Public Communication of Technical Issues in Today's Changing Visual Language – 12436

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ABSTRACT

Communication regarding the management of radioactive materials is a well-established challenge. Residents and consumers have suspected for years that companies and governments place short-term economic concerns ahead of health and safety. This skepticism is compounded with increased attention to safety issues at nuclear power plants everywhere after Fukushima. Nonetheless, today's environment presents unexpected opportunities to transform public fear into teachable moments that bring knowledge and facts to discussions on nuclear energy.

In the weeks following Japan's crisis, the lack of reliable information on radiation levels saw citizens taking to the streets with dosimeters and Geiger counters in crowd-sourced radiation-monitoring efforts. Efforts, based mainly online, represent a growing set of examples of how internet and cell-phone technology are being put to use in emergency situations. The maps, graphs and tables created to meet public interest also exemplify some of the psychological priorities of audiences and present learning tools that can improve future education efforts in non-emergency situations.

Industry outreach efforts often consist of technical details and quantitative data that are difficult for lay audiences to interpret. The intense attention to nuclear energy issues since last March has produced a wide array of visual samples. Citizen monitors, news organizations, government agencies and others have displayed quantitative information in innovative ways. Their efforts offer new perspective on what charts, maps and info graphics do – or need to do – to illustrate requirements, record assessments and promote understanding of nuclear-waste issues. Surveying the best examples, nuclear communicators can improve their offerings of easy-to-use, evidence-based visuals to inform stakeholders.

INTRODUCTION

Communication regarding the management of radioactive materials is a well-established challenge. Technical details often consist of quantitative data that are difficult for lay audiences to interpret. The visual display of quantitative information offers an easy-to-use, evidence-based approach to inform stakeholders.

The popularity of visitor centers, science museums and festivals in recent years has also helped change the way lay audiences expect to receive scientific information. They expect to interact with it. These venues engage people of all ages and have increased public receptivity to technical topics. Instructional designers have helped make science entertaining and learning recreational. They capture vast amounts of scientific information and provide ways to look at the research in meaningful ways. This approach includes extensive use of visuals such as charts, graphs and diagrams.

These practices are reflected in the mainstream media as well. Both online and in print, newspapers and magazines are trading prose for pictures. All of these popular outlets offer useful examples for communicators to model to improve visual communications on nuclear waste issues.

One of the disadvantages for nuclear communicators in these venues is that communication on nuclear science and technology frequently begins from a defensive stance. However, author and risk communication expert Peter Sandman describes fear as a useful tool to motivate action. He acknowledges the distinction is a matter of degree, excessive fear being paralytic. But the point remains that teachable moments exist when individuals feel threatened and need information to proceed. How they discover that new information will shape attitudes and associations for the long term. [1]

Instructional designers understand how people process new information and learn. Work in this field shows that learning takes place most efficiently when a person does not need to mentally integrate several sources of information. Visual communication achieves this by physically integrating diverse sources of information into a chart or graphic. Visuals reduce repetitive information and allow the audience to focus on key points. Online examples add an additional interactive component to the communication, which further engages the brain and associates new content into learning.

The intense coverage following the events at the Fukushima nuclear plants inspired a wide range of online visual and interactive tools created by designers both inside and outside the nuclear industry. Comparisons and evaluation of the charts, graphs, graphics and applications developed in the subsequent months offer insight for nuclear communicators to improve this craft.

METHOD

From May-Nov 2011, Potomac Communications Group conducted an audit of new visuals and interactive tools being used in the United States and other countries to communicate about radiation. These communication tools represent the work of government agencies, citizen groups and mainstream media outlets. This audit evaluates the efforts of specialists and non-specialists to aggregate, interpret, and distribute meaningful information about nuclear issues.

Increased scrutiny on nuclear science and technology issues has expanded the range of individuals seeking to characterize and communicate on nuclear issues. To address the potential impact of these new efforts to translate regulatory documentation, academic studies and scientific reports, recent visual communications on nuclear energy must be considered in terms of their accuracy, effectiveness and appeal.

RESULTS

Media coverage, government updates and citizen efforts since the earthquake and tsunami affected the Fukushima plants have produced countless charts, maps and info graphics. They have been designed to illustrate safety requirements, record assessments and promote understanding of nuclear issues. The sample of visualizations on nuclear issues for the public

reveals new expectations from varied audiences. The samples largely fell into three categories of visualization: timelines, maps, and info graphics.

Timelines started as static visuals and became interactive on many sites as the situation wore on. The events in Japan were straightforward news and did not express more sophisticated information.

The lack of reliable information on radiation levels sent the media into 24/7 coverage for weeks and citizens taking to the streets. In June, Japan faced confusion surrounding revised radiation release estimates. Public sentiment in the country was further enraged when radiation exposure limits for children were raised. With dosimeters and Geiger counters, concerned citizens took to the streets, logging their own radiation readings and entering numbers into online maps to crowd-source results. [2] [3]

Fukushima activated the interest of experts and lay people across the globe. The Radiation Dose Chart, excerpted in Figure 1, demonstrates the efforts of one comic artist, unaffiliated with the nuclear industry, who took the time and effort after Fukushima to create an online tool to demystify exposures and doses. Picked up by technology blog BoingBoing, the chart's popularity demonstrated the lack of clear visuals to help the public understand the subject of radiation exposure.

