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Unknown Horizons - An Open Source Project Evolves

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1 Introduction

1.1 Motivation

*Unknown Horizons*¹ is an open-source real-time strategy game developed by a team of programmers, artists, game designers and many more around the globe. The first revision to the current project was committed in late 2007 (Kerling [2007]). The idea started out in 2005 under the name *OpenAnno* and was renamed to *Unknown Horizons* in early 2009.

Over the years the project grew to a small team of more than 10 active developers and many patch contributors. The recent release version of *Unknown Horizons* has been downloaded more than 10000 times (Sourceforge.net [2011] & Chip.de [2011]), a rather big user-base compared to the team size.

In this document I want to give a personal report on the work I have done on *Unknown Horizons* in the past years and present an overview of how certain parts of the project's organization have evolved.

1.2 About Me

My name is Thomas Kinnen, I'm currently doing my Masters in Computer Science. On the development team and in the code repository I am mostly known by the nick-name *nihathrael*.

I started working on the project in early 2008, shortly after the first commits had been committed to the repository. The project had nearly come to a complete halt when I joined, so I set out to bring it back to life.

Since November 2008 I am one of the two project coordinators, with focus on code direction and introduction of new potential members to the team and code. In this position I got a good view into most of the necessary parts of an open-source game development team. This includes public relations, mentoring new members, graphics, content, programming, code design, leading meetings and many more.

¹Unknown Horizons website: <http://www.unknown-horizons.org>

2 History

In this section I present the history before and during my time as part of the *Unknown Horizons* team. I give only a brief overview of the history before I joined the project, as the current state has nothing, but the idea, in common with the older versions.

2.1 Pre History

The idea for the *Unknown Horizons* project existed long before I joined the team in 2008. The project's first name was *OpenAnno* for which the original sourceforge.net project was registered as early as July 2005². The original announcement for OpenAnno can be found on the German Linux forums: <http://linuxforen.de/forums/showthread.php?t=188350>. Version 3.5 (See screenshot in Figure 1) of OpenAnno was released in early 2006 (Happypenguin.de [2006]r. After a rewrite to C++, version 0.0.1.0 of OpenAnno was released in September 2006 (Developia [2006]).

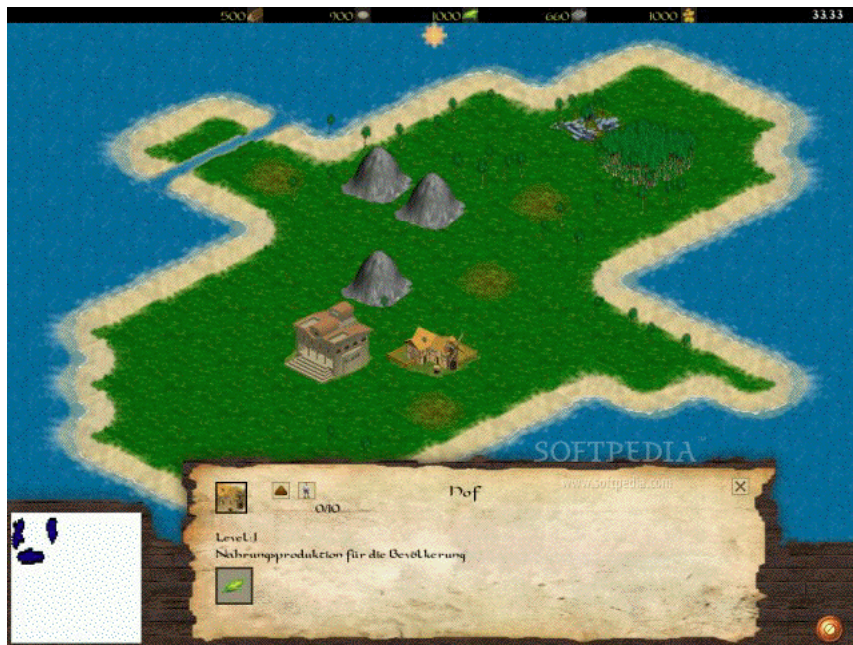


Figure 1: Early screenshot from OpenAnno 3.5 - taken from Softpedia.com

In April 2007 *LinuxDonald* (Thomas Kowaliczek) took over the project from *The Brain* (Martin Gerhardy) (Kowaliczek [2007a]).

The project took an interesting turn in August 2007 when the team decided to split the project into a 2D and a 3D version (Kowaliczek [2007b]).

