

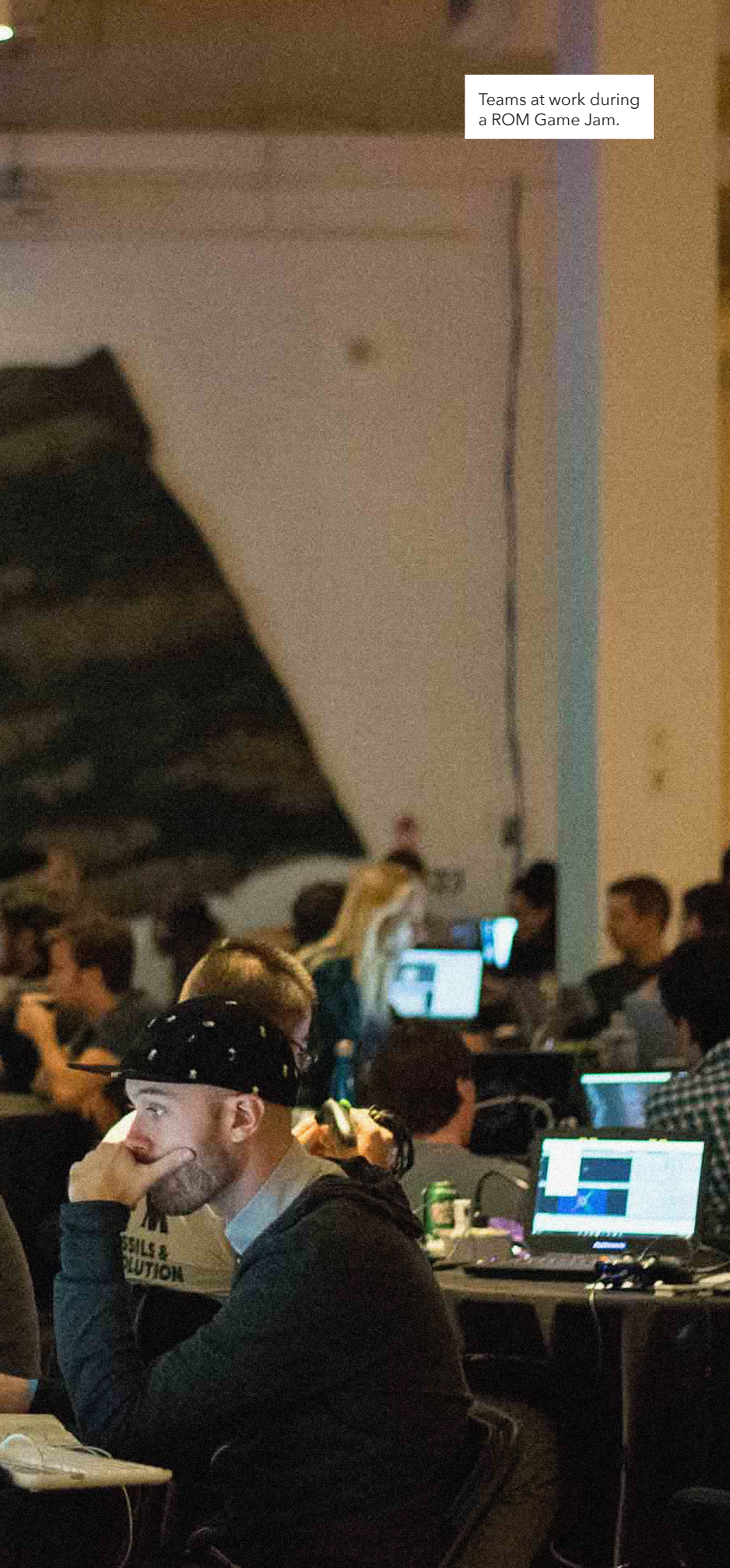
# Interpreting Objects through Digital Games

## The ROM Game Jam

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Teams at work during  
a ROM Game Jam.

In 2013, two staff members from the Royal Ontario Museum (ROM) met with a faculty member and student from the University of Toronto in the museum café to explore ways to integrate gaming into the museum’s galleries and programming.

The collaboration had been proposed by two of the ROM’s archaeologists, who were avid gamers. They enjoyed games about ancient cultures but were dissatisfied with their superficial cultural context and inaccuracies. Our small group wondered – could the university and museum work together to make games that were as compelling as the ones found in app stores, but more realistic? Could we create games that would feature authentic ROM objects, building an immersive learning environment around them?

