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Citation: Fleming, G. “Weather Presentation and Delivery – What Is the Value of This and How Can We Measure It?” In *Proceedings of the WMO Regional Association VI (Europe) Conference on Social and Economic Benefits of Weather, Climate and Water Services*, 2012

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WEATHER PRESENTATION AND DELIVERY - WHAT IS THE VALUE OF THIS AND HOW CAN WE MEASURE IT?

INTRODUCTION

It has always been clear that weather information has a value, and the improvements in meteorological science over recent decades have enabled forecasts of longer range and greater certainty, augmenting the value of weather information considerably. In approaching the question of placing a value on meteorological services, the work of Freebairn and Zillman provides a useful framework, dividing weather information into “Public Goods” and “Private Goods”, with the intervening category of “Mixed Goods” relating to products and services which can be either “Public” or “Private”, depending upon context or indeed upon national economic policy.

“Public Goods” and “Private Goods”

The value of weather products and services in the “Private Goods” category is clearly defined by what the market is willing to pay. This category encompasses bespoke weather services whereby specific weather information is sought by and provided to businesses that have very particular needs. It is a characteristic of such services that they are only provided to those who are willing to pay for them; they are not put into the public arena. This paper will concern itself with the category of “Public Goods”; that is, weather products and services which are made freely available to the end-user at the point of use (although there may well be contractual elements in the provision of such services, e.g. between weather providers and broadcast companies).

The key qualities of “Public Goods”, according to Freebairn and Zillman, are defined by reference to the qualities of **Rivalry of Consumption** and **Costs of Exclusion**. The first quality is centred around the concept of whether the consumption of a product or service by Person A can affect the subsequent consumption of the same product or service by Person B. Weather information which has been put into the public arena clearly has no **Rivalry of Consumption**; one person hearing this information, and putting it to use in making a decision, has no impact on the subsequent use of the same information by a second person. The quality of **Costs of Exclusion** is based around the idea of whether or not one can readily prevent “free riders” (those who have not paid) from benefiting from a product or service. Again, in the case of weather information in the public arena, there is no possibility of limiting its use by any specific person or persons.

The Weather “Value Chain”

The value of a weather information product or service is the end-point of a “Value Chain” which stretches from weather observations through Information Technology (IT) communication and database systems, the forecast systems / Numerical Weather Prediction (NWP), the forecasters themselves, through the mechanism of delivery and presentation to the end-users. Each of the technical elements of the chain has a specific associated cost, but in reality the value of the system derives from the whole. It does not therefore seem to make much sense to try and attribute specific value to any particular technical element of the weather information chain, but to group these elements together into a kind of “black box” and focus instead on the value added at the presentation / delivery stage. From the fact that weather information in the public arena has no property of **Rivalry of Consumption**, it is clear that the benefit of the weather information to society will only be maximised when the greatest number of people possible receive that information and act upon it when making decisions. This implies that the effective presentation and communication of weather information is an intrinsic element in maximising the overall benefit – or value – of weather information to society. To put it another way, good

communication of weather information can multiply its societal value in a manner which would be very difficult to achieve by, say, augmenting the observational network or improving the NWP models.

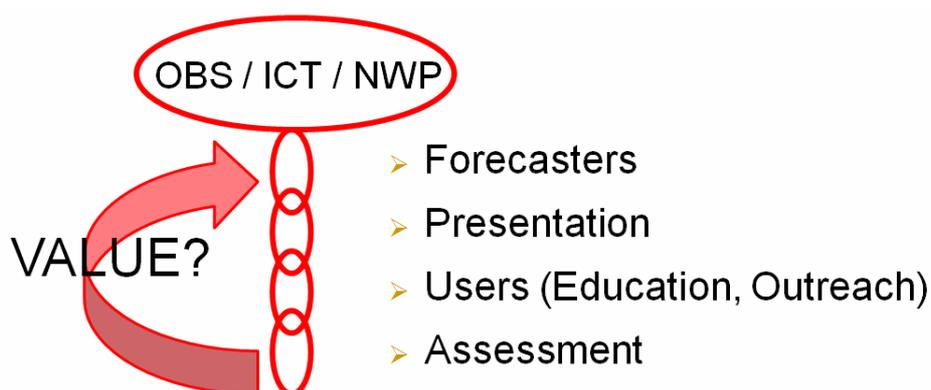
Different Kinds of Value

Before we go on to consider the value of weather information, we need to ask – what kind of value? For the purposes of this paper we will consider three distinct types of value:

1. Value of weather information to society (the broadest definition);
2. “Brand Value” of weather information to National Meteorological and Hydrological Services (NMHSs) (what does the institution gain in value?); and,
3. Value in respect of the NMHSs’ “Public Mission”.

