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A Communications Plan for an International Response to a Threatening NEO

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ABSTRACT

In support of the Working Group on NEOs of the United Nations Committee on the Peaceful Uses of Outer Space, Secure World Foundation and the Association of Space Explorers hosted a 2011 workshop to explore the communications components of an International Analysis and Warning Network. The two-day gathering brought together journalists, scientists, policy makers, risk and disaster management experts to scope out the elements of an effective communications strategy and provide guidance for an outreach and education plan as key elements of an effective response plan to the NEO threat. This paper summarizes the outcome of that workshop and various post-workshop observations.

Note: "NEOs: Media/Risk Communications Working Group Report," presents the findings from the working session held in November 2011 by Leonard David and Ray Williamson. Please go to:

http://swfound.org/media/82686/SWF%20NEO_Media_Risk_Communications_Working_Group_Final_%20Report_June_%202012.pdf

1.1

Background

On November 14-15, 2011 a Near Earth Object (NEO) Media/Risk Communications Working Group was convened by Secure World Foundation (SWF) and the Association of Space Explorers (ASE). A working group of nearly 40 scientists, reporters, risk communication specialists and SWF staff took part in the meeting at the University of Colorado, Boulder's Laboratory for Atmospheric and Space Physics (LASP), Boulder, Colorado.

The meeting concentrated on assisting the United Nations Action Team-14 (UN AT-14) on NEOs in its deliberations about the makeup and focus of an Information, Analysis and Warning Network (IAWN), designed to gather and analyze NEO data and provide timely warnings to national authorities should a potentially hazardous NEO threaten Earth. The need for such a network, made up of space agencies and other entities as appropriate, was first identified in *Asteroid Threats: A Call for a Global Response*, a report prepared by an expert panel established in 2001 and convened by ASE to assist the work of the UN Committee on the Peaceful Uses of Outer Space (UN COPUOS) AT-14.

Because the potential for NEO impacts represents a global, long-term threat to humanity's collective welfare, and because there are many uncertainties about where such impacts might occur and how much damage they can do, the ASE report urged that international preparations under the endorsement of the United Nations would be the best way for the international community to identify an NEO impact threat and decide on effective prevention or disaster response measures.

In accordance with the multi-year work plan agreed upon by the UN COPUOS, AT-14 prepared recommendations to COPUOS for international procedures in responding to the NEO threat. These have been considered by the working group on Near-Earth Objects of the Scientific and Technical Subcommittee of COPUOS, and incorporated into its report, which was accepted by the subcommittee in its February 2013 meeting.

Presentation of the ASE report to COPUOS in 2009 was followed up by a 2010 working group convened by SWF and ASE to examine and analyze the needed elements of an IAWN. Among its other recommendations, the 2010 working group report noted that: “The IAWN should develop a communications strategy, using well-defined communication plans and protocols.” It further stated: “IAWN should develop an outreach and education plan, leveraging outlets maintained by existing scientific and disaster response institutions.” The November 2011 working group explored in more detail the views of risk communication experts and experienced science journalists on the development of a successful communications strategy. It also helped key journalists become more acquainted with the NEO threat.

1.1.1

Working Group Findings

This working group was conducted under Chatham House Rule of discussion. The report was prepared by SWF and does not necessarily represent the views of any one of the working group participants.

Participants in the NEO Media/Risk Communications working group expressed several consistent themes:

The Task Ahead

Establishing an effective international communications strategy for potentially hazardous NEOs and/or an impending NEO strike is a daunting task that will require effective use of mass communication tools — from television to the Internet, and other information channels and technologies. General education should include information about NEOs and their place in our solar system, the nature of the potential threat, and specific information related to warnings of a potentially hazardous NEO.