At that very first meeting, an idea clicked. As we discussed our motivations for working together, our capacities and constraints, and the variety of possible projects we could collaborate on, we quickly agreed to collaborate on a “game jam” at the museum. A game jam is a community-led event where small teams work intensively over a few days to create games around a theme, usually just for fun. Game jams are an opportunity for developers of all skill levels to hang out, try new things, and learn from each other. Novice game

developers often want to push themselves to develop new skills, while seasoned pros may want a chance to do something more experimental or more quickly than they can in their jobs. Game jams can be organized by student clubs, professional associations, and other groups – so why not a museum?

As we brought others into the conversation, we found that the idea of a ROM Game Jam was appealing to museum staff because it offered us a chance to work alongside game developers to explore different ways to bring our collections to (virtual) life. It was appealing to the game development community because it offered them a new twist on a type of event they already participated in and enjoyed.

Over the past five years, this collaboration between the ROM and Toronto's game development community has grown into a multifaceted initiative that includes the ROM Game Jam event, video game arcades in the museum's galleries that showcase games from the jams, school visits focused on game development, and a digital learning program for Indigenous students living in Ontario. In this article, we situate the ROM Game Jam in literature on digital gaming in museums, describe the goals and outcomes of the ROM Game Jam, and share lessons that can inform other museum-community partnerships and digital learning programs. We also describe how the games interpret museum

objects, and highlight some of the opportunities to engage museum audiences in games within exhibitions and museum galleries.

[A]s people spend more of their leisure time immersed in other sources of learning and entertainment, museums must adjust to a shifting social, political, economic, and digital landscape.

### Gaming in Museums

Museums can offer visitors access to rich content and deep expertise, and have long played a vital role in supporting people's lifelong learning.<sup>1</sup> However, as people spend more of their leisure time immersed in other sources of learning and entertainment, museums must adjust to a shifting social, political, economic, and digital landscape.<sup>2</sup> As digital games and technologies

1 George E. Hein, *Learning in the Museum* (New York, NY: Routledge, 1998). Helene Illeris, "Museums and Galleries as Performative Sites for Lifelong Learning Constructions, Deconstructions and Reconstructions of Audience Positions in Museum and Gallery Education," *Museum and Society* 4, no. 1 (2006): 15–26.  
2 John Falk, Lynne Dierking, and Susan Foutz, eds., *In Principle, In Practice: Museums as Learning Institutions* (Lanham, MD: AltaMira Press, 2007). Erica Pastore, *The Future of Museums and Libraries: A Discussion Guide* (Washington, DC: Institute of Museum and Library Services, 2009).

increasingly pervade the lives of both children and adults, many museums are finding ways to incorporate them into the visitor experience in order to promote discovery and curiosity around museum objects.

Games can support learning in museums by making exhibitions more interactive and providing experiences that are difficult to simulate in physical form.<sup>3</sup> Playing games is part of a powerful process of learning for people of all ages.<sup>4</sup> Studies have shown that games can foster young people's interest and enthusiasm in learning,<sup>5</sup> especially their interest in science.<sup>6</sup> Even games developed purely for entertainment can help learners develop scientific habits of mind.<sup>7</sup>

In our experience with the ROM Game Jam, we found that short digital games can also serve as an entry point to encourage museum visitors to think, talk, and care

3 Danny Birchall et al., "Levelling Up: Towards Best Practice in Evaluating Museum Games," in *Museums and the Web 2012: Proceedings*, eds. Jennifer Trant and David Bearman (Toronto, ON: Archives & Museum Informatics, 2012).

4 Lloyd P. Rieber, "Seriously Considering Play: Designing Interactive Learning Environments Based on the Blending of Microworlds, Simulations, and Games," *Educational Technology Research and Development* 44, no. 2 (1996): 43–58.

5 Suzanne de Castell and Jennifer Jenson, "Serious Play," *Journal of Curriculum Studies* 35, no. 6 (2003): 649–65.

6 Merrilea J. Mayo, "Games for Science and Engineering Education," *Communications of the ACM* 50, no. 7 (2007): 30–35. Merrilea J. Mayo, "Video Games: A Route to Large-Scale STEM Education?" *Science* 323, no. 5910 (2009): 79–82.

