MONITORING USERS' SATISFACTIONS OF THE NWS CLIMATE PRODUCTS AND SERVICES

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NOAA NWS

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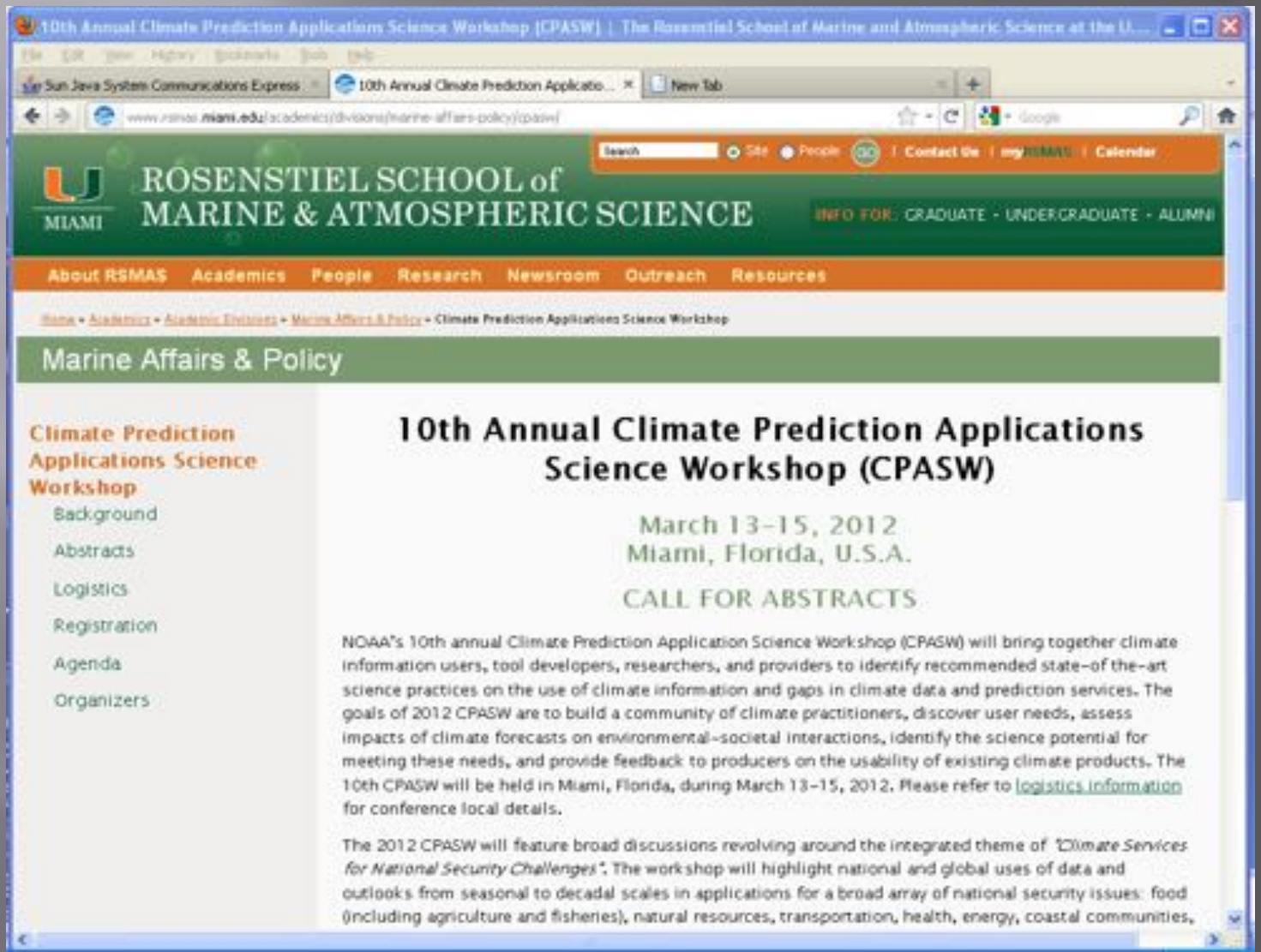
Climate Services for National Security Challeges