²Original sourceforge.net project: <http://sourceforge.net/projects/openanno/>

OpenAnno 2D was restarted in September 2007, using FIFE³ as its graphics engine. The team was hoping the collaboration with a dedicated graphics engine would make their work easier, as they had previously stalled on implementing different terrain heights and were having trouble getting all the work done. OpenAnno 3D was dropped in the same decision as the team had realized that the burden of developing two games basically in parallel was not a viable option. This presented a radical cut in the development of OpenAnno, as the core repository had over 1000 commits at that time (Kowaliczek [2007c]). Restarting meant throwing years of development over board to start again from scratch.

2.2 History - 2008

In March 2008 I joined the project as a novice programmer. When I joined the project, it had almost come to a halt. Amazed by the idea of writing an open-source game in the footsteps of *Anno 1602* I decided to give it a try non-the-less. The entire code was removed and I started from scratch, using only the graphics from old versions. Motivated by the new start *spq* (Kristoffer Janke) quickly joined me in my efforts only 18 days later. *spq* and I had a lot of time at our disposal, so with the help of many other old and new members development of *OpenAnno* progressed quickly. We hit 500 commits to the repository by June 2008 and finished our first milestone *2008.0* by July 8th. The 1000. commit followed quickly by July 16th. At the end of July the team had its first meet-up at the *Dusmania 2008* hobby game developers conference and was awarded 2nd place in the category best game.

On October 1st *OpenAnno* hit a major milestone with its first public release: *Version 2008.1*. The release received quite a lot of coverage and was featured on some big websites like the German magazine chip.de (Chip.de [2008]) and the freegamer blog (Blog [2008]).

During this time it became clear that *LinuxDonald* would not be able to continue doing the project management due to a lack of time on his side. After a long meeting and a vote at the beginning of November it was decided to split the position in two team coordinator jobs. *Nightraven* (Tobias Schröfel) was assigned to public relations and advertising and guiding game design decisions. I was chosen to assign tasks and guide the development of the code base. Tasks for both project coordinators were defined as posting news updates, guiding discussion on IRC and helping new interested developers join our project. LinuxDonald agreed to continue hosting the website and repository infrastructure, showing his continued dedication to the project.

2.3 History - 2009

The year 2009 started with a big change: The project was renamed to *Unknown Horizons*. This was done for two reasons:

- Copyright concerns about the word "Anno" being licensed by *Sunflowers* in Germany

³FIFE website <http://www.fifengine.net>

- Separate the game from the original Anno series, underlining it not being a clone

As *Unknown Horizons* is not a formal organization or company any lawsuits against the name (or any other part of the project) would result in the lawsuit going against the project coordinators Nightraven and/or me. Therefore we decided to change the name to something completely new, leaving us on the safe side of things.

This is the original commit from the official repository performing the renaming:

Listing 1: Commit 1831 renaming OpenAnno to Unknown Horizons

```
1 Author: nihathrael
2 Date:   Fri Feb 20 16:39:37 2009 +0000
3     * Renamed all occurrences of OpenAnno to Unknown Horizons
4     * openanno.py is now named run_uh.py
5     * openanno.sqlite ist now named game.sqlite
6     * Goodbye OpenAnno ;( Off to new shores we go :)
```

Besides this big change, 2009 was a regular development year for *Unknown Horizons*. The team released three new versions of *Unknown Horizons*:

- 2009.0
- 2009.1
- 2009.2 + bugfix release 2009.2a.

The releases generated over 35 thousand downloads on sourceforge alone.

Release 2009.2 was featured in the big German computer magazine *c't* (c't Magazin [2009]) and was delivered with the magazine's DVD, which is shipped with each copy.

2.4 History - 2010

In 2010 the team decided to move away from the subversion⁴ revision control system and switch to git⁵. With this switch, the repository hosting was also moved to github.com. Github is a collaborative source-code hosting website which deeply integrates git into the website. It makes it easy for developers to submit patches and even easier for the team to merge them. This also moves the source-code hosting away from our own servers, making it much more reliable and cheaper.

The team shipped one release: Version *2010.1*. It introduced a network mode, allowing the player to play with other players over the internet or a local area network.

2.5 History - 2011

2011 has been an exciting year for *Unknown Horizons* so far. Early 2011 the team decided to apply for the *Google Summer of Code*⁶ program. The application was accepted and *Unknown Horizons* was granted 3 student slots. The team had applied together with the graphics engine *FIFE* and it was decided that 1 slot would go to *FIFE* and 2 to *Unknown Horizons*. The three students were chosen for the following projects:

- Artificial Intelligence Player for *Unknown Horizons*
- Combat for *Unknown Horizons*
- Performance Improvements for the Rendering Pipeline in *FIFE*

Before the students started their work, the team released versions *2011.1* and *2011.2* of *Unknown Horizons*.

