

How South Carolina's surveillance
processes have changed under the
NEDSS Base System (CHESS)
2004 PHIN Conference

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NEDSS Base System = Carolina Health Electronic Surveillance System (CHES): Background

- All statements here are data-based, we believe
- Some statements are data-**documented**
- Opinions expressed are the authors'
- Note: confounding with impact of BT \$
- **“The IT is the easy part.”** And it's not easy.

NEDSS Base System = Carolina Health Electronic Surveillance System (CHES): Background

- In SC, county health departments are integrated with the state (DHEC)
 - Thus most reports **were** sent to state level first (many implications, e.g. re-sending to districts)
- Began NBS parallel testing May-June 2003 with all 53 Reportable diseases
- Began NBS (CHES) production at state 7/03
- 6/12 districts now using CHES, all 12 by 7/04
- ELR in two hospitals, parallel from LabCorps

Outline: How CHES/NBS has changed acute disease surveillance

1. Data acquisition and entry
2. Surveillance business processes, and epi-users
3. IT and technical changes
4. Management, planning and budgeting, legal/regulatory, training, communication
5. Outcomes

Data acquisition and entry

- Data entry and investigation is moving from state level to districts (6/12 now, 12/12 by July)
- Potentially more time for QA at state level
- Data entry and investigation of reports more timely
- Case Investigation begins sooner after event (?)
- More variation in data entry quality
- During transition, maintain different processes in different districts

Timeliness of investigations in CHESSE since 2/7/04

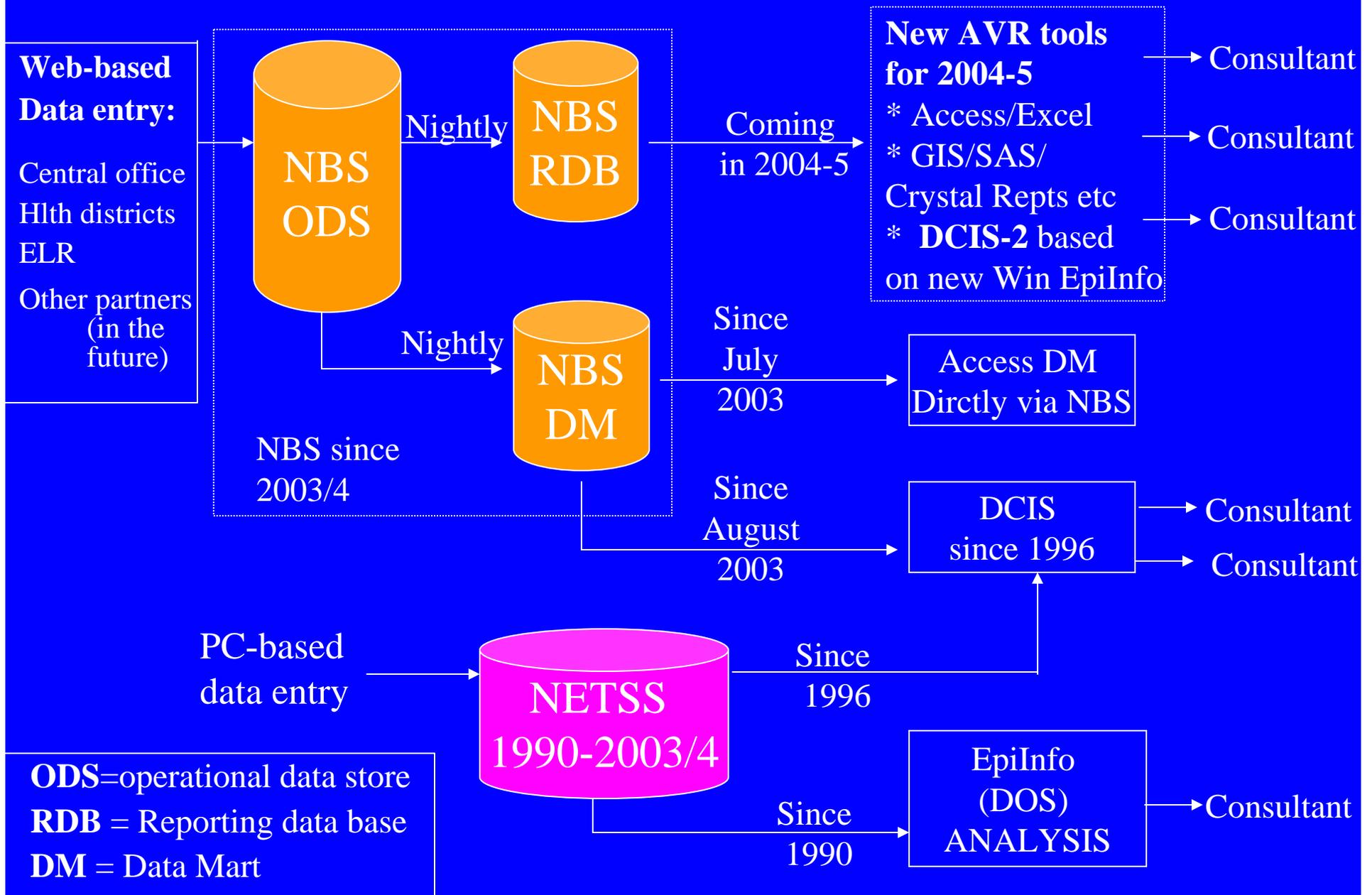
Median Delay (days)	Event to data entry	Event to Investigation start	Investigation to data entry	Entry to first notification
State level	28	28	0	0
Districts	0	28	0	0