7 Constance Steinkuehler and Sean Duncan, "Scientific Habits of Mind in Virtual Worlds," *Journal of Science Education and Technology* 17, no. 6 (2008): 530–43.

about museum objects that might not otherwise be intrinsically interesting or accessible to them. Games can contextualize and animate objects in the museum's collections, and provide an opportunity for museum visitors to engage with them more deeply. Above all, games can foster conversations among museum visitors, experts, and game developers, providing new ways for all parties to observe, interpret, and give meaning to museum objects.

### **ROM Game Jam Event**

The ROM is one of the largest museums in North America, with art, world culture, and natural history collections. Located in Toronto, Ontario in Canada, the museum welcomes over one million visitors annually. In order to be relevant and valuable for new generations and new Canadians, the ROM seeks to create participatory learning experiences, encourage deeper engagement with the museum's research and collections, and present the museum as a vibrant, changing space. To this end, in 2012 the ROM reorganized into Centers of Discovery, which organize the museum's research and collections into eight broad areas: Ancient Cultures, Biodiversity, Canada, Contemporary Culture, Earth & Space, Fossils & Evolution, Textiles & Fashion, and World Art & Culture. The centers have two roles: to help museum visitors understand, navigate, and connect with the museum's

collections, curators, and research; and to integrate the museum's public engagement, research, and collections activities.

The ROM Game Jam is a partnership among the museum, the University of Toronto computer science faculty, the University of Toronto Game Design and Development Club, and many other organizations and individuals in the Toronto game development community. Toronto has large multinational companies and smaller independent game development companies based in the city, and multiple higher education programs focused on the industry and craft. The city's game developers are well connected and well organized, with a variety of established professional events and communication channels that made it possible for our planning group to connect with the broader community. The largest game jam in Toronto, the T.O. Jam, started in 2006, and we were able to work with the organizers of that event and learn from many of the procedures and policies they had established through years of experience. While the membership of the ROM Game Jam planning team varies from year to year, it is always led by a managing director of one of the ROM's Centers of Discovery, and includes additional representatives from the museum, the university, and the wider game development community.

From the museum's perspective, the primary goal of the ROM

Playing games is part of a powerful process of learning for people of all ages.

fig. 1. Game developers learn from content experts during a behind-the-scenes tour of the Royal Ontario Museum's collection storage area.



Game Jam has been to create innovative learning opportunities among museum experts, game developers, and public audiences as they develop and playtest games based on the museum's research and collections. For our partners, the primary goal has been to "level up" the game jam experience by creating an event with a rigorous challenge – to make games related to museum objects – and by bringing other kinds of experts into the game development process. Many participating game developers are also excited by the possibility of sharing their games with museum visitors during one of the many playtesting opportunities that follow the jam.

Teams (or individuals) apply to participate in the ROM Game Jam, and the organizing committee chooses participants according to a variety of criteria, seeking diversity in the developers' levels of experience and styles. Participants can work independently but

often organize into small teams of programmers, game designers, artists, writers, and others. ROM Game Jam participants are at all stages of their careers, from students to industry pros. The majority are under age 35 (95 percent) and male (80 percent), reflecting the overall demographics of game developers in Toronto. Most have visited the museum in the past year (67 percent) or two to three years (26 percent); few have never visited (seven percent).<sup>8</sup>

The museum kicks off the weekend-long ROM Game Jam with an introduction to the theme for that year, which is related to one of the Centers of Discovery. This orientation includes exhibition tours, behind-the-scenes tours with ROM experts, and discussions of key objects or specimens related to the theme (fig. 1). The teams bring

<sup>8</sup> Alexander Johnson, and Eva Tolkunow, "Game Jam: Overview 2013–2015" (unpublished internal report based on ROM Audience Insight online feedback surveys, Royal Ontario Museum, 2015).

most of their own equipment, and set up in a large space with tables, power strips, Wi-Fi, and other essentials. They have free access to the museum, and ROM staff and game development mentors are on hand to offer advice and answer questions. There is a mellow, productive vibe as the teams work, until the last half hour or so, when the atmosphere becomes intense as teams race to create a playable build (intro image). The jam ends with a showcase, where the teams play each other's games. The final celebration also gives the jam organizers a chance to consider which games appear most promising for further development and playtesting with museum visitors.