Outline

- Motivation
- Survey Background
- 2011 Results
- 2004-2011 Dynamics in Customer Satisfaction
- Lessons Learned
- Next Steps

Motivation

- Climate forecast long-term performance is absolutely necessary information for both producers and users
- Reference* to Murphy's "forecast goodness":
  - **CONSISTENCY**: Forecasts agree with forecaster's true belief about the future weather [*strictly proper*]
  - **QUALITY**: Correspondence between observations and forecasts [*verification*]
  - **VALUE**: Increase or decrease in economic or other kind of value to someone as a result of using the forecast [*decision theory*]

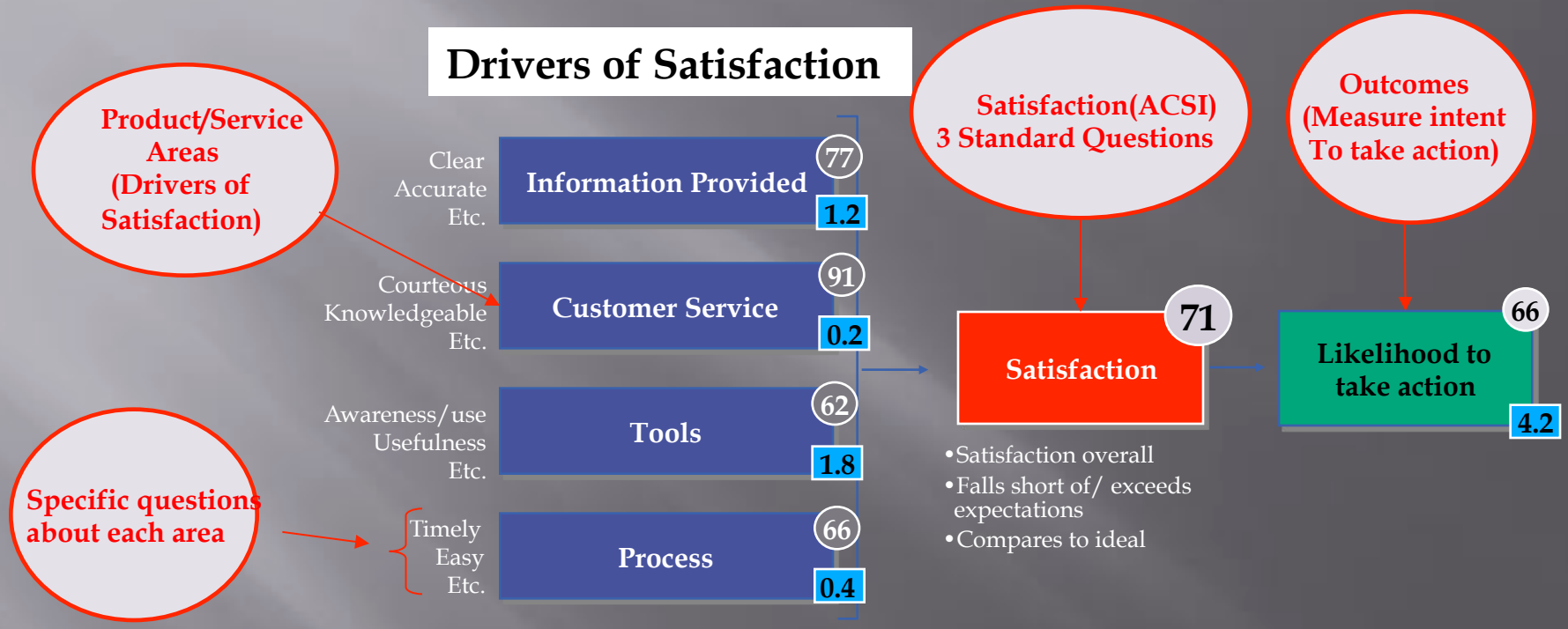
*Murphy, A.H., 1993: What is a good forecast? An essay on the nature of goodness in weather forecasting. Wea. and Forecasting 8, 281-293.