- 1650 reports, ~700 from districts, not including influenza or ELR
- **Mean** delays are longer
- Better than NETSS but: **we are not fully using CHESSE as an investigation tool yet!**

Surveillance processes and users

- Flow of reports at state has changed:
Consultants see reports at least twice: more chances for QA before Notification to CDC
- More standardization of flow of decisions
- More empowerment of district epi staff
 - Rollout easier than expected; more OB seen
- Formerly envelopes of cards/PO arrived, days/weeks delay
- More data errors: **need for data management**
- Work load increases: ELR, system slow at first

Schema of SC Reportable Disease Information Systems 1990-2004



Data Quality Issues, 4/04

1. Many info systems and user interfaces, varied codes & std. dates etc causing inconsistencies	DCIS uses amalgam of NBS and NETSS cases	Temporary: CSC is to send a final program to merge legacy data
2. Duplicate entries in NBS and in NETSS	Gerri vs Jerry, same ID but different addresses, same but DOOnset instead of DOB	There are ways in NBS to find and merge likely duplicates – but they do not work in the production system now!
3. Need standard codes for variables with reference tables	Mt Pleasant, Mt. Pleasant, Mount Pleasant	Drop-down lists, Provide standard code lists for entry staff
4. Loss of SCSPyyyyy.rec supplementary files in NETSS	Shigella species Salmonella serotypes Meningococcal serotypes	Fix NBS to include these data fields; in short term, data entry QA

Potential to use CHESSE as epi-tool

- Staff can use database to track investigations: assure follow-up on data for case definition and prevention
- Search for related cases and clusters
- See cases in neighboring districts, even across state lines perhaps
- “Centralize report entry, decentralize investigation and analysis”...with good QA

IT/Technical Changes I

- Reporting out CHES data is much harder, since essentially no reporting/analysis/visualization capacity in NBS versions so far
- We built a complex system with Epi-Info to extract reports from NBS, enter into NETSS for analysis
- Also had to do this because current NBS does not handle Salmonella, animal bites, Lyme, Shigella serotypes, invasive *Strep pneumo*