The latter two definitions are linked, but not identical. All NMHSs have a mission, usually defined around protecting the lives and property of the citizens. Suppose that a Meteorological Service issues a warning of imminent severe weather. This warning may be picked up and broadcast by a Television (TV) or radio station and transmitted to the public without any attribution to the Service. The “Brand Value” of the warning to the Service is thus zero, but the value in terms of the “Public Mission” of the Service may still be considerable if those who hear the warnings heed them and take appropriate action to mitigate the risk.

There is also a value implicit in the ability of users to understand and appreciate weather forecasts and warnings. A population which is well-educated in meteorological matters will derive greater benefit from weather information. Thus, the value of the presentation of weather information must include some element to reflect the public education and outreach activities that NMHSs might conduct, with a view to helping the public react appropriately to forecasts and warnings. A public that is engaged with its Meteorological Service through a process of assessment and feedback will also probably gain greater value from weather information, both routine and severe, so this is another part of the “Weather Presentation Value Chain” that may need to be considered. The different and distinct elements of the “Presentation Value Chain” are indicated below.



Broadcast Weather – TV and Radio

The presentation of weather information through broadcast media follows different models of operation, which flow from different legal imperatives, different broadcast cultures, and sometimes nothing more than the relationship (good or bad) between the NMHSs and the broadcasters. One of the first aspects to examine is whether the weather broadcast is really about the transmission of weather information, or is it primarily about the presenters ego, with the weather information merely in a supporting role. There is nothing wrong with weather presenters

having an ego; indeed, it is a necessary trait for any media presenters, but the balance between presenter and content needs to be correct.

That said, good production values can contribute enormously to the successful transmission of weather information through the media. This concept of production values might encompass some or all of the following elements, depending on the medium:

1. Good weather graphics;
2. Quality camera / good lighting;
3. Top-class chroma-keyer;
4. Adequate technical back-up;
5. Wardrobe;
6. Make-up;
7. Scripting quality; and,
8. Voice quality / training.

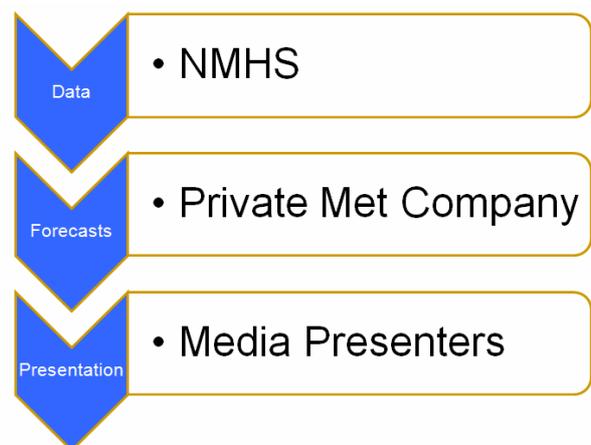
For all of these elements, NMHSs will usually rely on broadcasters; they are not part of the scientific meteorological world, but they can add significant value to the forecast nonetheless.

TV Weather Broadcasts – Different Organizational Scenarios

The arrangements through which weather broadcasts are prepared and presented vary considerably; here we consider four different scenarios which between them encompass most of the organizational structures.

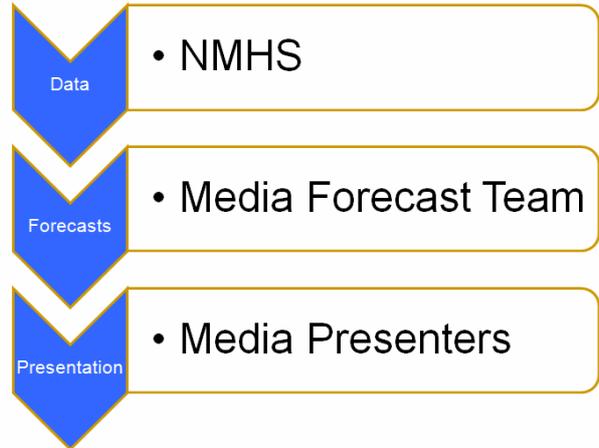
Scenario A

- NMHSs in the background
- Private Met Company between NMHSs and broadcasters
- No NMHSs' logos on-screen
- No NMHSs' recognition
- Official warnings may or may not be broadcast