CFI Survey Description

- Periodic (2004, 2009, 2010, 2011) assessment of American Customer Satisfaction Index (ACSI), which is an economic indicator based on modeling of customer evaluations of the quality of products and services.
  - ACSI computations use a variation of Partial Least Squares Regression (PLSR) to determine impacts when many different causes (i.e., quality components) simultaneously effect an outcome (e.g., Customer Satisfaction)
  - ACSI has a *"proven relationship with: Customer spending, shareholder value, cash flow, business performance, and GDP growth"*

**Reference to publications summarized by Russ Merz (2006), CFI Group*

Explanation of Survey Statistics



71 **Scores are averages on 0-100 scale; answers "How well am I doing?"**

Questions asked on 1-10 scale, converted to 0-100 for reporting.

0.8 **Impacts tell you what needs to be done better.**

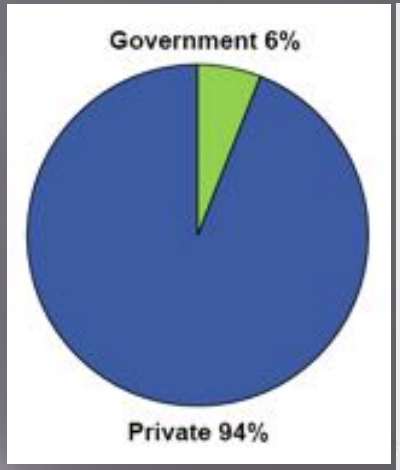
A 5-point change in driver yields change in satisfaction equal to amount of impact; e.g., if Tools increases to 67 from 62, Satisfaction would improve by 1.8 points from 71 to 72.8.

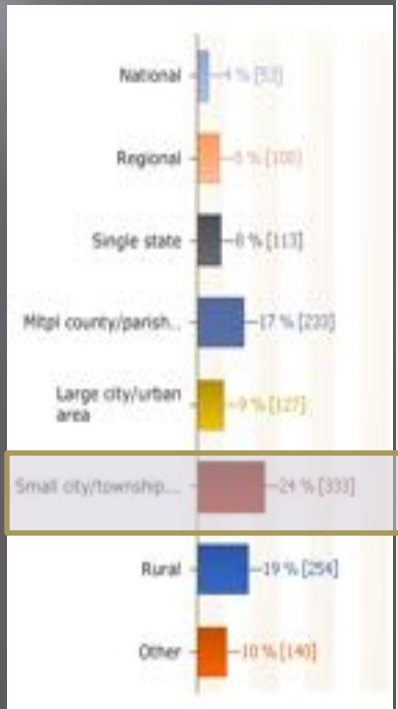
Survey Facts

- Data Collection
  - Survey link available on NWS web pages May 31 – June 23
  - A total of 32,572 surveys completed and used for analysis
- 2011 Survey Design
  - Measured satisfaction with general NWS products and services
  - Measured satisfaction with 4 specific service areas:
    - **Climate Services**
    - Fire Weather Services
    - Hydrologic Services
    - Tsunami
- At 84, NWS CSI is much higher than most benchmarks
  - 19 points higher than the other Federal Government ACSI

Who are our users?