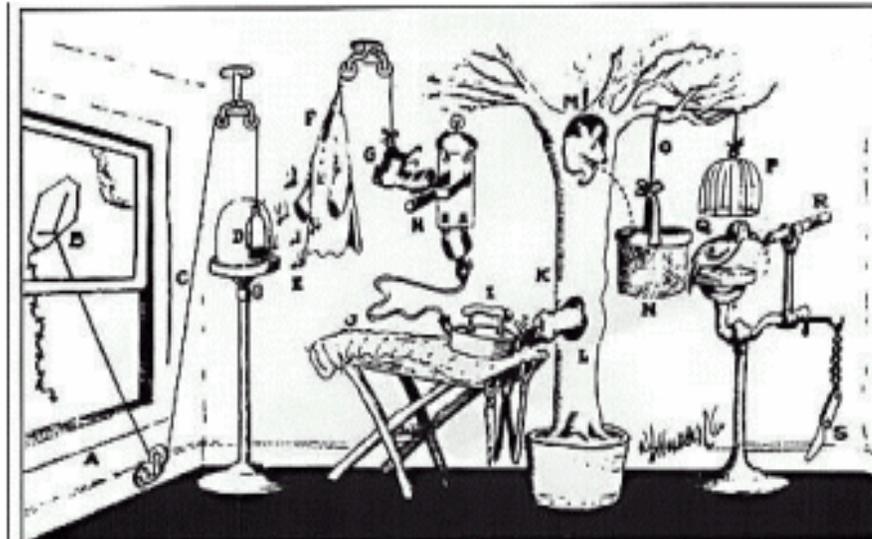
DRAFT September 5, 2003

Moving Data from the NEDSS Base System (NBS) to A NETSS-compatible Epi6 REC file

Why would anyone want to do that? and
One approach to doing it

Eric Brenner, MD
SC DHEC Bureau of Disease Control

Rube Goldberg's: Simplified Pencil Sharpener



The problem...



The solution...



