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IAC E.3.1.9 CRAFTING AN EFFECTIVE COMMUNICATIONS PLAN FOR AN INTERNATIONAL RESPONSE TO A
THREATENING NEAR EARTH OBJECT

As the many impact craters on Earth and the Moon attest, over time these celestial bodies have been subject to numerous impacts from asteroids and comets that orbit near Earth. Over the millennia, the Moon and Earth have swept up many of these Near Earth Objects (NEOs), but many more still orbit the sun and may at some time cross Earth's orbit, perhaps causing indescribable damage to populated areas. The wide uncertainties surrounding predictions of the point of impact and the enormous possible damage any one NEO might inflict lead to the conclusion that any response needs to be organized and carried out on an international basis.

The 2008 report of the Association of Space Explorers (ASE) recommended that the international community set up three functional groups to respond to such an eventuality:

- An Information Analysis and Warning Network (IAWN);
- A Mission Planning and Operations Group (MPOG) of agencies from spacefaring States to organize a response mission; and an
- Intergovernmental Mission Authorization and Oversight Group (MAOG) to authorize action if a potentially hazardous NEO is discovered.¹

In 2010, in support of the Working Group on NEOs of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), Secure World Foundation (SWF) and the ASE hosted a workshop to explore the components that would be needed to establish the first of the functional groups: the International Analysis and Warning Network. The report of that workshop urged the development of "a communications strategy. . . and an outreach and education plan" as key elements of an effective response plan to the NEO threat.²

In order to understand more precisely what factors need to be considered to develop an effective communications strategy, SWF and ASE convened a November 2011 workshop designed to explore in detail the views of risk communication experts and experienced science journalists on the question. The meeting was held at the University of Colorado, Boulder's Laboratory for Atmospheric and Space Physics (LASP), Boulder, Colorado.³

This paper reports on the findings of the workshop, in which nearly 40 scientists, reporters, risk communication specialists, disaster management experts, and SWF staff took part. It concludes that the

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

- The development of an effective NEO Communication Plan.
- A coordinated program of education targeting the 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.

I. BACKGROUND

The November 2011 meeting concentrated on assisting the UN COPUOS Action Team-14 (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.

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 to respond to a NEO threat.

Action Team 14 is now preparing recommendations of international procedures to follow in responding to the NEO threat. These will be considered by the Working Group on Near-Earth Objects of the Scientific and Technical Subcommittee of COPUOS, which will present its report to the subcommittee in June 2013.

The November 2011 workshop explored in more detail the views of risk communication experts and experienced science journalists on the development of a successful

communications strategy. In preparation for the workshop, participants were asked to respond to three key questions related to creation of an IAWN:

- *What are effective tools to empower audiences with a tangible outreach and education plan, one that fosters accurate and timely information about the possible effects of a potentially hazardous NEO and what actionable steps can the IAWN take to assure its effectiveness?*
- *How best to inform the public regarding NEOs and any Earth-threatening object in a way to avoid misinformation?*
- *What steps can be taken to develop an outreach and education plan, one that offers accurate and timely information about the possible effects of a potentially hazardous NEO?*

II. WORKSHOP FINDINGS

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. Participants in the NEO Media/Risk Communications Workshop focused on several consistent themes:

Education

The IAWN should 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. An informational plan 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.

Following release of AT-14 recommendations to the Working Group on NEOs, an important short-term task of COPUOS would be to identify 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 contacts among themselves 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. 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. This will be important in raising the general level of awareness around the world about NEOs.

One way to familiarize the public with NEOs that very occasionally pass close to Earth, is to prevail upon qualified broadcast meteorologists to present astronomical information (e.g. meteor showers, Space Station sightings), in addition to the information some already provide to their viewers on pollen and ultraviolet exposure indexes. Meteorologists in some countries already provide astronomical information. 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 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. 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. A NEO information infrastructure may also provide a useful model for instituting a worldwide alert-and-response network for hazards and disasters of several kinds.

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. Workshop participants noted that experts on risk communication have carried out extensive research on how best to communicate risk to affected populations.⁴ As they note, it is critically important for natural disaster and rescue authorities or specified individuals to determine, in advance, what 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.

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

IAWN must employ “trust agents” who have the skill set to communicate adequately with non-expert audiences. Throughout the workshop, 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, the strategy 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*. IAWN must be able to draw upon relevant scientific and technical expertise to frame communication messages to meet the needs of diverse audiences. It is paramount that information be presented in a lucid, succinct, accurate and comprehensive way.

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. For example, 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.

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

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 in which to operate.

The most immediate threats from outer space are not likely to be huge objects. Nevertheless, smaller objects 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, which leveled an area larger than New York City in Northern Siberia, was caused by a 40-meter or smaller diameter object.⁵ 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 initial threats reduce to zero after a few follow up observations.

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.

Lessons from Past Disasters and the Uncontrolled Reentry of Large Spacecraft

In preparing a communication strategy, attention should be paid to the communication lessons from natural disasters and uncontrolled spacecraft reentries. Like the weather, close calls with NEOs are "acts of God" that humankind cannot perfectly predict or avoid. 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 all provide useful lessons in what to do or not do prior to and during public emergencies.

The recent uncontrolled reentries of NASA's Upper Atmosphere Research Satellite (UARS), Germany's 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 about NEOs should take care to incorporate the mystery and wonder of these ancient objects and their potential promise as space-borne sources of valuable minerals. In addition to their potential threat to Earth and its inhabitants, asteroids especially have the potential to intrigue not only astronomers but also the public, in part because humankind might someday be able to use the resources they contain as we expand our activities in outer space.

For the future, on January 9, 2013, the close approach of 99942 Apophis to Earth will likely prompt a flurry of observational activity among professional and amateur astronomers alike. This flyby could provide an opportunity for amateurs, planetariums, public and on-line observatories to open up their telescopes to citizens for observing and learning about this

object. If people are invested in seeing this asteroid and have a personal experience observing Apophis, the experience could also provide an opportunity to educate about NEO risks. 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.

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⁵ Mark Boslough, *Airburst Warning and Response*, 2011 IAA Planetary Defense Conference, 09-12 May 2011 Bucharest, Romania.