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NEOShield public outreach / New media activities

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Extended Abstract

The NEOShield project is an international cooperation to investigate the threat that Near Earth Objects (NEOs) pose to Earth. In order to do so the partners in the cooperation investigate the physical properties of NEOs by using laboratory experiments and observations. Furthermore the cooperation entails the development and adaptation of relevant technologies such as autonomous spacecraft guidance in weak gravitational fields. Finally, the team uses the gathered knowledge in the design of possible future demonstration mission for NEO impact mitigation.

The NEOShield project falls under the European commission 7th Framework Programme for Research and Technological Development. From the 1st of April 2015 onwards the new project "NEOShield 2" continues these activities with slightly changed focuses within the Horizons 2020 programme. Much of the activities of NEOShield-2 are a logical continuation of the efforts initiated and developed for NEOShield. Specifically the public outreach activities, the subject of this extended abstract, are continued seamlessly into the new project setup.

Public outreach within NEOShield

The public outreach is contained within the framework of the NEOShield project to present the efforts and results of the project research towards the general public and media. It has as goal to create general awareness concerning the risks that NEOs pose to human society and the Earth and to educate the public on these risks. Next to information on the risks, the project provides information on the mitigation efforts that are undertaken, and on the current status of NEO research and NEO impact mitigation.

The main mode of outreach is through the NEOShield website and its social media channels: Facebook and Twitter. Through these channels relevant media articles related to NEOs and their threat, as well as the latest updates on the NEOShield project activities are relayed to the public. The NEO related subjects covered are:

- Astronomy: Updates on astronomical events such as visible asteroids and comets, meteor showers, and close approaches of asteroids to the Earth.
- Impact and bolide events: Reports of bolide events and impacts that have occurred around the globe.
- Space exploration: Updates on relevant space missions such as Rosetta, Hayabusa, and Dawn.
- NEO research: Basic research on NEO properties, populations, risks, and orbits. These articles usually have scientific articles as source, which are then converted to a more public aimed "popular science" website article.
- Mitigation mission designs: Updates on current activities from space organizations relevant to the NEO subject such as the NASA asteroid redirect mission, the DART mission and ESA's AIM project.

Next to the active outreach performed by the NEOShield project, the partners involved in the cooperation also act as the main points of contact for media concerning asteroids, NEOs, and the threat they pose. Journalists producing media items on these subjects turn towards the NEOShield partners within their respective countries for their knowledge on the subject. In this consulting role NEOShield has, since the start of 2012, contributed to at least 12 radio shows, 14 television programs, a number of magazine articles and podcasts, and tens of internet news articles. The radio and television shows were given mostly in Germany (9 radio and 11 television appearances). Other appearances on radio were in Denmark, Sweden and the US. Appearances on television occurred further on British and American television, and on ESA Euronews. This list only represents a small selection of the total number of media appearances

Two-way communication with the public

A number of activities have been undertaken for the NEOShield project to actively engage the public. These have been for example a "NEOShield Comic Contest", a "NEOShield knows Twitter Q&A" and a number of "free-pin-give-away" events.

The NEOShield comic contest was organized in October 2013, during Space Week 2013. Followers of NEOShield on social media were challenged to find fitting texts for an in-house produced comic featuring two asteroids that are about to be hit by a kinetic impactor (example at figure 1). There were 55 entries submitted in total, spread over English, German, French and Spanish entries.

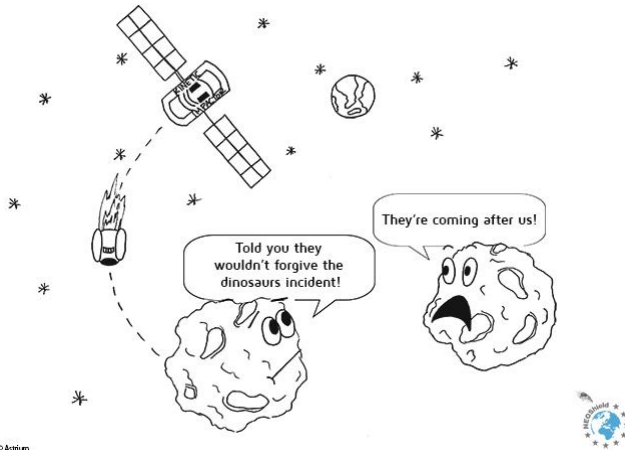


Figure 1: The selected first prize comic among the English entries for the NEOShield comic contest. The participants were challenged to find creative texts for the asteroid's speech balloons.