Technical Issues

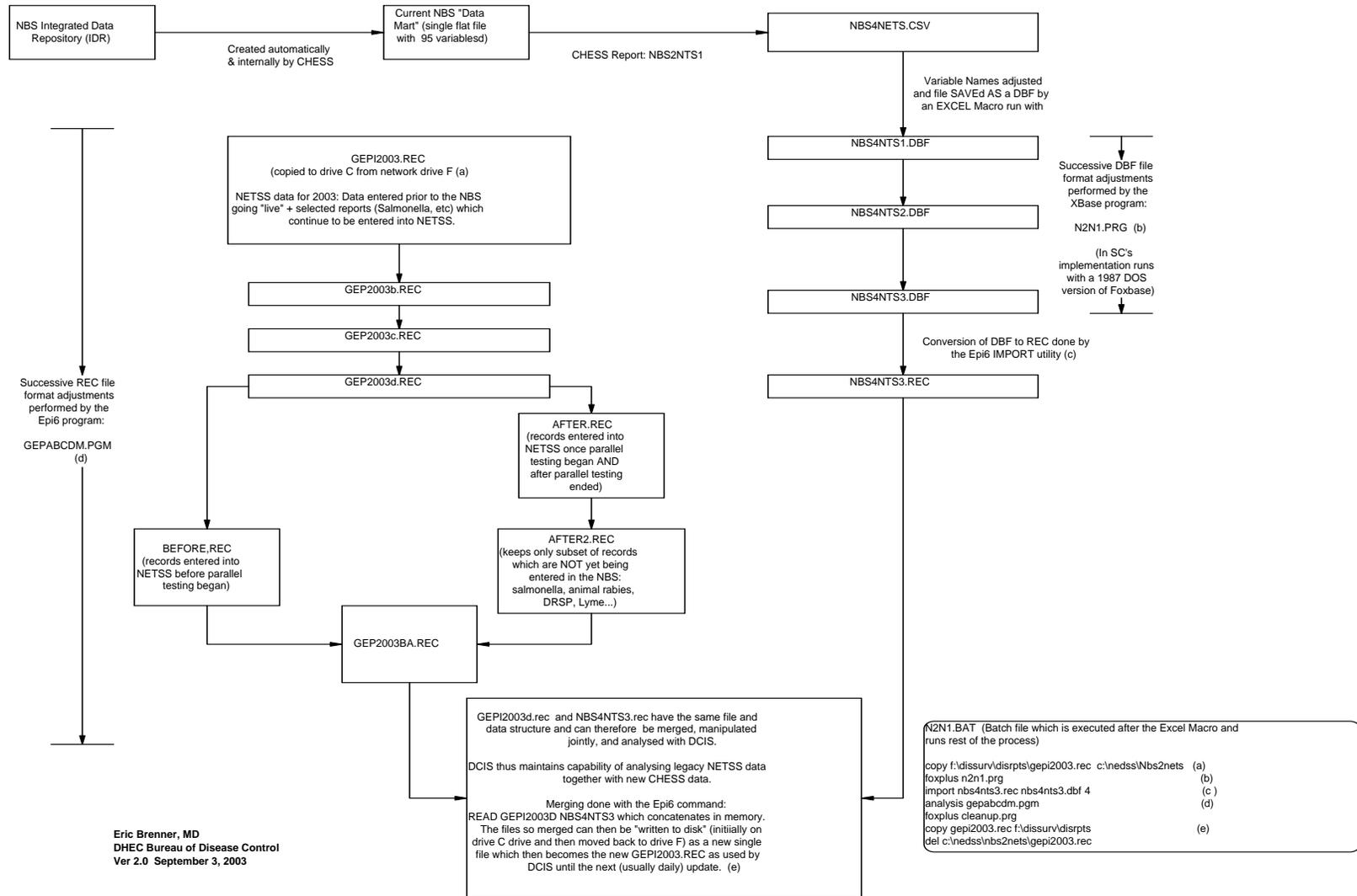
NBS/CHESS vs. NETSS/DCIS

Differences in:	NBS/CHESS	NETSS - DCIS
Physical location (in fact moot since as thanks to the Web and to Windows it usually does not matter where data physically resides)	2600 Bull St. 2 nd floor (in Bur. of Info Systems Server farm)	Mills Bldg: Ted's PC & Basement servers & DCIS on DADE consultant's PCs (in Acute Disease Epi Division)
File format	MS SQL Server	EpiInfo
Variable names (some examples)	Age Reported Birthtime Jurisdic Etc etc.	Age Birthdate Region
Variable codes and values (some examples)	Confirmed = C Probable = P Giardiasis Rocky Mountain Spotted Fever Etc etc	Confirmed = 1 Probable = 2 Giardia RMSF

Thus need for a method to extract data from NBS/CHESS, to manipulate / transform them into an Epi6 REC file with file structure, variable names and variable values which match exactly those used by the REC files containing NETSS legacy data as used by DCIS.

Flow chart illustrating data flow of « 1,2,3 » steps used to transform NBS data into NETSS format

Merging legacy (and ongoing) NETSS data with data new NBS data
Flow of file format and data structure transformations



IT/Technical Changes II

- NBS implementation generates much more “IT power” in-house – both agency and contractor.
- Internal IT support is very valuable. Because NEDSS is browser-based and ELR should be central, most IT problems are at state level
- Can do “extra” projects: Immunization registry, TB contact tracing management system