For example, in 2015, over 100 game developers participated in the ROM Game Jam, *Space Rocks*. The teams drew inspiration from the ROM's collection of over 100,000 rocks, minerals, and gems, including over 500 Martian, lunar, and asteroidal meteorites. ROM experts provided an overview of current research in planetary science and provided NASA datasets related to the museum's collection.<sup>9</sup> Resulting games include "Astro-Miners" ("Blast through the asteroid and be the first to grab the minerals!")

9 Marianne M. Mader et al., "21st Century Engagement: 'Space Rocks' Game Jam. An Immersive, Open-Ended, and Collaborative Science Outreach Program" (poster presented at the *Lunar and Planetary Science Conference*, The Woodlands, Texas, March 20–24, 2016).

and "Rogue Rovers" ("Rovers gone rogue! Collect rocks on Mars and keep them away from the astronaut!") (fig. 2).

[T]he primary goal has been to "level up" the game jam experience by creating an event with a rigorous challenge – to make games related to museum objects – and by bringing other kinds of experts into the game development process.

Following the Game Jam, the organizing committee works with a subset of the teams, and with departments across the museums, to choose games for further development and playtesting at the ROM. The playtesting experiences allow visitors to try game prototypes and give their feedback directly to the game developers, who then continue to improve the games based on the input. To choose these games, the organizing committee discusses all the playable games that were produced during the jam. Museum experts offer their opinion on which games are most successful at interpreting ROM objects or exploring key concepts related

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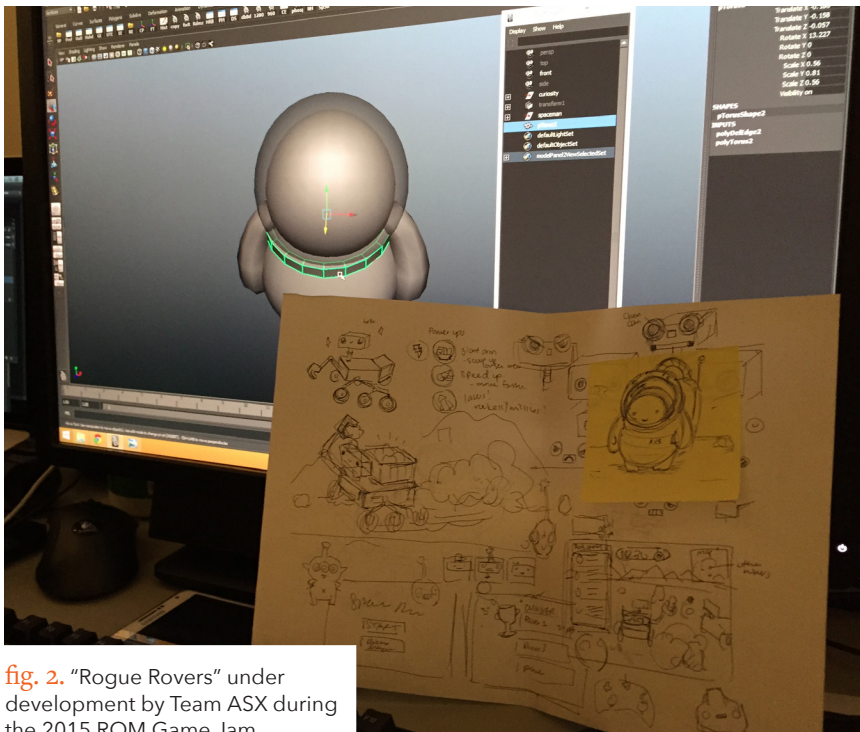


fig. 2. "Rogue Rovers" under development by Team ASX during the 2015 ROM Game Jam.

to the ROM's galleries. Gaming experts explain which games they consider fun and well-designed. Once the committee decides on a short list, the managing director contacts the teams to see if the developers are interested in continuing to develop their games with input from ROM experts and museum visitors. This opportunity is optional, but from year to year, the majority of teams that are contacted choose to further develop their games. Participating teams already have a good idea of what they could do to improve their games. The organizing committee gives them additional recommendations to make their games work in the

museum environment, and to strengthen the learning related to the featured objects or specimens. There is at least two months' time before the first of several playtesting events, so the teams have time to create a robust, playable version of the game.

Working with staff in departments across the museum, the ROM has integrated game jam playtesting and game development into a variety of exhibition settings and programs. These include pop-up "ROM Arcades" that are installed in museum galleries as well as school trip visits and other initiatives by ROM Learning (the museum's education department).