- Majority of respondents are private citizens
  - Most are accessing information for personal and recreational use
  - Most located in US – primarily Easter and Central Regions
  - Age between 35-64, male, with at least college degree
- Dissemination Services remains a high-impact driver of customer satisfaction
- Customers have less confidence in longer-term routine temperature and precipitation
- Staff are a strength for NWS





2011 Customer Satisfaction

https://portal.cfigroup.com/monitor.cfi

2011 Customer Satisfaction

	A	B
1		Scores
2	**Sample Size**	**2,805**
3	**CPC products**	**82**
4	Clarity	81
5	Presentation	81
6	Provided information	83
7	**Likelihood to make a decision about CPC products**	**75**
8	Likelihood to make decision CPC products	75
9	**Extended Range products**	**82**
10	Clarity	82
11	Presentation	82
12	Provided information	82
13	**Long Range products**	**81**
14	Clarity	80
15	Presentation	81
16	Provided information	81
17	**Hazards products**	**83**
18	Clarity	83
19	Presentation	83
20	Provided information	83
21	**ENSO products**	**81**
22	Clarity	81
23	Presentation	81
24	Provided information	80

2011 Customer Satisfaction

Please tell us what decisions you make based on CPC products

Score: 89 **Date:** 6/23/2011 8:25:00 AM Respondent Info

none because I have been unable to locate long range products.

Score: 87 **Date:** 6/23/2011 7:55:00 AM Respondent Info

Driving route decisions, what clothing to bring when traveling, trying to coordinate outside activity dates with the forecast

Score: 89 **Date:** 6/23/2011 7:29:00 AM Respondent Info

Golf Course Maintenance practices such as irrigation, fertilizer and, chemical applications

Score: 79 **Date:** 6/23/2011 7:24:00 AM Respondent Info

General plans .. sometimes travel plans. Often, I'm looking for a break from a negative trend (right now, I'm watching for a temperature decrease or rain). And definitely personal safety. At times, as a Skywarn spotter

Score: 100 **Date:** 6/23/2011 4:52:00 AM Respondent Info

Long range maps are very small online, and hard to read. Should be bigger

Score: 84 **Date:** 6/23/2011 2:11:00 AM Respondent Info

Trip planning, outdoor activities, travel

Score: 22 **Date:** 6/23/2011 2:08:00 AM Respondent Info

We don't know all your acronyms. Use words. How will I transport my products. And will I go boating/fishing.

Score: 69 **Date:** 6/23/2011 1:48:00 AM Respondent Info

Travel and class presentations

Score: 97 **Date:** 6/23/2011 12:42:00 AM Respondent Info

Its the first thing i check on my phone when i wake up in the morning weather i'm going hunting or looking at the weather for my crops or hay. Your website has proven to be much more accurate than the news channels on my tv set

Score: 95 **Date:** 6/23/2011 12:41:00 AM Respondent Info

use temperature forecasts to set irrigation schedule when I'm out of town (almost no summer rain here)

Score: 89 **Date:** 6/20/2011 10:59:00 AM Respondent Info

Whether community events will be delayed or cancelled. Determining when my long commute to work might be too hazardous. Warning employer when there is a risk the commute might take excessively long due to weather. Also: what is ENSO? might be nice to have a graphic showing 1-14 days showing overall probability of hazardous weather on each day and what the likely forms would be.

Score: 63 **Date:** 6/18/2011 8:51:00 AM Respondent Info

Excuse me? What are ENSO and CPC? See previous comment re: overuse of acronyms.

Score: 100 **Date:** 6/17/2011 10:18:00 AM Respondent Info

The Enso page is very technical(graphs are confusing) and sometimes difficult to decipher for the layman. Also it would be nice if it just said right on the front page we are currently in a Weak La Nina or neutral phase...

Score: 87 **Date:** 6/16/2011 9:30:00 PM Respondent Info

planning summer alpine backpacking trips (Rockies to CA) ...and I have no idea when ENSO means in the question.