The NEOShield knows Twitter Q&A was organized over the 7th, 8th and 9th of October 2013. During each of these three days experts associated with asteroid research and NEO mitigation measures were available for questions of the public concerning their specialized subjects. During the first day Rusty Schweickart of the B612 foundation talked about asteroid mitigation and B612 in general. This session was the most successful of the three with 15 questions posed and answered during the one hour session. On day two Dr. Norber Pailer and Mark S. Bentley were available for questions on the Rosetta spacecraft. On day three Noah Saks, Line Drube and Juan L. Cano, all from the NEOShield project team, were available for questions on NEOShield. The Q&A session engaged a number of enthusiastic NEOShield followers.

The "free-pin-give-away" events were organized as an interaction with the Twitter followers of NEOShield. The events varied in setup. The largest arranged one was a Christmas competition where the NEOShield public outreach posted a quiz question each day over the course of the four weeks before Christmas in 2012. Each person answering a question correctly was sent a pin as a prize. Other smaller events included for example a pin

as prize for the 1000th Twitter follower. These events all lead to a large public engagement with the Twitter followers.

NEOShield is at times also contacted directly via social media or via email by people interested in the work that we do. Usually the people reaching out ask questions concerning the project or even propose their own mitigation solutions and ask for our opinion.

Finally, NEOShield actively searches out a more direct target audience by attending numerous small conferences and events. These include for example a number of SpaceUp conferences in Europe in 2012, 2014 and 2015, the EU Open Doors event in 2013, and the Space World conference in 2013. Events such as the SpaceUp conferences already attract an audience that is more interested in space related subject and so in this way NEOShield can get directly in touch with its target audience.

NEOShield website visitor statistics

The NEOShield website at <http://www.neoshield.net> has been active in its current form since the start of 2012. The website is filled with general information on the NEOShield project and its results, along with the news articles and outreach events described before. The site is currently attracting around 300 unique visitors per week. This is a number that has slowly been increasing over the past years. In 2012 the average visitors level was near 200 per week but it has increased to the current 300 approximately since February 2013, after the Chelyabinsk event.

The spread around the weekly average is relatively big and may swing from lows around 100 visitors per week till large peaks in activity of near 700 visitors per week. The lows are observed mostly during summer holiday season and Christmas. The large peaks are mostly correlated to events that draw attention from the general public to the NEO subject. Figure 2 shows a graph of the total number of unique visitors per week for a period from week 31 in 2014 till week 13 in 2015 with a number of the major peaks in activity labeled. Three of these peaks seem to correspond with close approaches of asteroids to the Earth. These asteroids were covered in news articles on the NEOShield website and to some extend also on major news channels. As example; the Asteroid 2004 BL86 was visible through binoculars during its closest approach and in that way made it to general media channels and news agencies. Also the landing of the Philae probe seems to correspond to a peak in activity on the website.

