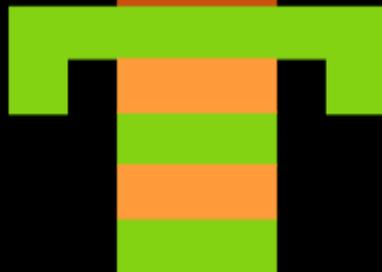




Image generated by <http://www.oregontrailtombstone.com/>

# PVWI (2008-10):

Funded under the Library of Congress's National Digital Information Infrastructure and Preservation Program, the project explored methods for preserving digital games and interactive fiction. Major activities included developing basic standards for metadata and content representation and conducting a series of archiving case studies for early video games, electronic literature and Second Life.

# LEVEL 1-1

## Bitstream-ish Preservation Strategies



**SURROGATES**



**EMULATION**



# LEVEL 1-1

## Bitstream-ish Preservation Strategies



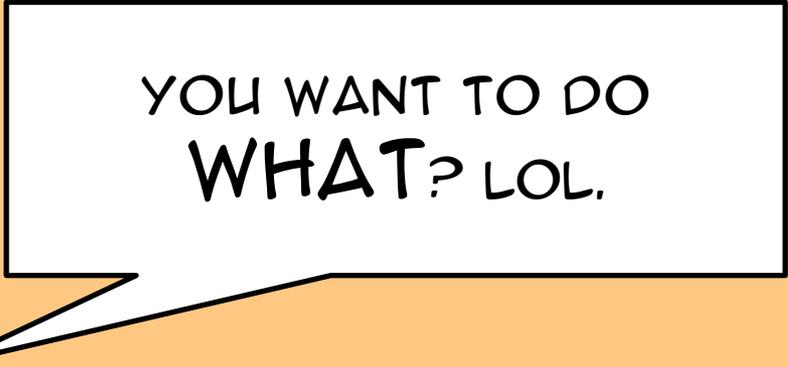
# LEVEL 1-2

## Intellectual Property

DMCA



YOU WANT TO DO  
WHAT? LOL.





# PVW II (2010-12):

Made possible by a grant from the Institute of Museum and Library Services, the second phase of the project explores the significant properties of digital games that must remain intact over time and investigates various preservation strategies such as virtualization and data migration that might be used to preserve these properties.



# LEVEL 2-1

## Significant Properties

those characteristics of an object  
which must be preserved in order to  
maintain its authenticity.

# Authenticity

- being authoritative or duly authorized.
- **being in accordance with fact, as being true in substance.**
- **being what it professes in origin or authorship, as being genuine; genuineness.**
- being real, actual; reality.

# Case Set

DOOM

**Typing of the Dead**

**Harpoon**

**Oregon Trail**

Civilization

Carmen Sandiego

**Super Mario**

# Property: Difficulty

## NINTENDO GAMECUBE CONTROLLER

**USEFUL SPECIAL ABILITY OR MENU. PROBABLY.**

L BUTTON

R BUTTON

**DO I EVER MATTER AFTER THE START SCREEN?**

Z BUTTON

START/  
PAUSE

Y BUTTON

CONTROL  
STICK

**SECONDARY**

X BUTTON

**CORE FUNCTION!**

+CONTROL  
PAD

A BUTTON

**CORE FUNCTION!**

B BUTTON

**I MIGHT BE IMPORTANT**

**ALSO IMPORTANT!**

CONTROLLER  
PLUG

C STICK

**YOU'LL NEVER  
REMEMBER TO USE ME**



# Controller Conventions (Mario)

-  is usually JUMP.
  - In SM Kart, it's "use item". Later Karts make it the *acceleration* button, which is as important to racing as jumping to platformers.
-  is usually ATTACK or ITEM (e.g. fireflower)
-  Go down TUNNEL (non-racing/sports)
- D-PAD controls Mario (NES/SNES)
- C-STICK controls Mario (N64/GC/Wii)