Score: 78 **Date:** 6/16/2011 2:57:00 PM Respondent Info

The ENSO information needs to have a distilled version available. All those charts and graphs for sea-water temps off the coast of Equador and the Philipines are nice and all that, but they don't really tell me what the dang 'nino is doing or not doing because I CAN'T UNDERSTAND THE DANG THINGS, 'cause I'm NOT a weather/climate/government person TRAINED to read 'em! I need to know what the 'nino is doing, and what that means now, 30, 60, 90 days out, in the United States of America. And I need it in simple, easy to understand terms that I can use to my advantage in forage agriculture. In other words, guys -- you've spent all that time and money for those fabulous multi-page presentations, and if the guy who actually NEEDS the information can't make heads or tails out of it, WHAT GOOD IS IT?!?!?! Sorta like this: El Nino is strengthening this week and the effect of that are expected to be THIS in the Southwest, THIS in the Northwest, THIS in the etc. etc. etc. El Nino is expected to do THIS in the next 30-60-90-120 days, which will affect the United States like THIS, with particular emphasis on THIS, over HERE, and THIS over THERE, unless THAT happens, which means THIS. See? I can USE that. So can just about everybody ELSE who relies on relatively accurate weather prognostications. Take all that fabulous stuff you've recorded and make it USEFUL for the Average Working/Business Guy without a meteorological degree. Okay? Thanks.

Score: 71 **Date:** 6/15/2011 10:10:00 PM Respondent Info

When I read the ENSO discussions, I have to allow A LOT of time to define and decode due to my lack of knowledge. I would like the glossary feature added that is used in the forecast discussions - that would help.

2011 Customer Satisfaction

Please tell us what climate information you need for your decisions

Score: 64 **Date:** 6/22/2011 10:12:00 PM Respondent Info

Seasonal outlooks on temperature, precipitation and hazards. Atmospheric mode forecasts (ENSO, NAO, and others). Probabilities of extremes (90 degree days, >2" precip, etc.). Hurricane and tornado season outlooks.

Score: 97 **Date:** 6/21/2011 12:14:00 AM Respondent Info

weather forecasts, temps, precip, winds, fire hazards, winter storm forecasts, drought and climate forecasts: daily, weekly forecasts regarding temps, rain, storms, fire hazards, heavy thunderstorms during monsoon.3 month climate info, forecasts for temps, precip, El Nino La Nina ENSO info.

Score: 88 **Date:** 6/20/2011 11:04:00 PM Respondent Info

ENSO

Score: 87 **Date:** 6/19/2011 1:28:00 PM Respondent Info

Snow depth and snow water by year for the last 50 years, having just ended a historically unusual and frankly worst possible case season, which until the end of the season iced the sensors (?) was available from snotel and state highway road conditions.

Score: 58 **Date:** 6/18/2011 8:57:00 PM Respondent Info

Information on various teleconnections (Arctic and North Atlantic Oscillations, Pacific-North American Pattern, ENSO), analogs.

Score: 82 **Date:** 6/18/2011 11:50:00 AM Respondent Info

I use temperature and precipitation trends, as well as ENSO data .

Score: 97 **Date:** 6/16/2011 4:59:00 PM Respondent Info

enso info, jet streams

Score: 58 **Date:** 6/16/2011 11:13:00 AM Respondent Info

Information on the ways weather in the west will affect weather in the east. It shouldn't be too difficult to run data comparisons for El Nino/La Nina years and ENSO neutral years and express trends in pie charts. Current pie charts almost always divided in thirds for our area which is not helpful. I don't use the graphed information much because the pie charts don't seem to vary from season to season so it seems a bit of a time waste.

Score: 100 **Date:** 6/16/2011 6:00:00 AM Respondent Info

I use ENSO generally for precipitation predictions when planning RV trips.

Score: 71 **Date:** 6/15/2011 10:10:00 PM Respondent Info

I often refer to the outlooks for temps, precip, when we are looking at seasonal changes, especially in the winter I taught myself to read the ENSO forecasts when I started watching hurricanes. I don't live in a state that is affected by hurricanes, but learning about them has increased my overall understanding of how weather occurs, and what elements are necessary for severe weather SO - make the ENSO information easier to decode. Don't dumb it down but make the supporting knowledge more accessible.