Education

It will be very important for the IAWN to develop a detailed and effective plan for informing policymakers and other stakeholders about the potential threat of NEOs and what responses are possible. Participants agreed that very few government officials—whether at the national, provincial, or local level — know much, if anything, about NEO threats, outcomes, and possible responses. The IAWN will need to include accurate descriptions of the nature of impacts, their inherent predictive uncertainties, and the wide possible variations of the extent and degree of inflicted damage. The February 15, 2013 meteorite strike over Chelyabinsk, Russia, certainly raised awareness of the threat of NEOs among the public, including policymakers, but much more will need to be done, especially should a much larger object threaten Earth.

Following approval of the report of the working group on NEOs by COPUOS, it will have the important short-term task of identifying the relevant entities and/or individuals within governments and public-safety organizations at all levels that should be notified in the event of a likely NEO impact. These individuals/entities should receive education and training on the NEO threat and what it could mean for their communities.

It will be important for stakeholders to develop mutual contacts on a regional level, because a large and particularly devastating impact would likely affect more than one country. In addition, there should be a general education program similar to those already in place as part of space agency outreach and in general university astronomy courses. This will be important in raising the general level of knowledge around the world about NEOs.

One interesting suggestion that surfaced in the Working group was to prevail upon qualified broadcast meteorologists to familiarize the public with NEOs that very occasionally pass close to Earth. Meteorologists in some countries already present astronomical information (e.g. meteor showers, Space Station sightings), as well as information on pollen and ultraviolet exposure indexes to their viewers. If they could also be enlisted to provide details of close-approaching NEOs as they occur, the general public could become more attuned to the terminology used by NEO specialists. Planetariums also have an especially important role in educating policymakers and the general public about NEOs and the threat they can pose to Earth’s inhabitants.

Need for a Warning Communication Strategy and Protocol

The IAWN needs to develop a clear international communication chain of responsibility for dealing with NEO risks. Creation of such an infrastructure may also provide a useful model for instituting a worldwide alert-and-response network for hazards and disasters of several kinds.

Today, no worldwide disaster-notification protocol of any kind exists. The closest analogy might be the cooperative early warning system developed for tsunamis in the wake of the devastating inundation of the coasts of Southeast Asia in 2004.

Different types of communication are required for different levels of NEO risk: (1) the NEO general threat; (2) a specific threat in the future with a long warning time of years; and (3) an imminent threat (a few days to a few months). All pose challenges to communicators.

The IAWN will need to employ an array of public education tools on the range of observational and predictive uncertainties concerning the threat, about any campaign to divert an asteroid, and about the potential effects of an impact, should it occur. There is a big difference between educating an audience about a future threat in general and communicating with it before an impending impact, and any plan should take such differences into account.

The IAWN should make use of the findings of experts in risk communication in designing its communications strategy. Working group participants noted that experts on risk communication have carried out extensive research on how best to communicate risk to affected populations. As they note, it is critically important for natural disaster and rescue authorities or specified individuals to determine, in advance, which forms of communication will be most effective in reaching all segments of their at-risk populations. Social media will play an important and perhaps dominant role, particularly with young people. The importance of social media in communicating information after an asteroid strike was amply demonstrated in the February 15, 2013 Chelyabinsk event. Harnessing social media for communicating accurate information to potentially affected communities *prior* to an impending will be vastly more important.

Citizens of some countries have a deep distrust of government officials, so in such cases the most effective means of notification might be to enlist the help of non-incumbent civic, scientific, cultural or religious leaders, or even local celebrities.

Transparency and Risk

The IAWN must employ “trust agents” who have the appropriate skill set with which to communicate adequately with non-expert audiences. Throughout the working group, the importance of transparency in dealing with NEO communications was underscored. Transparency is closely linked to credibility and trustworthiness. Trust needs to be established from the inception of communication and communicators must frame the NEO issue by using proven crisis communication strategies and best practices, in order to reduce public misinterpretation.

Regardless of what communication strategy for NEO detection is adopted, it needs to take into account risk evaluation and how best to communicate uncertainty. Any strategy demands clear, concise messaging and, above all, transparency. Furthermore, any plan for communicating NEO risk and any response must be in place before it is actually needed.

