

Global Infectious Diseases and Epidemiology Network (GIDEON)

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Edberg, S. C. (2005). Global infectious diseases and epidemiology network (GIDEON): A world wide web-based program for diagnosis and informatics in infectious diseases. *Clinical Infectious Diseases : An Official Publication of the Infectious Diseases Society of America*, 40(1), 123-126.

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Introduction

What: Global Infectious Diseases and Epidemiology Network (GIDEON) is a database designed to support decision making in geographic medicine. Users can also elect to use GIDEON via a CD-ROM or web-database. This presentation focuses on the user interface of the web database.

Who: GIDEON is the product of collaboration between specialists in infectious diseases, epidemiology, microbiology, biostatistics and computer sciences at university-based medical schools in the United States and Israel.

How: GIDEON's four interactive models generate a differential diagnosis based on patient signs, symptoms, exposure history, and country of disease acquisition. GIDEON's data is updated every week.

Source: www.gideononline.com

GIDEON Background: Users

The Need

There are new disease outbreaks, epidemics and unknown pathogens discovered each day — over 2,000 named bacteria, viruses, fungi, and parasites are known to cause human disease. There is a huge need for timely and comprehensive infections disease data.

Users

GIDEON is used by emergency room physicians, infectious disease specialists, hospitals, medical schools, public health departments and the military. It is an ideal teaching tool for health care students, residents and fellows. The web application allows simultaneous use by the ID office, emergency room, travel clinic, pharmacy, microbiology laboratory and student teaching areas.

Source: www.gideononline.com

GIDEON Modules

Diagnosis Module

Epidemiology Module

Therapy Module

Microbiology Module

Diagnosis Module

- Designed to create a ranked differential diagnosis based on signs, symptoms, laboratory tests, incubation period, nature of exposure, and country of disease origin
- The differential diagnosis list is generated by a Bayesian formula which compares the product of disease incidence and the symptom incidence. A symptom incidence could be all compatible infectious diseases.

Differential Diagnosis

Example: Statistical likelihood of having Chikungunya

$$P - (C/S) = \frac{P - S/C \times P - C}{P - S/C \times P - C + P - S/D2 \times P - D2 + P - S/D3 \times P - D3 \dots P - S/Dn \times P - Dn}$$