# OTHER PROPERTIES

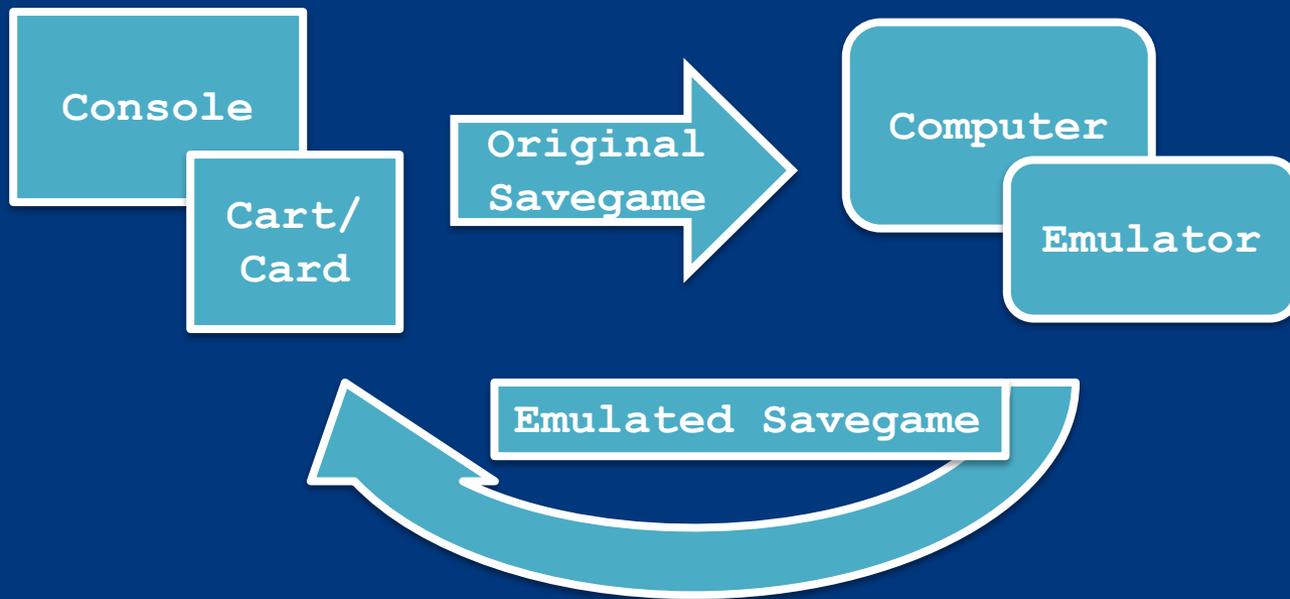
- Data Model (Harpoon unit stat databases)
- Surface characteristics (aesthetic, audio, etc)
- Iconic moves (bunny hopping in Quake)
- Use of demo files/scripts as an audit tool (DOOM LMP files)

Super Mario Brothers defined platformers as a genre. When other games are described as "like Mario," this usually means the motion is side scrolling and the player jumps around a 2d environment. So what makes Mario *Mario* and not just another platformer?

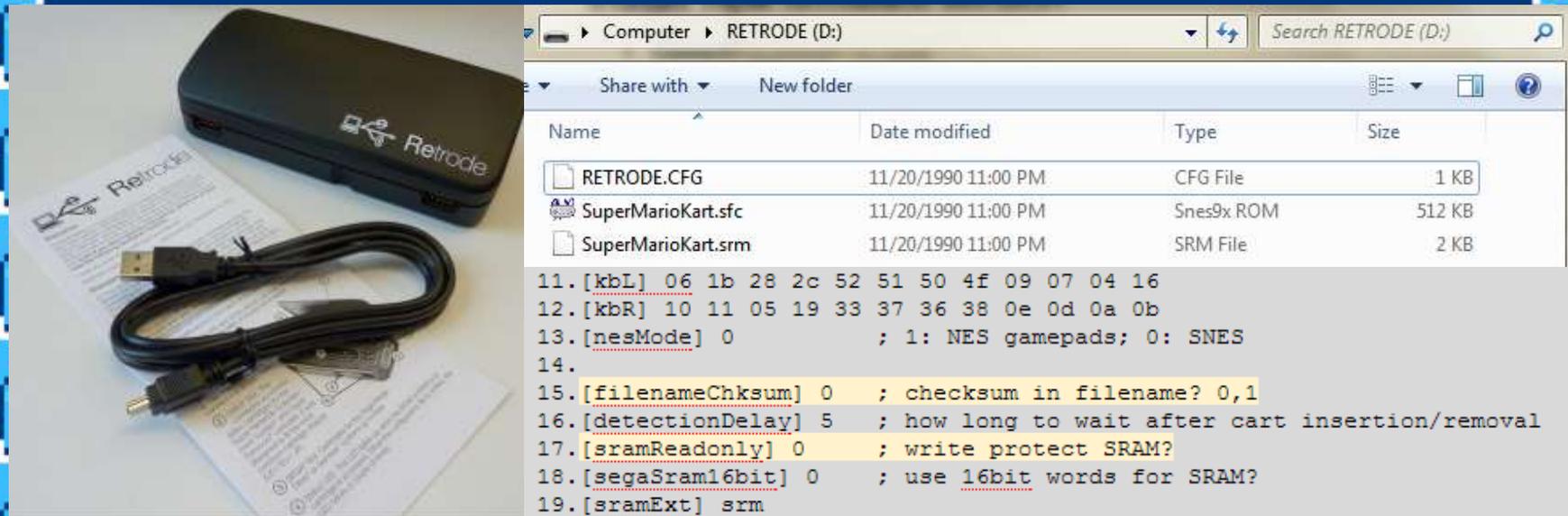
LEVEL 2-2

TINKERING!  
DISMANTLEMENT!  
BURNINATION!