Score: 89 **Date:** 6/23/2011 8:25:00 AM Respondent Info

where is this located again?

Score: 89 **Date:** 6/23/2011 7:29:00 AM Respondent Info

daily and 14 day forecast, 3-6 month temp & precip forecast, weather records

Score: 97 **Date:** 6/23/2011 7:13:00 AM Respondent Info

Rainfall/Snowfall amounts, temperature...

Score: 100 **Date:** 6/23/2011 4:52:00 AM Respondent Info

Wind information would be useful. Average windspeed, max, min.

Score: 22 **Date:** 6/23/2011 2:09:00 AM Respondent Info

temperature wind and water temperature

Score: 97 **Date:** 6/23/2011 12:42:00 AM Respondent Info

Radar, air temps, daily forcast, satilite pictures, and week long forcasts

Score: 95 **Date:** 6/23/2011 12:41:00 AM Respondent Info

frost prediction

Score: 89 **Date:** 6/23/2011 12:38:00 AM Respondent Info

River levels

Score: 54 **Date:** 6/22/2011 11:40:00 PM Respondent Info

accurate info for temp, precip, hazards on minimum of 4 hour increments

Score: 92 **Date:** 6/22/2011 10:33:00 PM Respondent Info

I have learnd thru this survey that you probably already publish in understandable form all the information. I simply need to become more familiar with your existing products.

2011 Customer Satisfaction

What do you need in Extended Range forecast products that is currently missing from CPC products?

Score: 89 Date: 6/23/2011 8:25:00 AM Respondent Info

I dont know. I cant find most of the things listed as available.

Score: 87 Date: 6/23/2011 7:55:00 AM Respondent Info

More accuracy, especially in winter

Score: 79 Date: 6/23/2011 7:24:00 AM Respondent Info

Ease of finding. I marked 'Presentation' down because I don't know where to find some things.

Score: 100 Date: 6/23/2011 4:52:00 AM Respondent Info

Confidence rating

Score: 69 Date: 6/23/2011 1:48:00 AM Respondent Info

Percentage of probability

Score: 97 Date: 6/23/2011 12:42:00 AM Respondent Info

Nothing

Score: 89 Date: 6/23/2011 12:38:00 AM Respondent Info

The more info, the better ...

Score: 100 Date: 6/22/2011 10:51:00 PM Respondent Info

I do not always understand the terminology but I do have a dictionary.

Score: 92 Date: 6/22/2011 10:33:00 PM Respondent Info

Better accuracy.(I know you don't control the many factors which have an impact on the weather It may be better that we can't. Someone would be sure to try to use it for their advantage.

Score: 64 Date: 6/22/2011 10:12:00 PM Respondent Info

Verification of recent 8-14 day, 30 day periods. Comparison to climatology when looking at 8-14 day or 30 and 90 day lead probability maps.

Score: 81 Date: 6/22/2011 5:55:00 AM Respondent Info

More accurate precipitation forecasts.

Score: 64 Date: 6/22/2011 2:36:00 AM Respondent Info

First, for farm use they need a presence on the main page. Second, they need to be rather more concrete than nebulous, even if it means reporting conflicting model data. Third , they need to be updated daily.

Score: 81 Date: 6/22/2011 2:30:00 AM Respondent Info

I would love to be able to click directly on the map (at http://www.cpc.ncep.noaa.gov/) to pull up a bigger image instead of having to go to, for example, One-Month Outlook to click on it there.

Score: 86 Date: 6/21/2011 6:38:00 PM Respondent Info

a mobile app

Score: 85 Date: 6/21/2011 6:30:00 PM Respondent Info

I know extended-range forecasting for summer rain in the southeast is tough, but maybe some distinction between the expected tropical activity and the non-tropical rain mechanisms? 1-3 month rain anomaly predictions seem to be dominated by expected hurricane/tropical storm activity, which is so erratic it doesn't seem to me to be much of a criterion for long-range drought prediction.