### Game Arcades in Museum Galleries

The ROM Game Jam organizing committee and the museum's public engagement staff work together to create temporary installations called ROM Arcades, which feature several games developed during the jam. (The name refers to video game arcades and also signals that these are a special kind of experience embedded within the museum galleries.) Because they are temporary and are facilitated by the game developers and ROM staff, ROM Arcades are flexible. A ROM Arcade can be set up directly in the galleries, in

fig. 3. Museum visitor playtesting a game, with the game developer observing.



STACEY LEE KERR



fig. 4. A snowy owl and a hawk compete for prey in "Clash of the Talons."

programming spaces within the galleries, or in the museum's special events areas. During a typical ROM Arcade, the game developers play their games with ROM visitors and talk about the process of creating it (fig. 3), while ROM staff and volunteers are nearby to show and talk about the real objects featured in the games.

ROM Arcades are offered during the museum's busiest times of year, such as school breaks during winter and spring, when the museum typically offers special activities and installations in the galleries. They have also been installed during large public programs that occur throughout the year, such as evening events that target young adults, and weekend events that target family audiences. At these times, ROM Arcades enhance the social experience of a museum visit and provide additional layers of interpretation in the permanent galleries.

For example, throughout 2015 and 2016 ROM Arcades were hosted in the ROM Biodiversity gallery, featuring games that were developed during the 2014 ROM Game Jam, *The Evolution Revolution*. This gallery has an integrated programming space with five large screens. During ROM Arcades, a different game was set up on each screen with appropriate game controllers. One game, "Clash of the Talons," was developed by a team of university students together with the museum's ornithology experts. In this two-player game, 10 different species of North American predatory birds compete head-to-head to capture prey, using accurate representations of interactions that happen in the wild (fig. 4). The background of each scene in the game illustrates the birds' real-world ecosystems from across North America (such as forests, fields, mountains, and lakes). After visitors played the game, a museum volunteer was



All together, the game, the objects, and the conversations with game developers and facilitators provided visitors with a rich sense of ROM biodiversity research and the collections that surround the ROM Arcade space.

on hand to show specimens from the ornithology collection and discuss differences and similarities between different birds. For example, a facilitator might show visitors a snowy owl wing and discuss the dynamics of flight seen in the game (such as soaring and diving to capture prey). All together, the game, the objects, and the conversations with game developers and facilitators provided visitors with a rich sense of ROM biodiversity research and the collections that surround the ROM Arcade space.

Another popular Game Jam game that museum visitors have playtested is called “eCambrian,” developed during the 2016 ROM Game Jam, *Dawn of Life on Earth*. This game is inspired by tiny Cambrian period fossils, which are important to telling the story of the evolution of life on Earth, but which can be easily overlooked by museum visitors who are captivated by the dinosaur fossils nearby. The eCambrian game introduces the small Cambrian creatures through a playful mock dating app, presenting