**In fact, here is a room-full of IT folks
all working on NEDSS related projects**



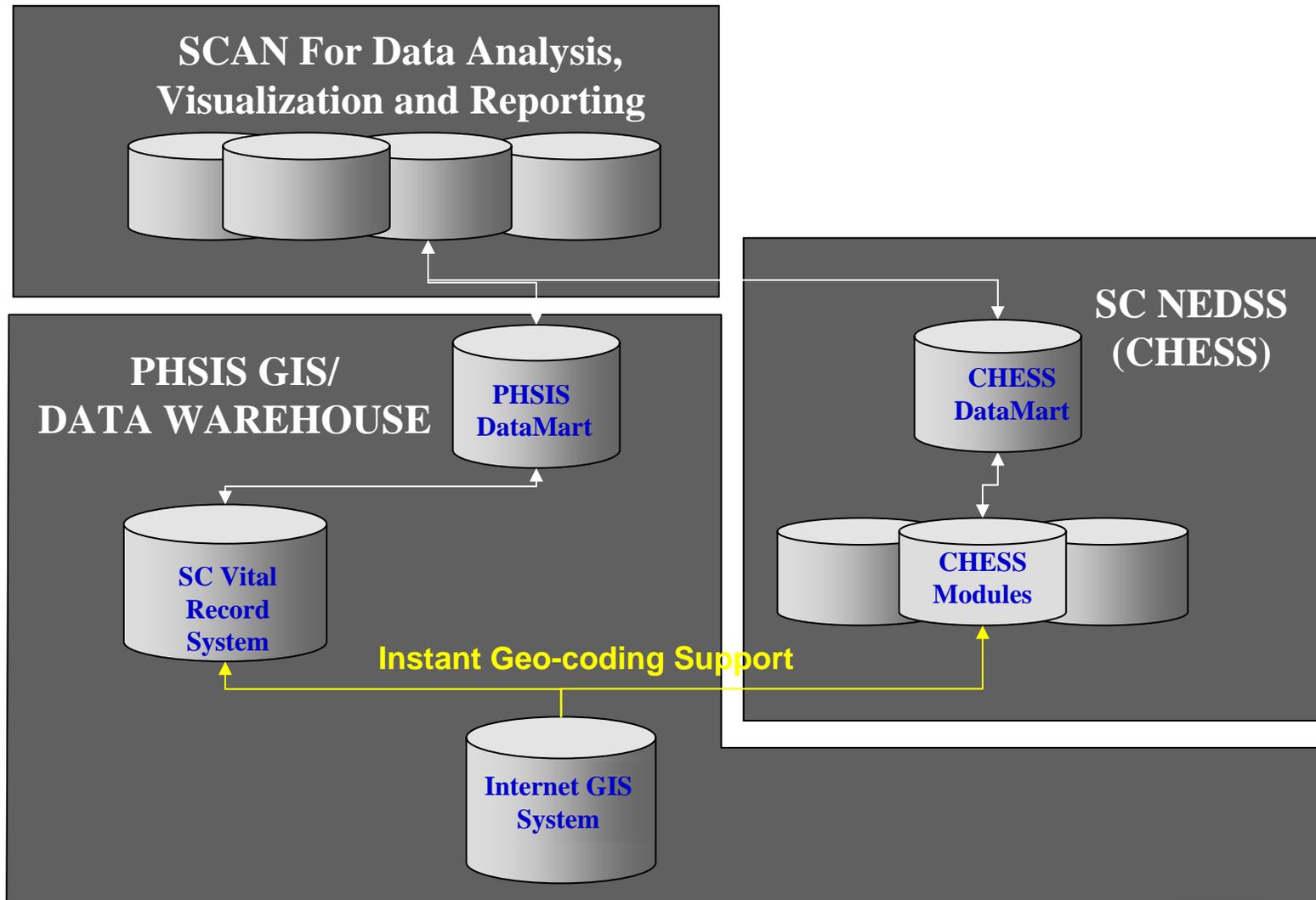
IT/Technical Changes III

- The NBS works!
- Somewhat “clunky” to use
 - Can’t move from “lab data entry” to “clinical case entry” sections
 - Too many unnecessary options, bells and whistles, because it’s “one size fits all” and functional requirements were planned by CDC
- But CSC is improving, and “user-defined fields” are coming

Management Changes I

- Great need for constant communication/ coordination with agency partners, especially agency IT unit, Vital Statistics/GIS, others
- NEDSS process inevitably threatens other units because of its **power, generalizability, potential conflict with agency IT plans, large resources, questions of recurrent cost, TURF**
- Legitimate issues! Early vigorous proactive communication with every unit generating health-related data is essential
- New IT coordination work group at agency level

SCAN Supporting NEDSS AVR



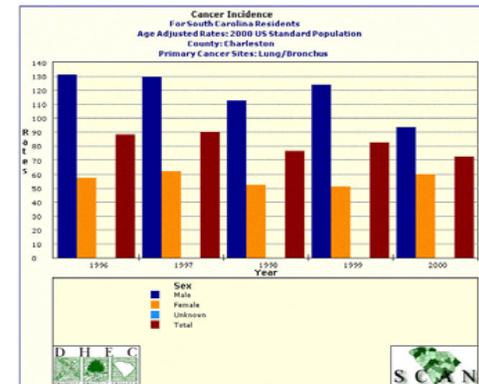
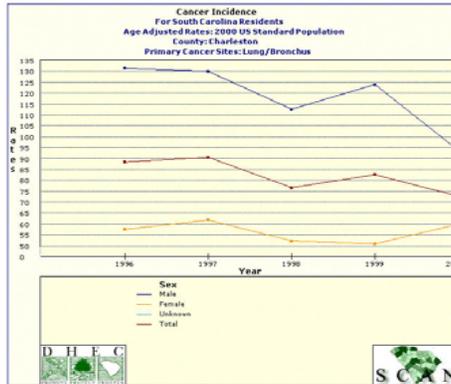
SCAN AVR Functions