Score: 97 Date: 6/21/2011 6:12:00 PM Respondent Info

Make the text less scientific so that it is easier to understand.

Score: 92 Date: 6/21/2011 5:49:00 PM Respondent Info

Much clearer presentation for area extended forecasts. For example, I use a point forecast page for 5 miles north of Lisbon Maryland. It gives me a wealth of info., that I would not want to see diminished. If NWS could take the weekly graphics in the Quick Forecast and extend it out to 15 days, that would be a big improvement. Also, maybe you could figure out how to present information in that format by weeks and months. For example: "Week 3 (July 11 to 17) temperatures will be above normal with highs averaging in the mid 90s and lows in the mid 70s. Precipitation will be below normal with rain .25" below the daily average of .75" Something like that that would give lay-people easily understood information on the coming intermediate and long-term periods. You could do this for weeks on the intermediate term and months on the long term. For these types of predictions, you could give confidence ratings (e.g. 60%) since they are quite a bit in the future. You could keep your other probability graphs for people interested in more technical information.

Customer Satisfaction Dynamics

- ACSII is computed as a group score
- ACSI growing for all products
- Are doing a better job?
- Customers are more appreciative?
- Different demographics?

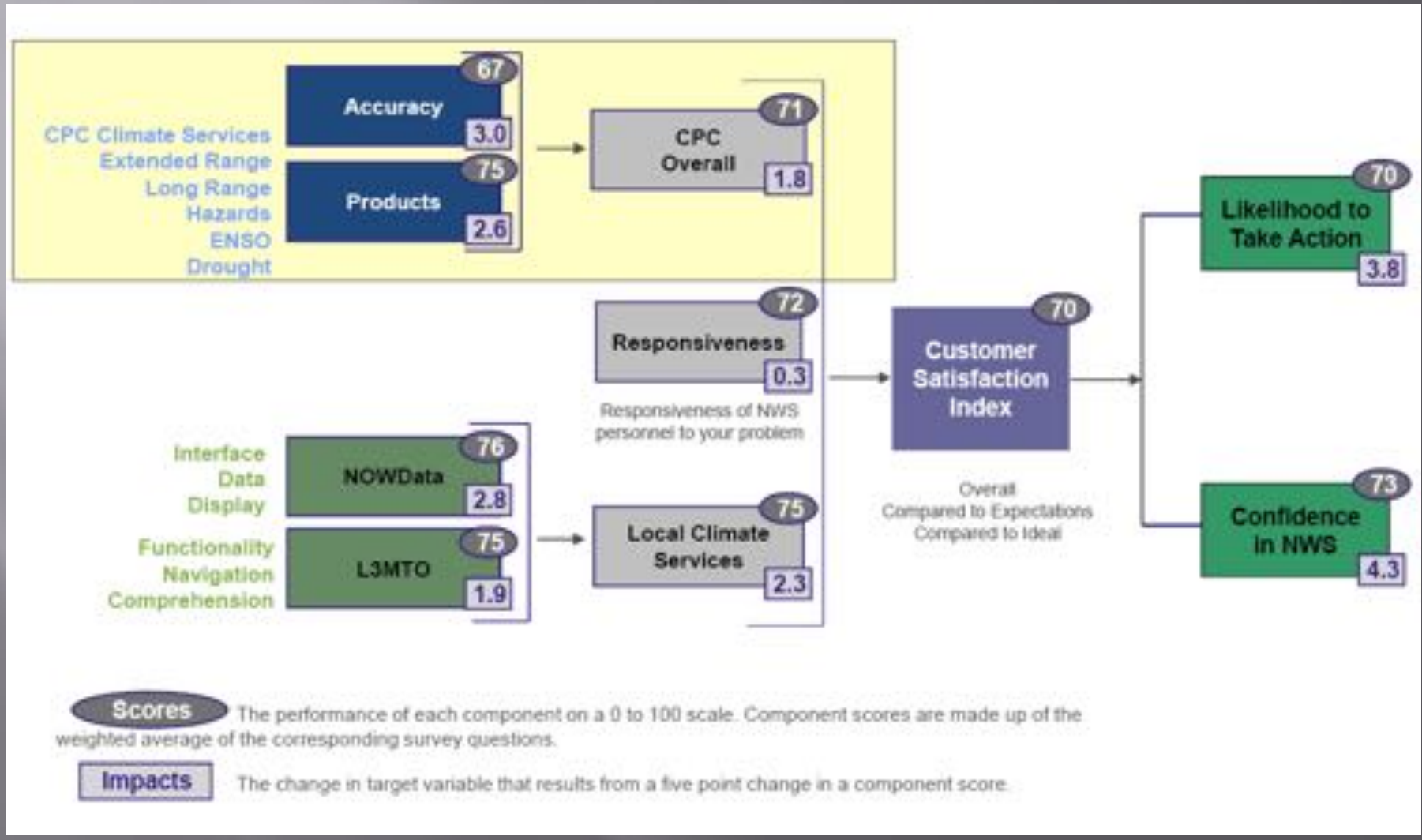
	A	B	C	D	E
1	Products	2004	2009	2010	2011
2					
3	6-10 day forecasts	71	74	86	87
4	8-14 day forecasts	69	74	86	87
5	ENSO	76	76	83	84
6	3-Month National Outlooks	70	70	84	85
7	3-Month Local Temp Outlooks (3LM)		75	85	86
8	Drought Monitor	81	80		
9	3-Month Drought Outlooks	79	80	85	87
10	NOWData		76		80
11	Hazards	72	76		88
12	Overall Total Respondents	2,214	1,433	14,057	32,572
13	Respondents Studied	2,134	1,433		2,805
14					
15	NOTES:				
16	Hazards				
17	* in 2004 this products was called 'Excessive Heat and Wind Chill Outlook Products'				
18	** in 2009- 2011 Climate Hazards Assessment				
19	$ only major products and services have been surveyed				