An IAWN risk communication program needs to have structural and content clarity. It cannot be *ad hoc*. The IAWN must be able to draw upon relevant scientific and technical expertise to frame its messages to meet the needs of diverse audiences. It is paramount that information be presented in a lucid, succinct, accurate and comprehensive way. NEO forecasters within IAWN should consider translating probabilistic calculations into terms that provide a sound assessment of the chances for a possible Earth impactor without employing technical or mathematical terms that may not be understood by most people.

Given the history of public reaction to similar predicted threats, it seems inevitable that there will be contentious debate between scientists and a few charlatans out to gain attention or influence. Many members of the public, as well as journalists, often cannot tell the difference between legitimate scientists and illegitimate claims to authority. Further, there are likely to be differences of opinion among experts about how to deal with a NEO threat. Those in charge of communicating about an actual NEO event will have to prepare in advance to deal directly with misinformation and conspiracy theories in an upfront manner and counter with clear, concise and accurate information.

Today’s NEO communication outlets are vital data sources for seasoned NEO watchers but do not always convey NEO developments in a manner that is comprehensible to the average general reporter, layperson or political decision maker. Yet these individuals could be a deciding factor in NEO response or monitoring strategies.

The IAWN should explore a variety of methods to convey the sequence of events and the extent of damage of a possible impact. Wherever possible, communications to the public about NEOs should strive to use familiar analogues, metaphors, and visual imagery. Visuals are an ideal tool to combat the public's misconceptions of NEO-related subjects and to bridge language barriers. Artists who specialize in astronomical imagery can provide a host of images that can be used in public outreach and education circles. The resulting images, for example, could be generated by computer-generated graphics overlaid on various geographic locations, rendered by *Google Earth*. This tool has been used successfully in conveying situations that involve large geographic areas.

Risk Communications

The IAWN should consider developing a NEO public database that incorporates what experts have learned in other areas of risk communication. Such a database could act as a hub to foster communication among scientists, politicians, reporters and the public-at-large about the work going on today to address NEO concerns.

Public Affairs Officers in space and disaster response agencies are typically not required to have a background in communication theory or in risk communication theory and methodology. In some instances these individuals may be little more than political appointees. In such cases, politics and risk communication do not necessarily mix well.

Because of the psychology of how the public, including policymakers, perceives risk, policymakers may not have the will to invest in 'just in case' plans for NEOs. The public does not worry much about threats that are not immediate, that appear abstract, or that have never actually been witnessed or experienced by someone like themselves. The more aware of risk the public becomes, the more readily it is alarmed. Still, most people have little or no understanding of numerical probabilities and have a binary reaction to learning about a threat or crisis: "Does it affect me or not?"

A further practical—but nonetheless, critical requirement—will be to communicate directly with the public and with media in multiple languages. It cannot be assumed that English alone would be adequate for an international threat alert and response plan. There may also be utility in studying negative advertising and its effects in order to understand how to communicate messages without unduly frightening people or giving charlatans an opening to operate.

The most immediate threats from the sky are not likely to be huge objects but the smaller ones are nevertheless capable of destroying a city or sparking a tsunami. For example, recent modeling research suggests that the asteroid that apparently caused the Tunguska event in Northern Siberia was caused by a 40-meter diameter object, which is much smaller than previously thought. Objects of this size are more common than the larger ones originally thought to have caused that massive explosion. Because the smaller NEOs escape detection for a longer period, any advance warning might be on the scale of mere hours, days or weeks, and the response might require a broad evacuation, analogous to the evacuation from the path of hurricane Katrina.

Perhaps the greatest challenge in formulating strategies for dealing with an impending NEO strike is conveying the uncertainty surrounding the NEO threat to all of the concerned and/or at-risk parties, governments and public. This challenge is especially high when the potential impact is years in the future and the observational and computational uncertainties are still quite large.

The stated odds of impact are calculated on the basis of how much or how little is known about a NEO's orbit. Typically, an object that initially appears to have a relatively high chance of impacting Earth turns out later, as more tracking information is acquired, to be much less of a threat. Most threats reduce to zero after a few follow-up observations.