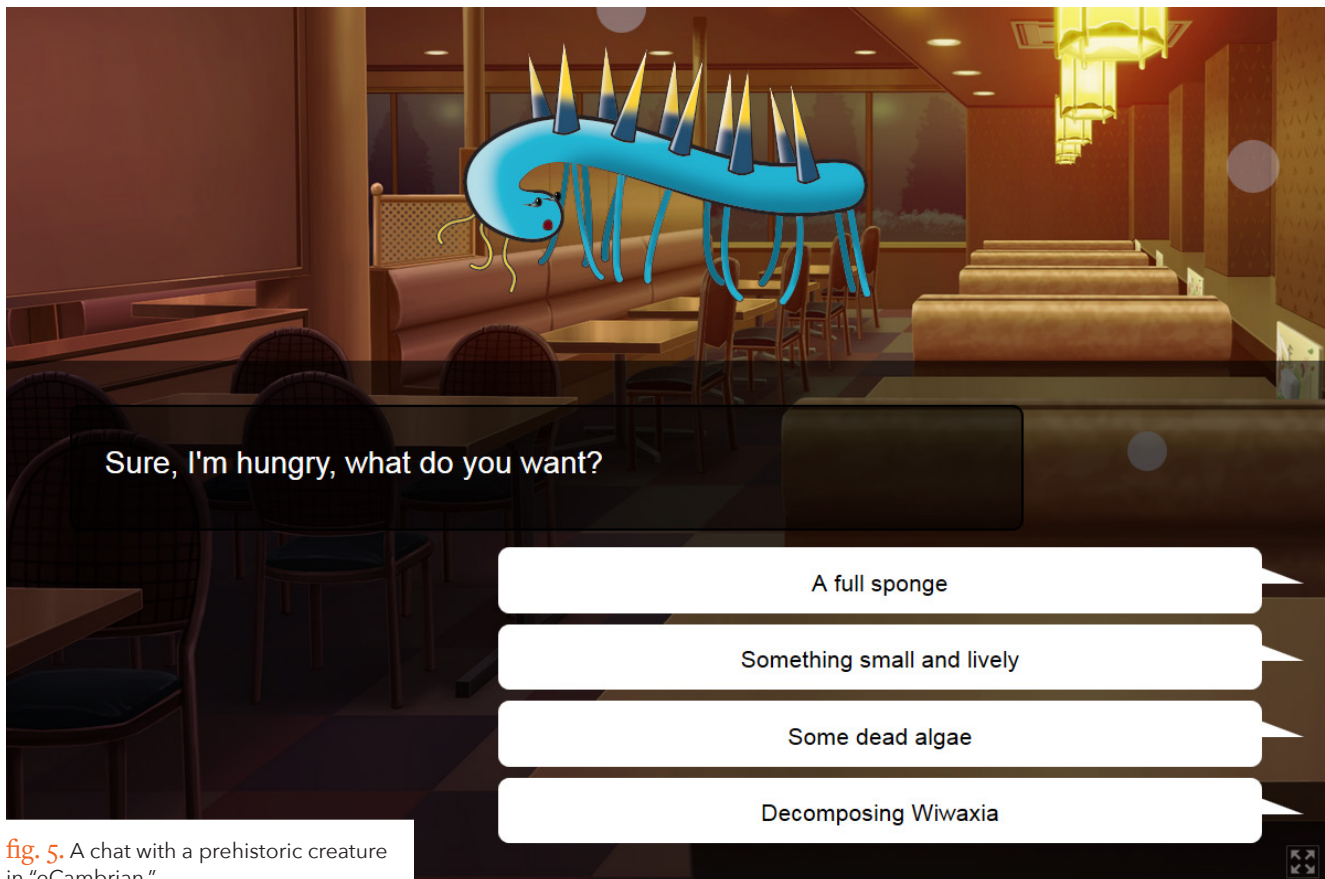


fig. 5. A chat with a prehistoric creature in “eCambrian.”

information from the case labels in an appealing and humorous way. ROM educators report that the eCambrian game makes these fossils more appealing and helps students develop an interest in learning about them (fig. 5).

### Visitor Evaluation

The ROM's evaluation team has evaluated the ROM Game Jam initiatives to understand the experience of the participants. The game developers participate in evaluation surveys following the game jam event, while museum visitors participate in evaluation surveys following their visit.

Between 2013 and 2015, 72 ROM Game Jam participants responded to the post-event survey. The majority reported that the jam was "successful" or "very successful" at creating a valuable game jam experience for participating teams (93 percent); providing an innovative way for them to engage with the museum's permanent galleries, collections, and research (74 percent); and encouraging game developers to be part of a community that participates in the Centers of Discovery (70 percent).<sup>10</sup>

The ROM's evaluation team has also looked at the impact of ROM Arcades on the overall visitor experience. Surveys indicate that the games are popular with visitors: for example, in a 2015 survey, respondents ranked the ROM Arcade and live animal interactions

10 Ibid.

as their favorite aspects of the holiday programming.<sup>11</sup>

### Conclusion

Beginning as an experiment, the ROM Game Jam has evolved over the past four years, and will continue to change with time.<sup>12</sup> To conclude, we offer some thoughts about the ways in which museum staff feel this initiative has been successful, as well as some challenges and possible shortcomings of the model for others who might be interested in implementing it.

**Community building.** The idea for the ROM Game Jam came out of an exploratory conversation about the interests, goals, and capacities of the museum and the game community. Additional activities and participants (such as school programs) have grown out of the success of the original event and the strong relationships it created among individuals and organizations. Game development is now integrated into the ROM – and the museum into the Toronto gaming landscape – in a way that is remarkable, given how separate the two communities were when the initiative began.

Like all strong relationships, however, the ROM Game Jam requires a large investment of time by all the partners. As new

11 Eva Tolkunow and Alexander Johnston, "ROM for the Holidays 2015 Visitor Insight" (unpublished internal report based on in person visitor feedback, Royal Ontario Museum, 2016).