# Savegames as Audit



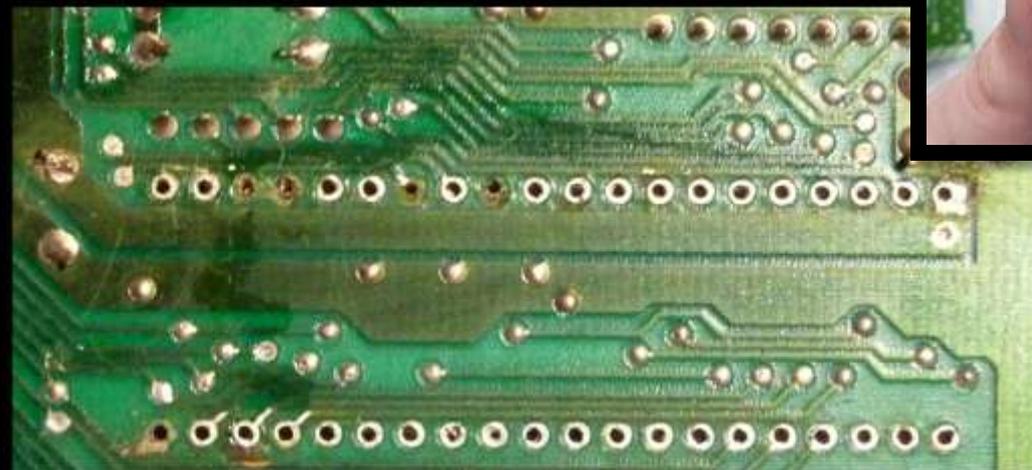
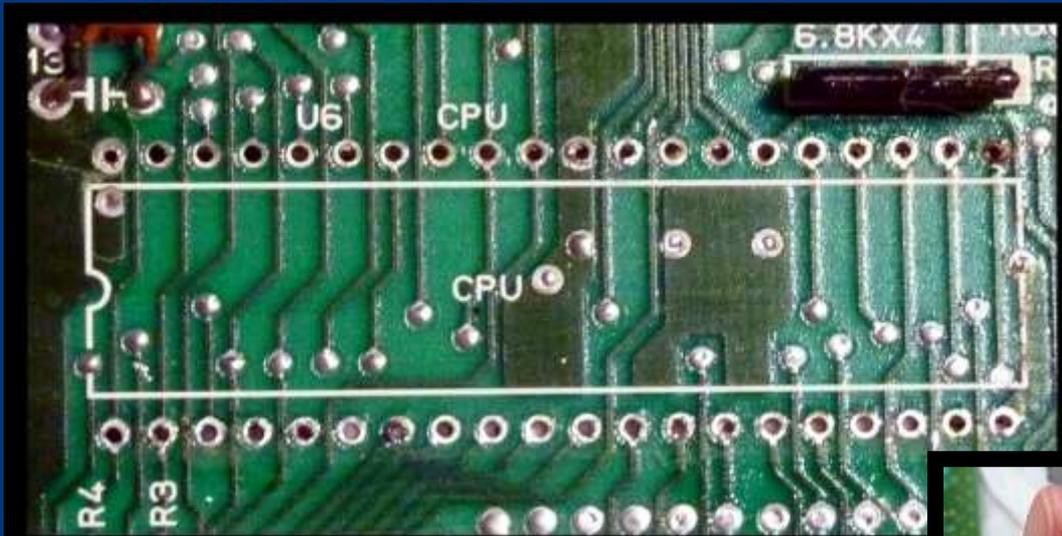
# Saving Savegames



# Saving Savegames



# Burnination



# Saving Circuit Boards





**LEVEL 2-3**  
**STRATEGY GUIDE**

# Creator Questions

- Where did the idea for the game come from? [How was the key concept(s) behind the game explained to you?]

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- What genre would you assign to the game? Has this classification changed over time?