C = Chikungunya, P = probability or incidence, S = observed symptoms

$P - (C/S)$ = probability of Chikungunya, given these symptoms

D2, D3, Dn = other diseases compatible with this clinical scenario

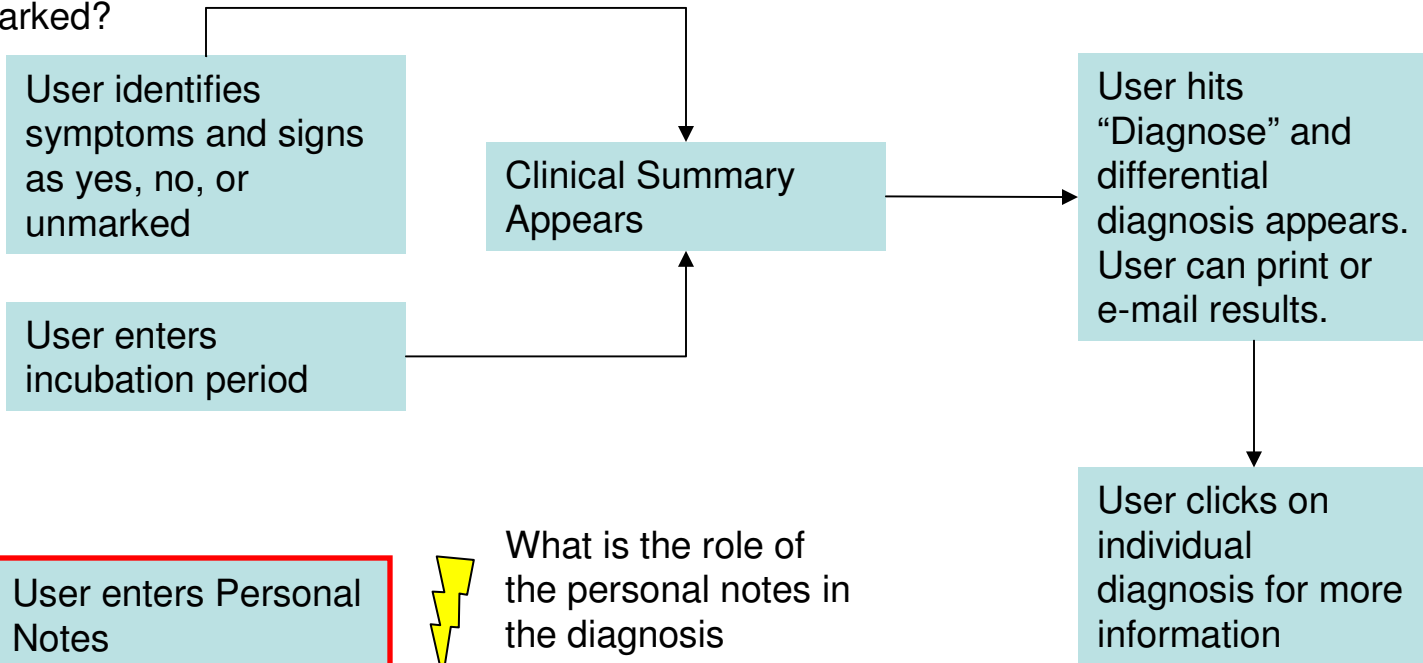


A study of 500 cases conducted by the author found that the correct diagnosis was listed in the differential list 94.7 percent of the time and was ranked first 75 percent of the time. A second study found that the correct diagnosis was listed only 69 percent of the time and was ranked first 60 percent of the time. The author suggests that inclusion on the list may be more important than ranking.

Diagnosis Module



What is the practical difference between no and unmarked?



User enters Personal Notes



What is the role of the personal notes in the diagnosis process?




One nice feature is the "Why Not?" option.