12 "Learning: Games & Apps," *Royal Ontario Museum*, [www.rom.on.ca/en/learn/activities/games](http://www.rom.on.ca/en/learn/activities/games).

aspects of the initiative have grown, the partners have had to consider which parts are most valuable and sustainable for the community. In 2017, the planning committee agreed to put the game jam event on hiatus, while some of the other aspects of the initiative, such as the museum education programs, will continue. The lesson here is to maintain open communication and continue to examine the goals, interests, and capacities of the partners as time goes on.

### *Co-creation of museum experiences.*

ROM Game Jam events focus on the process of co-creating games, and fosters mutual learning among game developers, museum staff, and museum visitors. The Game Jam experiences promote multidirectional learning, because all the participants – ROM staff, game developers, and ROM visitors – have a defined role and a valuable perspective to contribute to the process of developing the games. ROM experts contribute deep knowledge related to the jam's theme, and help develop game concepts based on interesting research questions, methods, and objects in the museum's collections. Game developers contribute their technical expertise and skills to create games that are fun to play and capture the essence of key ideas or objects. Museum visitors help these experts understand how to improve the games' educational and engagement value by playing the games, offering direct feedback, and participating in evaluation.

In the best games that have come out of the ROM Game Jam, there has been a certain amount of compromise on all sides. The game developers and curators work together to decide on key messages, and then allow for some give and take in terms of what is necessary for accuracy, and where creative license should be given to make the game fun and engaging. This shared control requires trust and negotiation, but results in a product that neither the game developers or the museum would have created on their own. For example, in “Clash of the Talons,” the game developers and museum curatorial staff agreed to focus on the predatory birds’ hunting behaviors. The game developers invested much more time than they otherwise would have to ensure that the way the birds flew and captured prey was accurate. Meanwhile, the museum’s curatorial staff agreed to let go of other content they found important, such as the variation among the birds’ nests, in order to establish a clear storyline and focus on the parts of the game that were most engaging for visitors.

**Mutual benefit.** For museum staff and game developers, the most valuable aspect of the ROM Game Jam event has been the opportunity it creates for experimentation and innovation with minimal constraints. Some of the games don’t work out, but within just a couple days dozens of interesting ideas are developed to a playable point.

However, it’s worth emphasizing that a game jam event is not a sensible or efficient way to deliver fully functional games for the museum floor. Museums that want to produce reliable games for permanent use would be better off working with an external consultant. Game jams are very rewarding, but in this kind of open-ended creative environment, you can’t specify your product as you can with a vendor.

**Intellectual property.** It is essential to be clear about who owns the intellectual property represented in the games, and what assets can be used in their creation. As we entered into our partnership, the ROM wanted to protect the museum’s rights to such assets as images of our objects, while game developers wanted to protect their right to their intellectual property, represented in the game concepts. Before the first ROM Game Jam, the museum’s public engagement staff and legal counsel worked with a small group of game developers (including organizers of other game jams) to create an intellectual property agreement and usage rights for the games developed during the jam.

According to the ROM Game Jam agreement, game developers own their games and can further develop, share, or commercialize their products independently or in partnership with the ROM. They give the ROM non-exclusive rights to use the games for educational purposes for a certain

period, which can be extended. The museum and the game developers consider the resulting agreement fair to all parties, because both parties retain the rights to their intellectual property and assets, both have access to the resulting collaborative product for a period of time, and both can negotiate the terms of any ongoing work and collaboration as the relationship progresses.

**Integration across the museum.**

In the ROM’s experience, the games that are created during a game jam event can be leveraged by many different parts of the museum. Once there are playable games – as early as the conclusion of the jam – then the general visiting public can be engaged in the creative process and in learning about the objects that inspired the game. The relatively short games that are produced can serve as conversation starters, or ways to ignite visitor interest and learning, which can be used in many different ways across the museum, from object interpretation to public programming.

For the Royal Ontario Museum, one of the most important outcomes from the ROM Game Jam has been developing capacity with game-based learning and relationships with the game development community. In just a few years, ideas, approaches, and products from the ROM Game Jam have been integrated across the museum: in galleries, public programs, school visits, and the

website. The initiative began as a conversation among a handful of people, exploring how we might bring the museum's objects to life through games. Even as the initiative has grown and gone in many different directions, the museum's collections, research, and dedication to object-based learning remain at the heart of all the ROM Game Jam experiences.

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