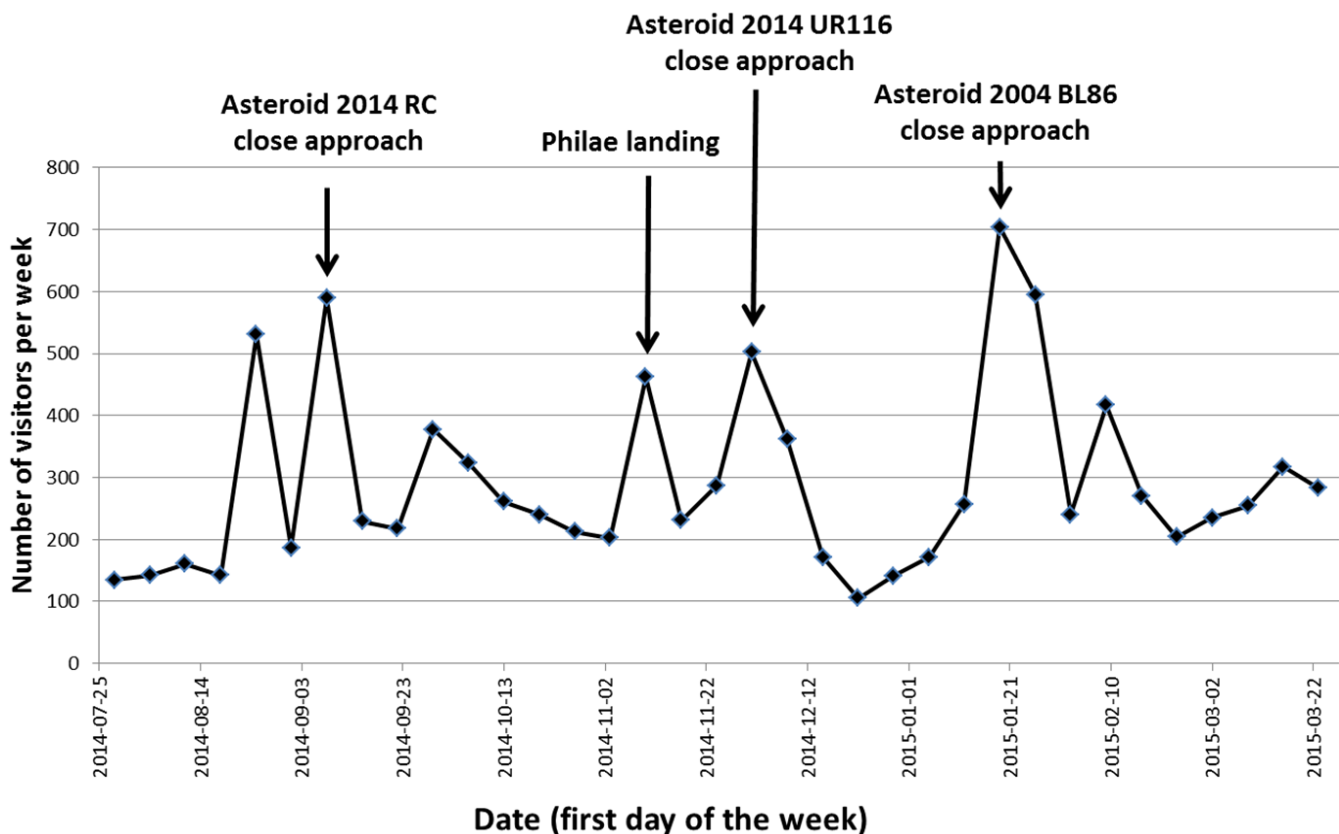


Figure 2: NEOShield.net number of unique visitors per week from week 31 in 2014 till week 13 in 2015. A number of the identified peaks are labeled. The peak at the far left corresponds to a spike in traffic after a link to the site was posted on reddit.com. The minimum around the new year was in the week of Christmas.

Some peaks in the visitors level do not seem to be correlated to the NEOShield public outreach activities itself or to general NEO related events. One of these corresponds to the visitors peak in week 35 of 2014 (seen as the unlabeled, most left peak in figure 1). After examination of the visitors analytics it turned out that a link to the mitigation measures page on the website was posted on the social network reddit.com. This led to a large increase of visitors from the US to the website for a short period of time. The analytics also showed that, although there was a large number of visitors on the website at that point, they stayed only very shortly on the page and did not go further to other parts of the website. In other words, their engagement with the subject was very low. This peak shows that making active use of large media websites such as reddit can attract a large number of new visitors to the site, it is however in such media campaigns vital to also guide these visitors to a subpage that will capture their attention and will make them stay longer.

The largest peak of weekly visitors to the website during the whole period for which statistics were gathered was the combined events of Chelyabinsk and the close approach of asteroid DA14 at the same time. During week 7 of 2013 more than 2600 visitors were recorded on the website. The peak was at the Friday of the event, with 1272 unique visitors on that day only.

The visitor levels dropped relatively quickly to normal levels during the following week but have remained on average higher than before the event.

Analysis of the average visitor levels per day does not yield significant results. The only conclusion to be drawn from it is that week days on average have a higher number of visitors than the weekend days. This may be explained by the simple fact that the NEOShield public outreach activities such as the posting of website articles are themselves mainly conducted during working hours.

Social media statistics

The two main social media channels employed for the NEOShield public relations are Facebook and Twitter. Articles that are posted on the NEOShield website are also promoted over these channels and help to guide more traffic to the website itself. Furthermore, the channels are used for more special activities such as the Twitter Q&A session of October 2013.