The students did excellent work during the three months of their active work on both *Unknown Horizons* and *FIFE* and all easily passed the final evaluation. Following up on the *Summer of Code* Google invited two members of each organization to participate in the mentor summit at their campus in Mountain View. Christopher Ölmüller, who did the administrative work for GSoC for *Unknown Horizons*, and me got the chance to go and meet many fellow open-source game developers from other projects like *Battle for Wesnoth*, *Worldforge* and *Hedgewars*.

FIFE released version *0.3.3* of their engine on October 7th, followed by bugfix release *0.3.3r2* on November 2nd. This release includes all changes done by their student *kozmo* (Kajetan Świerk). *Unknown Horizons* will release *Unknown Horizons* version 2011.3 during the 2nd week of November, containing all changes made during the *Summer of Code* and the regular development (See Figure 2).

⁴Subversion website: <http://subversion.tigris.org>

⁵Git website: <http://git-scm.com/>

⁶Official GSoC website: <http://www.google-melange.com/gsoc/homepage/google/gsoc2011>



Figure 2: Screenshot of the upcoming *Unknown Horizons* release version 2011.3

3 Project Organization

In this section a description of the project's structure and organization, using different tools like meetings and bug trackers, is given.

3.1 Member structure

There are only two defined jobs on the team: The two project coordinator jobs held by *Nightraven* and me. It was specifically named project *coordinator* and not project *leader* as the purpose of this position is not to make all the decisions and tell everyone what to do. The intention is that the project coordinators guide the project on its path, making sure basic communication works correctly. For example the project coordinators usually hold the weekly IRC meetings and make sure the general tone of communication is friendly and helpful. This is based on the foundation that it is not possible to force anybody to do anything on an open-source project, as everyone works on it in their free time and because they enjoy it. It is the project coordinators task to make sure it stays an enjoyable project to work on.

Unknown Horizons does not follow any other strict structure of members. The team is not divided into different sub teams. Much thought has been given the idea of forming different apartments for programming, game design and graphics but the team found that the team size of about 10 active members is not big enough to split it into different subgroups and thereby adding a lot of overhead to the project's communication. It has been agreed that this step could be undertaken when the project grows further and communication becomes slow if everyone talks to everyone else all the time.

Over time basic structures naturally emerged, meaning that those members spending the most time on a certain area became a *go-to* person in case of questions. For example *totycro* (Bernhard Mallinger) and me are most experienced with the code, making us the *go-to* persons for this area. Since this emerged over time and is not an artificially created structure, it automatically changes over time if new members come in and become more experienced or are available a larger amount of the time.

3.2 Language

Unknown Horizons started out as an entirely German project. In 2008 it became clear that a mainly German development would not attract foreign developers easy, if at all. At the time there was only one non German member on the team, *Greyghost* (Tushar Sawant) from India, who had recently joined. He used *Google Translate*⁷ to understand wiki pages and the discussions on IRC.

The team quickly realized this would not be beneficial and decided to set English as the main language on IRC, the website and the wiki. The change was not easy as there was some disagreement on if this was really necessary. This was one of the main points on my personal agenda when I was voted project coordinator and is the only time I ever used my informal "power" – to enforce English language if necessary.

Today this is no longer an ongoing issue, as we have many people from countries around the world on our IRC channel, automatically making English the language of choice.

*In my opinion the decision to switch to English is the most **important and valuable** decision the team has ever made.* It allowed us to grow the team globally and is the foundation for our participation in Google's *Summer of Code* program.

3.3 Communication

The team uses a variety of channels for their communication: IRC, forums, mailing-list, e-mail, etc. The by far most used of these is our IRC channel *#unknown-horizons* on *irc.freenode.org*. As most developers are based in similar timezones, real-time communication via a chat room has proven to be the best written communication available. All team members are usually available on the IRC channel while they work on *Unknown Horizons* and the team lives the habit of always being online on IRC while in front of a computer. This way questions can usually be answered quickly and discussion is held continuously all day around. The IRC channel is also our main support gateway for users having problems.

During the *Summer of Code* we required our students join our IRC channel during their working hours, this proved to be a very effective method of including everyone in the team and making sure the students were not a separated, isolated group next to the team. Quickly they were actively participating in discussions and taking part in the day to day project development.

⁷Google Translate website: <http://translate.google.com/>

Besides the IRC channel we also give support and collect feedback via a forum on our website⁸. Forums are the main support method in the gaming industry, which is why most users are already accustomed to the use of a forum and find it easy to request support through this channel.

After learning about *The cathedral and the bazaar* (Raymond [1999]) we recently introduced a beta mailing-list, which we recommend to users seeking support and willing to put some time into solving the problem. We post pre-releases of upcoming releases on this list, so they can be tested by a wider number of users on different systems. This provides invaluable feedback which **can not** be replaced by any testing on our side.

We also have two more lists set up, but these are not used actively. Communication never moved from IRC to the mailing-lists. This might very well be due to the project's size and might change if the project grows further.