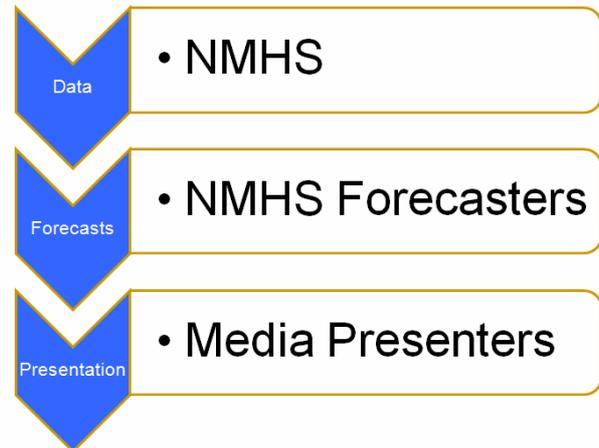
Scenario B

- NMHSs in the background
- Forecasters employed directly by the broadcaster
- No NMHSs' logos on-screen
- No NMHSs recognition
- Official warnings will probably be broadcast



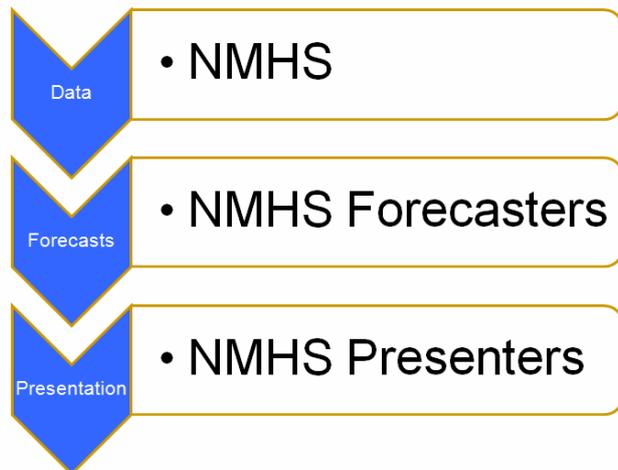
Scenario C

- NMHSs provide weather story
- Forecasters employed by NMHSs
- NMHSs' logos on-screen
- Some recognition of NMHSs
- Official warnings will be broadcast



Scenario D

- NMHSs' weather story
- Forecasters / presenters employed by NMHSs
- NMHSs' logos on-screen
- Full recognition of NMHSs
- Official warnings will be broadcast



Scenario D clearly offers the greatest value to NMHSs in terms of “Brand Value” and in terms of value to NMHSs respective missions. All of these scenarios might deliver a service of identical societal value, but the brand and mission related valuations will be different. We will return to these scenario definitions in the analysis below.

Broadcast Weather – Internet

It is a characteristic of the Internet that it enables everyone to be their own “broadcaster”; the set-up costs for web pages can be low, and the medium can support many different types of delivery, from text and still images through to sound, animation and video. However, the production values relevant for TV and radio will also be relevant to the Internet, and if they are absent the resulting service quality will be poor. This will mean that the website will simply not attract an audience. The Web offers nearly everyone the chance to be their own broadcaster, and it is therefore characterised by a vast range of possible sources of weather information, many coming from commercial companies but many also coming from amateur enthusiasts. The challenge for NMHSs on the Web is to attract users, and then to retain them with a site which interests, educates and entertains.

NMHSs will generally offer the information on their websites “free at the point of use”; it is notoriously difficult to get web users to pay for content directly, as witnessed by the many efforts of newspapers to establish sustainable “pay per view” websites. However, NMHSs may commercialise their websites through sponsorship or through supporting advertisements. If NMHSs choose not to do this, then the costs of developing and maintaining the website must be justified by reference to the core public service mission of NMHSs.

The Value of Broadcast Weather

How does all this help us in our task of putting a value on weather presentation and communication? We could estimate the value of a TV or radio weather bulletin by reference to the advertising rates charged for ads “around” the bulletin. There is some basis for this; more successful TV and radio shows get moved to prime-time slots, and the advertising rates surrounding these shows increases accordingly; however, it would be difficult to create a direct relationship between advertising rates and societal value.

Similarly with the Internet, we could estimate the value of a website in terms of the sponsorship it could attract or the advertising costs which the “market” is willing to pay. In each of these cases, the key point will be the audience numbers. All broadcast values relate directly to audience size, and this relationship should hold also for weather bulletins - the more people see or hear them, the greater the value transferred to society.

A Different Approach

There are a number of studies in the literature which have attempted to estimate the total value of weather forecasts and warnings to society. The methodology has generally been through the conduct of a survey of representative numbers of the public, with questions as to how people access weather information and what they would be prepared to pay for the services they receive. These “Willingness To Pay” (WTP) studies have thrown up a range of values; for the purposes of this paper we will refer to the values and numbers in *Lazo et al, BAMS, June 2009*). This paper reported on a WTP study and estimated the total societal value of weather information in the US to be \$31.5 billion per annum. The paper also estimated the number of times annually a forecast or warning was received (we might use the word consumed) in the U.S. at 300 billion. Putting these figures together, we arrive at an estimate of 10 cents per forecast consumed. It is acknowledged that these figures can only be rough estimates; we might think of them primarily in terms of an “order of magnitude”.