Customer Satisfaction Dynamics

- Compatibility of 2004/2009 and 2010/2011 surveys is obscure
- 2010/2011 surveys do not allow to distinct the resolution of all customer satisfaction drivers for different products

	A	B	C	D	E	F
1	ENSO		2004	2009	2010	2011
2		Meets My Needs	77	76	84	85
3		Ease of Understanding			82	84
4		Timeliness	76			
5		Accuracy				
6		overall satisfaction		76		
7		Organization of information	76			
8		Presentation		76		81
9		Clarity	75	76		81
10		Provided information		77		80
11	3- Month National Seasonal Outlook		2004	2009	2010	2011
12		Meets My Needs	71		85	85
13		Ease of Understanding			85	86
14		Timeliness	73			
15		Accuracy				
16		overall satisfaction				
17		Organization of information	70			
18		Presentation				
19		Clarity	66			
20		Provided information				
21	3- Month Drought Outlook		2004	2009	2010	2011
22		Meets My Needs	79		85	86
23		Ease of Understanding			86	87
24		Timeliness	78			
25		Accuracy				
26		overall satisfaction				
27		Organization of information	79			
28		Presentation				
29		Clarity	78			
30		Provided information				

2009 Survey Information



Lessons Learned

- Having information about the overall performance of NWS climate product suite is informative, but not sufficient
- Scores are growing over time
  - Sampling size may matter
  - Combining Climate and Weather products might provide misleading information
- The majority of our users do not show readiness to use the climate products intelligently
- To obtain needed information, we need to ask proper questions
- We must make greater effort to socialize our products: dissemination service is the high impact area
- More thoughts/time/effort should be allowed for the survey analysis

Further Thoughts

- How to improve survey to evaluate the quality of our products and services?
- What is the intended target audience for our products?
- Are we ready to make change to serve better our users?