Lessons from Past Disasters and the Uncontrolled Reentry of Large Spacecraft

Like the weather, close calls with NEOs are "acts of God" that humankind cannot perfectly predict or avoid. In preparing a communication strategy, attention should be paid to the lessons from the communication performance during the 2011 Fukushima nuclear disaster following the large Tsunami, the Chernobyl nuclear meltdown, the disruption caused by Hurricane Katrina in New Orleans, and the aftermath of the attack on New York City's Twin Towers on September 11, 2001.

The recent uncontrolled reentries of the National Aeronautics and Space Administration's (NASA) Upper Atmosphere Research Satellite (UARS), Germany's Roentgen Satellite (ROSAT) spacecraft, and Russia's

Phobos-Grunt spacecraft can also shed light on how to mount a responsible communication strategy in the face of an actual threat of NEO impact. These reentry events triggered widespread interest, concern, and even alarm in some circles, despite assurances by reentry experts that there was little risk of harm. These events also generated alarmist articles apparently deliberately designed to frighten readers. These reentries should be studied in detail for potential lessons learned.

Treating the Mystery and Promise of NEOs

Any educational campaign should take care to incorporate the mystery of these ancient objects and their potential promise as space-borne sources of valuable minerals that humankind might someday be able to use as we expand our activities in outer space. In addition to their potential threat to Earth and its inhabitants, asteroids have the potential to intrigue not only astronomers but also the public.

For the future, the reporting of NEO flybys – such as the close approach of 2012 DA14 to Earth, and other similar objects -- will likely prompt a flurry of observational activity among professional and amateur astronomers alike. This flyby, which coincidentally passed close by Earth on February 15, 2013, the same day as the Chelyabinsk event, provided an opportunity for amateurs, planetariums, public and on-line observatories to open up their telescopes to citizens for observing and learning about this object.

This might be an opportune time to gauge governmental and public interest in—and concern for—the risk to Earth posed by NEOs.

Call to Action

In conclusion, the organizations that currently constitute a nascent IAWN should, at the earliest possible date, include at least the following basis elements:

- **The development of an effective NEO Communication Plan.**
- **A coordinated program of education targeting general public, policymakers, students and media.**
- **Skilled communicators supported by risk analysts, planners, scientists, psychologists, emergency management experts and other functional experts.**
- **Access to research data and real-time NEO information.**

1.2

Post-workshop Observations

Citizen sensors

The Chelyabinsk meteor event of February 15, 2013 highlighted the value of “citizen sensors,” noted a blog entry in The Commons Lab, a group within the Science and Technology Innovation Program of the Woodrow Wilson International Center for Scholars in Washington, D.C. The Commons Lab draws attention to the use of everyday sensors, readily available to the public, to spot problems, gather and interpret data, and act on the results.

The Commons Lab pointed out that, while official and standardized sources were providing valuable information on the Russian skyfall, so too have decentralized citizen sensors. The number of omnipresent dashboard-mounted and hand-held cameras yielded remarkable footage at the same time traditional news outlets picked up the story.

“The ubiquity of these affordable recording devices allowed people in and around Chelyabinsk to document a rare and scientifically significant situation...and some of the best footage showed up on news broadcasts around the globe,” the Commons Lab blog noted. Using all the video, scientists were able to determine that the meteor flew in at a shallow angle of 20 degrees above the horizontal, described as a ‘grazing impact through the atmosphere.’

“This event depicts the new status quo. Citizens might not be replacing traditional media, but they are certainly supporting it. The amateur footage from Chelyabinsk provides on the ground perspective that previously went unrecorded,” the Commons Lab blog said. “Rapidly evolving communications, sensing, and mapping

technologies have placed the extraordinary power of mass data collection and analysis into the hands of citizens, communities, governments, and businesses.”