Death Statistics for Residents of South Carolina

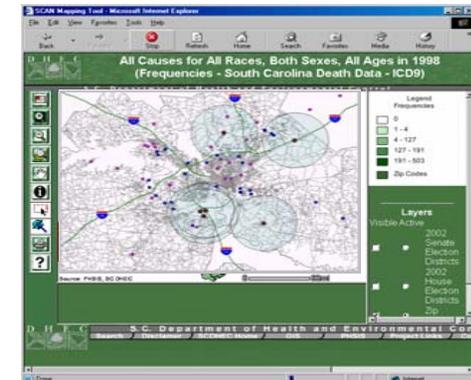
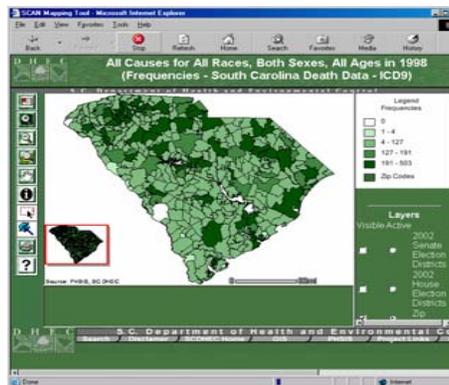
Cause of Death: All Causes

Race	1995		1996		1997		1998		1995-1998	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
White	23,342	5.4	23,585	5.4	23,363	4.9	24,428	4.9	94,718	5.1
Black	10,070	8.2	10,379	8.4	10,190	7.6	10,230	7.5	40,869	7.9
Other	82	3.8	69	3.2	86	2.6	103	2.9	340	3.0
Unknown	6	0.0	2	0.0	21	0.0	20	0.0	49	0.0
All Races	33,500	6.1	34,035	6.1	33,660	5.6	34,781	5.5	135,976	5.8

Footnote: Rates per 1,000. Age Adjustment Uses 1940 Standard Population. Rates calculated with small numbers are unreliable and should be used cautiously.



- Step Eight**
- Choose output preference (default: Frequencies).
- Frequencies
 - Frequencies and Crude Rates
 - Frequencies and Age Adjusted Rates: 1940 Population
 - Frequencies and Age Adjusted Rates: 1970 Population
 - Frequencies and Age Adjusted Rates: 2000 Population
 - Frequencies and Percents by column
 - Frequencies and Percents by row
- Step Nine**
- Choose confidence interval (default: No Confidence Intervals).
- No Confidence Intervals
 - 95% Confidence Intervals
 - 99% Confidence Intervals
- !** In order to view confidence intervals, frequencies and rates must be selected in Step 8.
- Generate Table Reset All



Management changes II

- More senior leadership interest and oversight of the surveillance process – more management information
- More willingness to promote legislation to ease data access, e.g. LOINC, SNOMED
- More communication with providers, new partners
- More skill in project management

Outcomes?

- Better completeness? Some evidence, especially with ELR
- Better timeliness? Some evidence
- Better data quality? Worse, at first!
- More cases and outbreaks prevented?
- Excitement? Yes!

The End

The « 1,2,3 » steps for getting NBS data into NETSS format (simplified version)

1. Run a **pre-prepared NBS report** which extracts in CSV format (an ASCII variant comma delimited format file) all the records entered to date in the NBS. Only fields corresponding to legacy NETSS fields are extracted!
2. Open that CSV file in **Excel** and run a **macro** which substitutes the proper legacy NETSS variable names for those used by the NBS, then saves the data in DBF format.
3. Run a **DOS batch file** which in turn executes a cascade several **Foxbase PRGs** and **EpiInfo PGMs** which transform that DBF file data into a NETSS compatible Epi6 REC file, which which is then finally merged with legacy NETSS REC file data accessible by DHEC's DCIS.
4. **Red tools and steps** => an odd Rube Goldberg solution (runs daily in 90 seconds) using quaint old-time tools but again, hardware, software & development costs = **\$0.00**.

So much for the NBS hardware. Now Here is a look at the **NBS ODR (operational data store) table structure**. 120+ tables, without counting the « system reference tables », the tables in the datamart, the tables in the RDB (reporting data base). If you were not familiar with the whys and hows of complex relational data bases are all about, you will be now for sure!