The NEOShield Facebook page has been online since June 2012 and currently has around 1250 likes. Figure 3 shows a graph with the number of Facebook likes over time. It can be seen that there were two events on which the number of likes significantly increased: one in October 2012 and the other in August 2013. Both of these increases are due to paid advertisement for the page on Facebook, which seems to work quite well. The

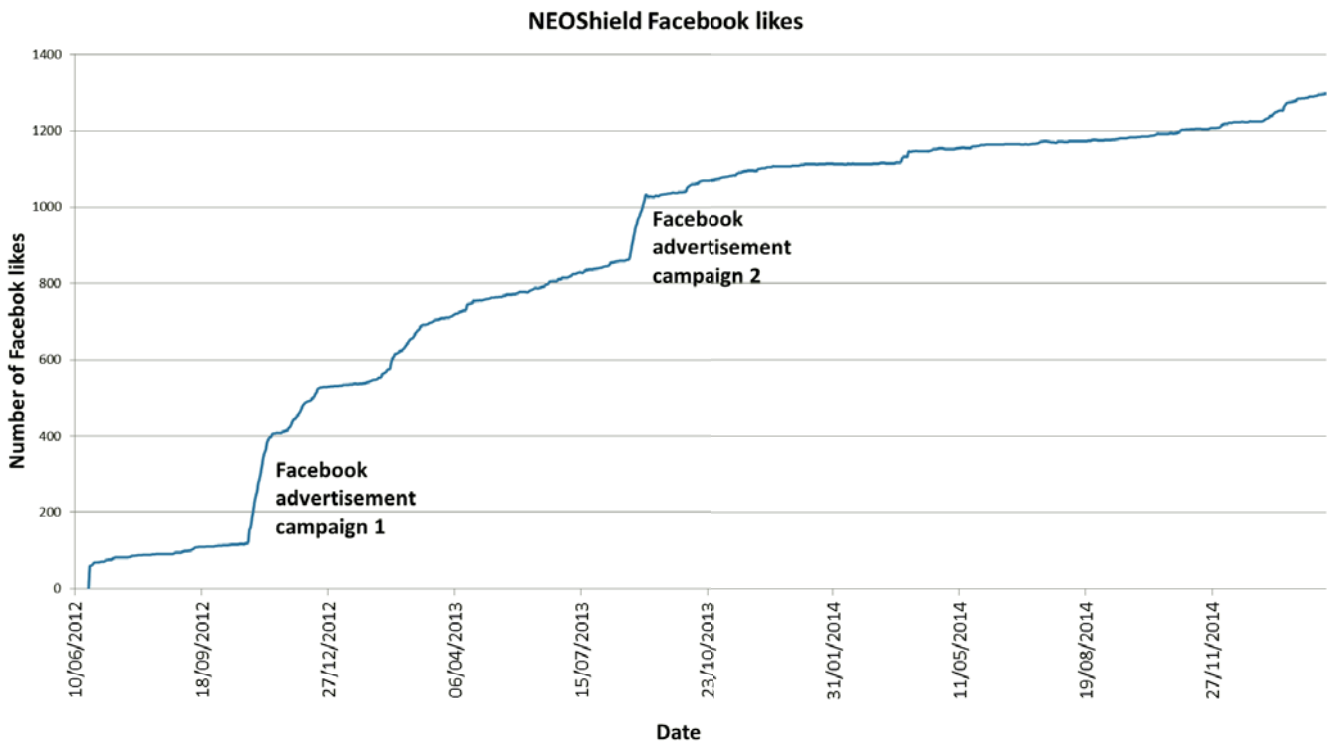


Figure 3: The number of Facebook likes for the NEOSShield page versus time. Clearly visible are the two Facebook advertisement campaigns in October 2012 and August 2013 respectively.

advertisements increases the number of page likes and after the end of the campaigns the number does not decrease again. Outside of these campaigns the number of likes increases on a steady pace. Over the last year (March 2014 until February 2015) the number of likes has increased with an average of 15 per month. The only significant decrease in Facebook likes occurred during the global removal of inactive Facebook accounts by Facebook itself in March 2015 (this occurred after the creation of figure 3). This led to a decrease of around 50 likes.

On Twitter, currently @NEOSshieldteam has 2355 followers which is a relatively high number compared to the number of Facebook likes and website page views. The number of followers was around a 1000 at the end of February 2013 and around 2000 in September 2014. The average growth of followers on Twitter has been approximately 70 per month since the start of the Twitter account in June 2012.