New Bolide Agreement

Public release of what government spaceborne detectors pick up in the form of large bolides is now made possible by a newly signed memorandum of agreement (MOA) between Headquarters Air Force Space Command Air, Space, and Cyberspace Operations Directorate and NASA’s Science Mission Directorate. The MOA for the public release of bolide data was signed on January 18, 2013. For security reasons, the actual MOA is classified. As a result of the agreement, NASA’s Near Earth Object (NEO) Observation Program is receiving information on bolide/fireball events based on analysis of data collected by U.S. Government sensors.

1.3

References, Resources

- Reference, resource and presentation materials from the SWF NEO Media/Risk Communications Working Group session are available via SWF website at: <http://swfound.org/events/2011/near-earth-objects-mediarrisk-communications-working-group>
- Association of Space Explorers, Asteroid Threats: A Call for a Global Response, 2008; <http://www.space-explorers.org/ATACGR.pdf>, accessed 3 February 2012.
- Crafting An Effective Communications Plan for an International Response to a Threatening Near Earth Object; 25th Symposium on Space Policy, Regulations and Economics, National and International Space Policies and Programmes; IAC 2012, Naples, Italy; http://swfound.org/media/93083/e.3.1.9-neos_media-williamson_david_schweickart.pdf

Additional resources include:

1. *If An Impact Looms, Then What?*

News Blog by Kelly Beatty, Sky and Telescope Magazine

About 30 impact scientists, communications professionals, policy-makers, social scientists, and science reporters came together in Boulder, Colorado, to explore the “what ifs” were a near-Earth object (NEO) to threaten Earth for real. This diverse group had been assembled by the nonprofit Secure World Foundation. <http://www.skyandtelescope.com/community/skyblog/newsblog/If-An-Impact-Looms-Then-What-134136683.html>

2. *Asteroid debate rises to next level*

By Alan Boyle/MSNBC

The hubbub over the asteroid 2005 YU55, which recently passed within 200,000 miles of Earth, set the scene for a seminar on near-Earth objects sponsored in Boulder, Colo., by the Secure World Foundation. The public's interest in the harmless flyby was just a foretaste of what could happen when astronomers spot a rock that has a significant chance of hitting Earth. And it is a question of “when” rather than “if.” http://cosmiclog.msnbc.msn.com/_news/2011/11/16/8845471-asteroid-debate-rises-to-next-level

3. *The Sky IS Falling. Should We Worry?*

By David Ropeik for Big Think: A forum where top experts explore the big ideas and core skills defining the 21st century

This piece grew out of a recent meeting in which I participated, sponsored by the Secure World Foundation, to bring communicators and asteroid scientists together to explore the challenges of communicating about this issue. <http://bigthink.com/ideas/41151?page=all>

4. *The Undiscovered Country of Small Bodies: What We can Learn from Near Earth Objects*

The work and ruminations of Carolyn Collins Petersen, also known as TheSpacewriter. This blog entry was written after a workshop about communicating risks of NEO impacts, sponsored by the Secure World Foundation <http://thespacewriter.com/wp/2011/11/18/the-undiscovered-country-of-small-bodies/>

5. *Planetary Defense Plans for Asteroids Form*

Concepts for communicating the risks and managing the threat of asteroid impacts will be considered by the United Nations following an expert working group meeting in Colorado.

By Guy Norris, Aviation Week & Space Technology

http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=space&id=news/awst/2011/11/28/AW_11_28_2011_p51-395551.xml

6. *Near Earth Object Media/Risk Communications Experts Gather*

A team of workshop participants, including journalists and writers, hazard communication authorities, artists and Near Earth Object (NEO) researchers, met at the University of Colorado, Boulder's Laboratory for Atmospheric and Space Physics (LASP).

<http://www.newswise.com/articles/view/583055/?sc=dwtr&xy=5028369>

7. *An Assessment of the U.S. Tsunami Program and the Nation's Preparedness Efforts*

For NRC news release on the assessment, go to:

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12628>

For full report, go to:

http://www.nap.edu/catalog.php?record_id=12628

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