Weekly Meetings

The team holds weekly meetings on IRC. These are used to discuss and decide on issues that came up during the week. It is used to plan the upcoming tasks and distribute the workload between the members. At the end of each meeting there is a fixed topic called *Status update and Hallway chat* where everyone can drop short notes on which parts of the project he worked this week or any other information that might be useful for the rest of the team, but does not need discussion. This is useful to keep everyone up-to-date on how the project is going and who is doing which work.

3.4 Tools

The team uses many different tools to organize the development: Trac, Github and a wiki.

Trac⁹ is a project management tool which allows milestone specific issue-tracking. We use it to keep track of the different tasks and bugs that have been created and found. We also organize our planned workload for the upcoming milestone using trac. It has proven an invaluable tool to organize the team's work.

Together with our switch to the GIT versioning system, we also switched to github.com for the hosting. Github comes with a number of useful tools, like providing comments on single lines in commits, which is a great tool for code review. We made extensive use of this during our participation in *Summer of Code* to give our students regular feedback on their work.

Interested contributors can leave git pull-requests which can usually be merged by a click of a button on the website if wanted. This has streamlined the work-flow to contribute code to our project a lot. An example for such a pull-request can be found at: <https://github.com/unknown-horizons/unknown-horizons/pull/22>.

⁸Unknown Horizons Forum: <http://forum.unknown-horizons.org/>

⁹Trac website: <http://trac.edgewall.org/>

The team uses a MediaWiki¹⁰ installation for documentation. The wiki contains mostly design documentation and all sorts of guides to help with the installation and development of the game. It is also used to store new ideas discussed on IRC and then formulate them into something that can be implemented later on.

One thing the team learned is that trying to maintain multiple languages of the same article in the wiki does not work with such a small team. So unless the team is big (>100 active contributors) *and* there is a very good reason to use multiple languages, I would advise the use of only one single language (English) in the wiki.

4 Lessons Learned

In this section I present a few of the lessons I and/or the team have learned over the past years.

4.1 Google Summer of Code

Google *Summer of Code* (short *GSoC*) is a great opportunity for every open-source project to move the project forward, gain new contributors and keep everyone motivated. It is also **a lot of work**. The application period is already very time consuming and the mentoring part is even more so. Your project should be able to dedicate one member for the *GSoC* administration alone, he will not be doing anything else during the application process. Especially if it is your first year participating in the project, like it was the case with *Unknown Horizons* this year.

The student selection process is very difficult in my experience. Here is what we did get an idea of the applying student's abilities:

- Ask every applicant to show up on IRC. If they did not, we dismissed their proposal
- If they show up, ask them to fix one bug of their choice from our bug-tracker
- Have a nice application form to fill out¹¹
- Have them summarize their proposal on our wiki
- Talk to each student individually about their goals, our expectations and their ideas (possibly in private)

Of 32 applications we received in total, this process left us with 6 to decide from. The final decision is very difficult and we let the mentor of each task decide which student they wanted to take. This is important as the mentor and the student have to be able to communicate well. If you have to choose between two students of which one is technically superior to the other, but lacks communication skills, choose the one with better communication skills.

¹⁰MediaWiki website: <http://www.mediawiki.org>

¹¹*Unknown Horizons* GSoC student application form: http://wiki.unknown-horizons.org/w/Student_application_template

4.2 University Projects

There is great potential in university projects. For many subjects there are courses which demand work on a real project. If communicated and prepared well, open-source projects can be these real projects. University projects generally require a lot of time from the student, so if they can spend this time working on your project, it will gain a lot.

Our multiplayer mode is a result of such a university project – we had *totycro* and two colleagues working on *Unknown Horizons*, for an estimated 70 hours each. In open-source that is a lot of time, which is not easy to find in normal free-time.

4.3 Keep going!

Over the years we have had times where we hardly had one commit a week, or even a month. Do never give up! After these times we always had times of great activity and it was well worth the effort of keeping the project running. Time is a valuable resource on an open-source project and it is always scarce. People come and go, but if the project manages to keep the core team together and motivated, work will always progress. Keep going!

5 Conclusion

The idea for *Unknown Horizons* originated 6 years ago in the *OpenAnno* project and it took 3 complete restarts to get to its current state. Developing a full scale RTS game is usually funded by thousands if not millions of euros, achieving the same results with an open-source project is nearly impossible. Yet the team managed to build a playable game and over time became an important part of the open-source gaming community. More than three years of development time have been put into the current version of *Unknown Horizons* and the project is still going forward. A low management and communication overhead is the key to keeping the project running even in times when members are short on time.

Working on an open-source game has been a great experience over the past years and I am looking forward to the next years.

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