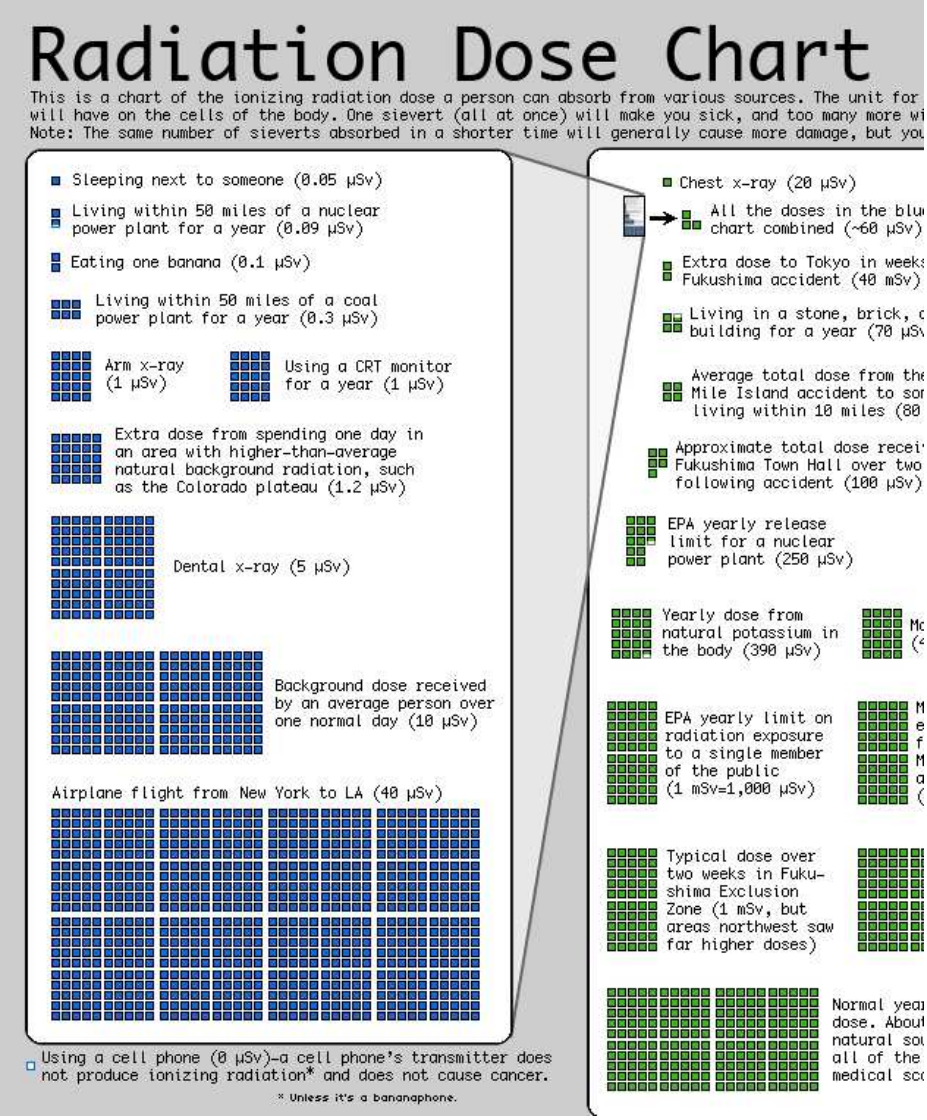

Figure 1. Radiation Dose Chart. Web comic Randall Monroe, who has a degree in physics, created this graphic (excerpted) from public sources to help explain the various sources emitting ionizing radiation that a person can receive and posted it to his comic site, www.xkcd.com

YouTube videos in Japan reveal diners in pizza parlors and homeowners on their roofs taking readings. The comments sections of these websites include long discussions and posts regarding the accuracy of these readings and the ability of citizen monitors to use the monitoring equipment and accurately capture readings. Yet, the emergence of these sites demonstrates that citizens worldwide were motivated and willing to change their behavior and participate. [4]

Communicators must compete for the attention of stakeholder groups by providing complex information in easy-to-use formats. The audit revealed new challenges for nuclear communicators to keep information in context as diverse datasets become available online for dubious comparison.

Experience shows that static visuals accomplish education and outreach goals most effectively when they are integrated into communication strategies that reach audiences through multiple channels. This is especially important for scientific work that can be difficult for audiences to comprehend without deep technical background. Info graphics typically appeared with articles and linked to blogs, Facebook and YouTube frequently. When visuals appeared in conjunction with social networking sites, users generated discussion and interaction with them, lending a virtual approach to integrated communications.

DISCUSSION

The visual display of quantitative information can offer an easy-to-use, evidence-based approach to informing stakeholders on the issues they care most about. However, this form of communication is often underutilized or abused. Poorly conceived graphics can undermine public confidence in the credibility of those most knowledgeable on nuclear issues. Therefore, subject matter experts can better ensure accuracy and understanding by considering new ways to communicate visually on nuclear waste issues.