Based on this estimate, we can say that the total societal value of a weather broadcast is simply the value per forecast consumed multiplied by the audience numbers. Thus, a TV weather bulletin viewed by 700,000 people would have a societal value of USD \$70,000 (or Euros €70,000 – given the broad uncertainty in the estimates the currency conversion factor is minimal). What about weather broadcast through different media? Should we apply a weighting factor to account for the differing power of different media? TV has graphics; radio only has voice; the internet is a busy place with many competing sites; newspapers are always out-of-date in that the forecast is generally 12-18 hours old when it hits the street. Weighting factors would need to be estimated for each individual country, and the weights thus estimated supported through analysis, but they might look something like this:

- TV: 1.0
- Radio: 0.6
- Web: 0.4
- Newspapers: 0.1

“Brand Value” to NMHSs

The valuations estimated in the section above relate to total societal value; if we want to estimate “Brand Value” to NMHSs then we need to carry the analysis somewhat further. The four scenarios defined earlier outlined four common organizational arrangements for the TV presentation of broadcast weather. Using these scenarios, we might introduce a second list of weighting factors to reflect the different brand values to the NMHSs:

- Scenario A: 0.10
- Scenario B: 0.15
- Scenario C: 0.30
- Scenario D: 0.40

Even in Scenario D, the primary “Brand Value” of the weather broadcast will be to the broadcaster itself; the Service would do well to achieve even 40% per cent of the total societal value of the weather presentation as a “Brand Value”. These points have relevance in the real world. In the case where a Meteorological Service has a contract with a broadcaster to provide weather information / forecasts, there will be a contract cost. However, this contract cost relates only to the value of the weather information / forecast service to the broadcaster; the broadcaster will pay for the value it perceives to be getting. There may well, however be, an additional “Brand Value” to NMHSs themselves and this is almost never reflected in the contract cost. Thus, the total value of the service might be estimated as the sum of the contract cost and the “Brand Value” garnered by NMHSs.

“Value” to NMHSs’ Missions

As mentioned above, the concept of “Value” to the missions of NMHSs is quite different to the concept of their “Brand Values”. The “Value” to the mission is closely related to the ability of the Service to get the official forecast and warnings services to the public, and is not related to the perception of the public as to the source of the information. In these terms, the weighting factors above will need to be adjusted; the following terms might be suggested:

- Scenario A: 0.05
- Scenario B: 0.20
- Scenario C: 0.80
- Scenario D: 1.00

These numbers try to relate the value of the forecast presentation to the core missions of the NMHSs.

Different Measures of “Value”

We can see from this analysis that the concept of “Value” is closely linked to context. Market-price arrangements are clearly a crude and unsuitable tool with which to estimate the societal value of “Public Goods” such as weather information transmitted through broadcasts. To clarify the analysis above, we can consider again the case of the forecast, valued at 10 cents per individual consumption, and viewed by an audience of 700,000.

- Total “Value” to society is simply 10 cents X 700,00, or \$70,000;
- “Brand Value” to NMHSs would be 40% per cent of societal value, or \$28,000, if the forecast was delivered through TV under Scenario D arrangements;
- “Value” to the mission of NMHSs might be as high as \$70,000 (TV, Scenario D) or as low as \$3,500 (TV, Scenario A). The “Value” might be even lower if delivery were through the Internet or via newspapers.

CONCLUSIONS

The figures above are only illustrative; the aim of this paper is to outline a possible methodology for calculating the value of weather forecasts as presented in the media. It is clear that a lot of value can be gained or lost in the communications process. It is equally clear that the concept of the value of broadcast weather is a complex one, and relates not just to the different media but to the different arrangements that underlie the delivery and presentation of the weather information. If one is to ask “What is the value of a weather broadcast”, the answer you get will depend very much on how you define the term “Value” – is it total value to society, value to the public missions of NMHSs, or “Brand Value” to NMHSs as organizations?

Despite these differences – or perhaps because of them – it would be of great benefit to have some rigorous economic surveys carried out to examine the value of weather broadcasts, if possible across a range of countries and contexts. It is clear that many NMHSs value their access to media, and through media to end-users, primarily in terms of the “visibility” provided to the organization – either the “Brand Value”, the “Value” to NMHSs missions, or some combination of these. The generation of monetary values around these concepts would be of tremendous help to NMHSs, and would, in all likelihood, raise the profile of the importance of good communication and presentation of weather information, leading to a greater investment of resources in these key elements of the forecast chain.

* The Power Point Presentation related to this abstract can be located at: ftp://ftp.wmo.int/Documents/PublicWeb/dra/eur/SEB_Conf_Oct2011/presentations/PPT_RA6SEB_S3_GFleming_Media.pdf