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- [If the game is part of a series or franchise] What makes for continuity within this specific game franchise? Is it different or similar to what allows for continuity in other franchises?

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- When working on a game series, there is always a tension between adapting to technological changes and keeping enough elements the same or similar to guarantee continuity. How do you feel that has been addressed with this game/series?

# Curator Questions

- Do you have the hardware necessary to play the game natively? [Yes | No]
- Do you have the hardware necessary to migrate the game to a media neutral format? [Yes | No]
- What supplementary materials exist for the game/which do you own?
- 12. Does the game support saving? [Yes | No]
  - Cartridge Battery (NES, SNES)
    - What is the file format of game saves?
  - Memory Card (N64, DC, Wii)
    - What is the file format of game saves?
  - System Harddrive (Wii, PC)
    - What is the file format of game saves?
    - What is the file size of save games?

# Player Questions

- What is the core or heart of this game?

[If the game is part of a series/franchise] What factors contribute to continuity within the franchise? (*i.e. what makes a Mario game a Mario game?*)

- [If the game is multiplayer] Have you ever played this game with other players, in person or over a network?
  - What was it like? Would the game change if it could only be played by a single player?
- What new technologies, modes of play, or game mechanics did this game introduce you to?
- If you knew that some aspect (color fidelity, controller, etc) had to be sacrificed to preserve a playable version of the game, what would you be willing to give up? What would you NOT be willing to give up?

# Custom Questions



2009-2012



Well, that  
was fun.

# Glitch Creator Qs

The Glitch API provided outside developers with the opportunity to create wonderful tools like Glitch Remote. Can you talk a little bit about the rationale of providing such an API? Would Glitch have been the same game without an open API?

- Perhaps the most contentious portion of the game came in the form of nerfs. What was the process for deciding what features to nerf? Do any particular nerfs stand out to you?
- A distinguishing feature of Glitch is the lack of player-to-player conflict (PvP combat, specifically), a core feature in many MMOs. How and when was that decision made? Did it affect the development process?

# Glitch Player Qs

- Glitch underwent drastic changes as it moved from Alpha, to Beta, to Launch and Back to Beta. Have you played through any of these transitions? Please describe your experiences with them. (E.g. changes you felt strongly about, level of desire to play the game, etc.)
- Did you participate in any player-run activities in game? For example, the Sandbox Group, Housing Resource Routes, Ghost Tours, etc. If so, please describe your experience with it. Why did you participate? What did participation entail?
- Did you personally do anything to help you remember Glitch? (Screenshots, video, visiting specific locations, etc) What did you do?

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----- Slide 1-----

When I first started talking about videogame preservation, I used to start off with a list of reasons everyone should care. Four years later, I think it's safe to skip that part. For this presentation, I'm using "videogame" to mean interactive gaming software played on a computer or dedicated console. I'm not talking about LED handhelds, mobile games, or (for the most part) browser games. In fact, I'll \*mostly\* be talking about console games.

1

----- Slide 2-----

I'm going to start things off by giving a little history of the Preserving Virtual Worlds project, which just ended its second phase last year. If you've ever heard me speak before, this is your cue to check your email or take a nap.

2

----- Slide 3-----

The first phase of PVW was a partnership between the University of Maryland, the University of Illinois Urbana-Champaign, Stanford University, and the Rochester Institute of Technology (the second phase included the same partners) working investigating the preservation of digital games in the context of libraries, archives, and museums. UMD's investigators are Matthew Kirschenbaum, Kari Kraus, and Rachel Donahue.

3

----- Slide 4-----

As a project dedicated to preserving the actual game, we looked at a few strategies other than sticking the disk in a closet and forgetting about it: creating surrogates, migrating media and format, emulation, and adaptation. Surrogates—namely video and screenshots—are a valuable part of a game preservation package, but do very little to preserve that crucial aspect of games—play. Migration in combination with emulation is probably the most realistic strategy: make a media neutral copy of the game (we'll look at doing that with the Super Nintendo a bit later) and play it through an emulator. This won't be a lossless process, but in the long term (50+ years), it's easier than maintaining original media and hardware.

4

----- Slide 5-----

The final possibility we looked at was adaptation, basically preservation through remix. The best examples we had were the Mystery House Taken Over Project and fan translation of games.

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----- Slide 6-----

Copyright, patents, and trade secrets, oh my! I could talk about this for years, but I won't. Just believe me when I say it's a little like DOOM in Nightmare mode.

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----- Slide 7-----

The last thing we did in PVW 1 was figure out how to describe what we were preserving. That was slightly less complicated than intellectual property, but I'm still not going to do more than let you bask in the fuzzy image up there.