Visual communications on nuclear issues are often limited in scope for complexity or security reasons. As new technology makes the creation of compelling graphics more accessible, specialists and non-specialists are demonstrating good work to aggregate, interpret, and distribute meaningful information about nuclear issues.

Reviews of info-graphics and interactive tools produced by government agencies, citizen groups and mainstream media outlets characterize new expectations in how data is presented. Access to scientific data has increased with online distribution. Maps offer familiar interface to see where nuclear sites are, who manages them and what facilities exist. Virtual communities form within social media forums to discuss this data. And internet distribution of news is connecting local to national issues. As a result, new technology is redefining effective communications for many audiences.

Technology and innovation take root in society in different ways. Social researchers evaluate the perceived attributes of technology to explain why some innovations are adopted fairly quickly while others require decades to reach widespread adoption. What is for certain is that audience expectations for communication excellence are changing as low cost, high performance tools make photo editing, home video making, application building and social network ubiquitous.

Touch screen tablets have been on the market for years, but the introduction of the Apple Ipad popularized this technology. The incorporation of touch interactivity elevates digital communications to a new level by providing two-way communication. Viewers navigate themselves through rich content and encounter an interactive experience. Users expect customized experiences that are unique to their interests and they have the technology to get it on their phone, their tablet or their computer. However, nuclear science and technology falls by the wayside in this consumer level content.

Experience shows and risk communication research demonstrates that interest in nuclear energy issues will remain negatively motivated, so the question becomes how nuclear communicators can utilize new visual and interactive options to engage skeptical audiences in positive ways. Web users expect to experience custom communications that meet their needs

quickly. That expectation has filtered into public communication of all forms. Unfortunately, technical details often consist of quantitative data that are difficult for lay audiences to interpret. Providing enough detail with sufficient context and background can help avoid produce confusion. A more powerful approach invests staff effort into cultivating audiences into partners who help shape nuclear educational tools to meet their needs through conversation and engagement. The citizen monitoring sites demonstrate the potential for this approach. [5]

Rather than crowd-sourcing information, nuclear communicators have a treasure trove of data rich content to shape into exciting visual communications. Websites archive and organize information related to nuclear waste issues. Search engines make information much easier to assemble and compare. Archives and search engines themselves increase use of this information, as shown by the NEEDLE search engine developed at Idaho National Laboratory. From data rich visualizations of environmental monitoring to interactive games, nuclear issues are being explored in innovative ways that will shape attitudes and understanding into the future.

This evaluation of visual language invites increased use of technical information. However, it also reveals that participation in nuclear-relevant interactive tools is most frequently negatively motivated. Public perception on nuclear energy issues in these tools reflects the consensus of people whose fear responses have been activated. The Art is Open Source Nuclear Anxiety performance illustrates in real time how fear trends across the globe. Citizen monitoring is done out of distrust in the official regulators.

Organizations and individuals who communicate to a concerned public play an important role in shaping the fear response. When fear is in the mix, facts will not address the emotion. Strictly informational efforts to show audiences they have nothing to fear have been demonstrated failures. This situation poses both challenges and opportunities to designers and communicators promoting the visual display of quantitative information.

Nuclear communicators face the challenge of how people perceive risk. Fear was another thing when humans faced predators and the elements. Today's risks are far more nuanced and complex. Social scientists have added much depth to what is known about fear and how it shapes perception. Ultimately, the interest lies in determining if we can evolve our fear response to content with the actual threats that we face today. The discussion of fear is relevant to understanding how to improve visual communications because visuals connect emotionally with audiences more effectively than print or audio.

Fear is a universal survival mechanism for humans. While humans are physiologically adapted to respond to physical threats, psychologists and cognitive scientists have done tremendous work in recent years to explore how the fear response in the limbic brain performs in the modern word, where social, economic and emotional threats far outweigh physical threats in terms of probability.[i]

Hollywood offers the best evidence of how complex the psychology of fear is and how powerful visual communication is in this context. Horror movie viewers are happy to be unhappy – they seek heart-pumping, fear-inducing imagery. Everyone can experience both negative and positive emotions simultaneously. Horror fans seek out great directors who can elicit these dissonant emotions from them – these are people who enjoy being scared, happy too to know

they will feel relief when the threat is removed. More significantly, the Hollywood example reminds nuclear communicators of their responsibility in triggering or avoiding fear responses.

Fukushima became a gestalt of images, converging the disasters: the devastation from the earthquake and tsunami intermingled and eventually merged with the crisis at the Fukushima nuclear plant. Perception exists that any loss of life in Japan is connected to the nuclear power plants. Nonetheless, even fear that is statistically inappropriate, can and should be legitimized as normal, understandable and widespread.

CONCLUSION

Familiar to most communications professionals in the nuclear industry, risk communication is a science-based approach with over three decades of research evidence informing the discipline. Risk communication principles address the fact that often perception is reality. Scientific evidence for decision making must be approached differently in situations where stakeholders have high levels of concern and low levels of trust. Visual communications must take this into account to be successful.

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