7

----- Slide 8-----

And now I'll talk about the newer stuff, the sequel! In the second phase of PVW, we were ostensibly studying the significant properties of games and how to suss them out. Because even in less esoteric parts of digital preservation, there's very little that goes beyond the theory of significant properties. Turns out there's reason for that, but first: what we tried.

8

----- Slide 9-----

What are significant properties? The Essence of The Thing you're trying to preserve.

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----- Slide 10-----

The stuff you need to preserve Authenticity, particularly the two definitions in bold.

10

----- Slide 11-----

We selected our case set to cover a range of genres and media types, with a preference to game series or franchises with lots of titles. All partners worked on Typing of the Dead, Maryland

focused on Harpoon, a naval simulation game created by local author Larry Bond, the Oregon Trail, which you'd better be familiar with, and Nintendo's affable Super Mario. We played the games ourselves and interviewed players and creators in an effort to define the significant properties on our case set.

11  
----- Slide 12-----

As an example, One of the games in the case set is Paper Mario and the Thousand Year Door for Gamecube. As a staunch believer in emulation for preservation, I used to be very resistant to the idea that hardware was important. You have the game, who cares what you play it on?! Then Paper Mario reminded me by making me go like this <<contort>> to get through certain levels. If you don't have to contort yourself to hit all the necessary buttons, the game suddenly becomes a lot easier.

12  
----- Slide 13-----

And then there are things like controller conventions -you KNOW the A button is going to select things on a Nintendo machine-and rumble packs (is Rampage as much fun if I can't feel the buildings rumble as I smash them) and I'm forced to admit that hardware-at least in terms of input devices-can be pretty important.

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-----Slide 14-----

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-----Slide 15-----

Nintendo ran a GREAT series of interviews for the 25th anniversary of Super Mario Bros. The developers were often asked variations on the question of what made Mario Mario. They're answer, invariably, was "fun." Not exactly the significant property we were hoping for. So the reason there's few practical resources for significant properties turns out to be.. it's hard! So in the second phase of the second phase of PVW, we did an about face and looked at practical ways we could help professional preservers of videogames do their jobs. I say professional, because the amateurs have got it totally figured out, and nothing I'm about to talk about would be possible without them.

15  
-----Slide 16-----

The next few slides refer to the process described in this blog post: <http://mith.umd.edu/preserving-virtual-snes-games/>

16  
-----Slide 17-----

One small but important step in any digital preservation workflow is auditing the files- making sure that the bitstream you have in your repository is the same as the bitstream on the original media (or, down the line, making sure that the bitstream in the repository is the same as the bitstream you originally ingested). When we migrate console games to a media neutral format, we're taking code that was originally burned into a read-only chip (ROM) and creating a digital file. We then access that digital file using a software emulator instead of proprietary hardware designed to do nothing but read those cartridges. This raises two questions:

How do we know that the file we save matches the file originally burned on the ROM?                      How do we know that the emulator is correctly interpreting the ROM?

17  
-----Slide 18-----

To answer these questions for the SNES, we used a nifty device called the Retrode2. The Retrode2 device, made by a dude in Germany names Matthias Hullin, allows you to play Super Nintendo and Sega Genesis on your computer, using a software emulator (also created by players) and the original game cartridge and controller. Coincidentally it also allows you to rip the ROM and savefile off the cartridge, giving you a media neutral copy of the game which can be played as originally intended with the SNES controller. Magic! The Retrode also works with Genesis games As-Is, and there are plans available to make plug-in adapters for various other cart types.

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-----Slide 19-----

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-----Slide 20-----

Unlike the SNES, working with save games for the NES requires soldering and, more difficultly, DE-soldering. This is easiest if you just get yourself two Nintendos so you can destroy the CPU chip on one and the board on the other—unless you just happen to have a rework station, then it's cake.

20

-----Slide 21-----

A number of errors with old Mac Classics can be solved by putting the logic board in the dishwasher. For a longer term solution, leaking capacitors should be replaced.

21

-----Slide 22-----

Questionnaires to help curators with preservation and context.

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-----Slide 23-----

-----Slide 24-----

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-----Slide 25-----

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-----Slide 26-----

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The last slides refer to this forum post: <http://www.glitch.com/forum/general/30100/> And these questionnaires: <http://surveymonkey.com/s/glitch-players> <http://surveymonkey.com/s/glitch-devs>

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-----Slide 27-----

-----Slide 28-----

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-----Slide 29-----

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