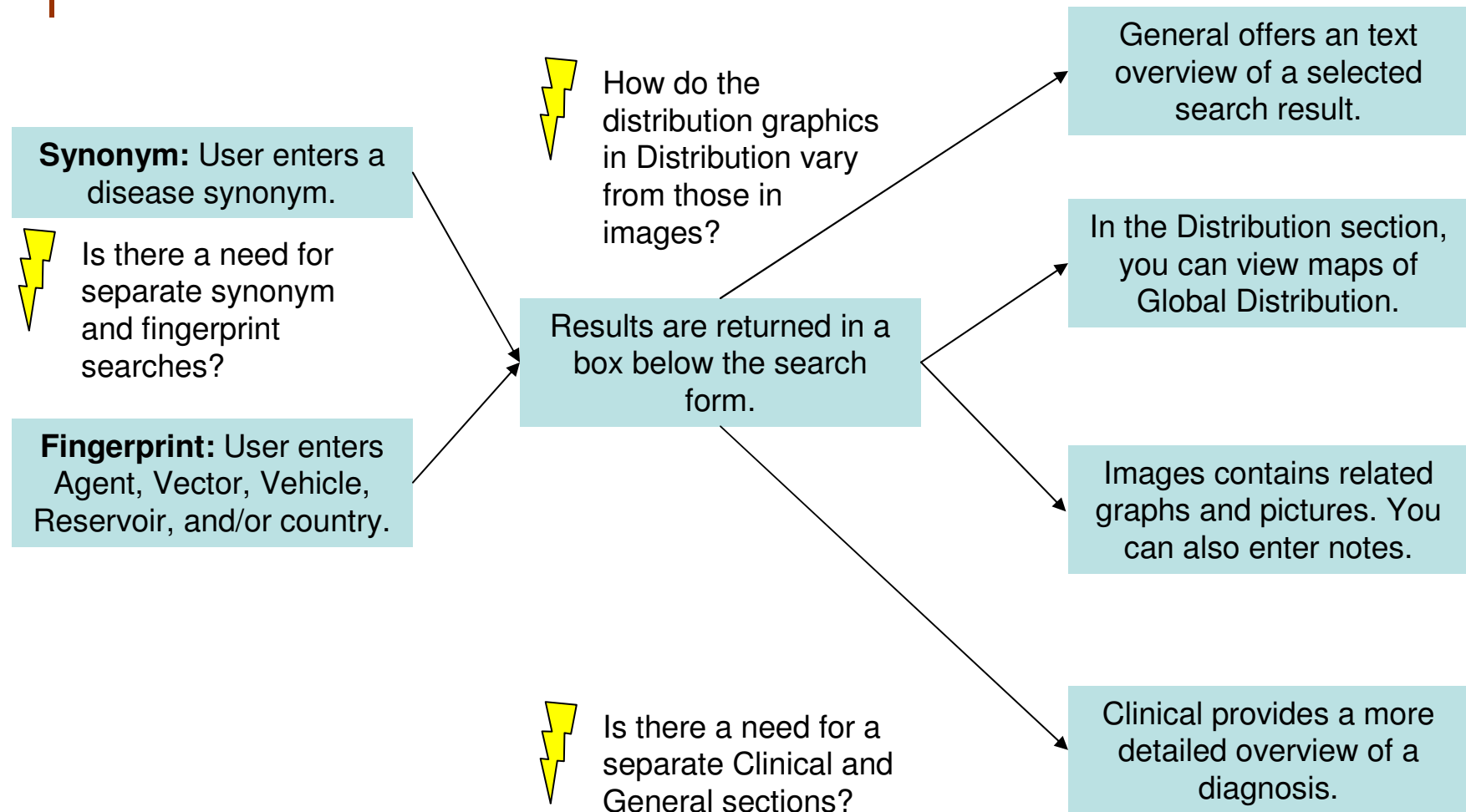
Other Diagnosis Features

- Data entry could be monitored at the server level for surveillance of disease like SARS “in theory” (p 6). It is unclear whether this is being done currently.
“If one or more users in China were to enter cases of fatal pneumonia, a ‘red-flag’ at any monitoring agency (i.e. the World Health Organization) could indicate the possible appearance of SARS – long before submission of specimens or reporting of the case to local authorities.”
- A “bioterrorism simulator” search generates the differential diagnosis for diseases associated with bioterrorism. “Worldwide” can be used to see all world diseases consistent with certain conditions.
- Users can add personal notes.

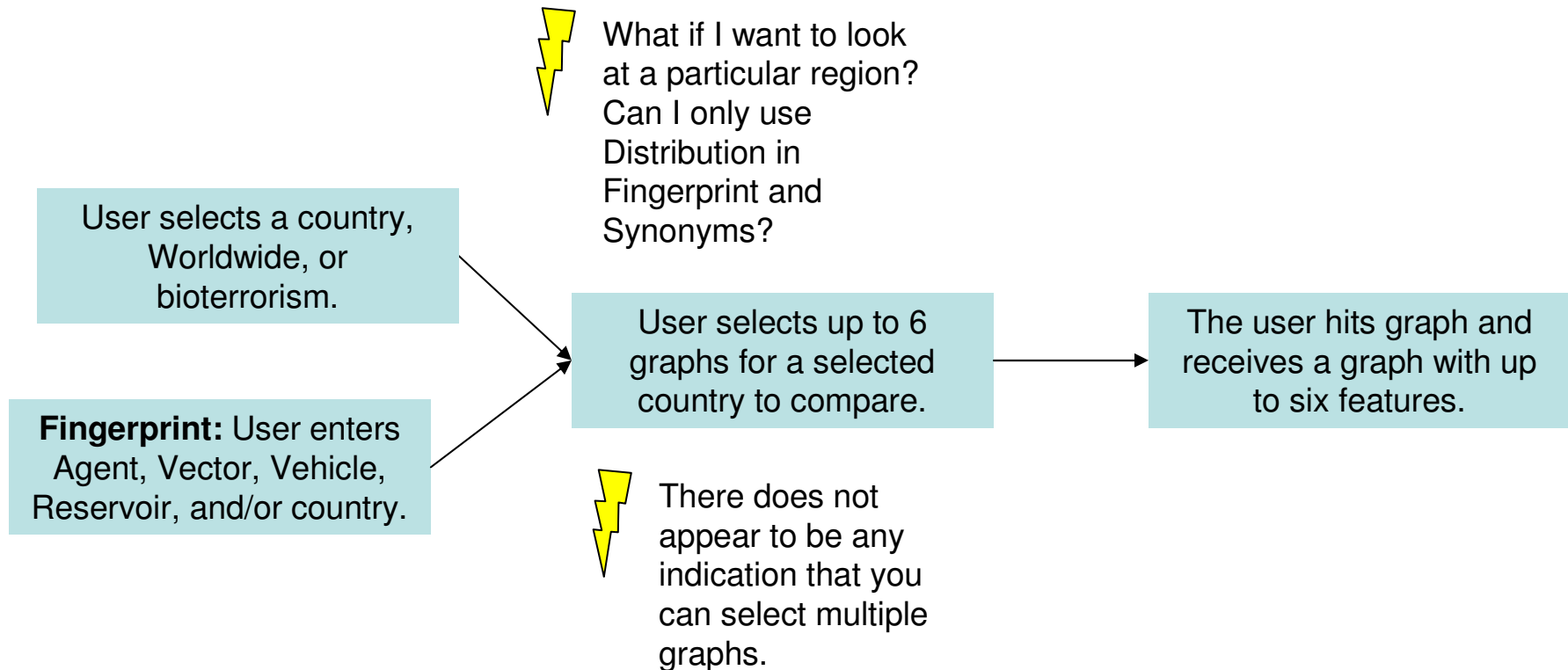
Epidemiology Module

- Users can access maps of the global distribution of diseases, read general information about diseases, view images of diseases, and read clinical descriptions of the diseases.
 - Users can search by fingerprint or synonym. They can also elect to browse by graph.
 - Users can add personal notes.
 - Contains country-specific information related to the status of diseases globally and within relevant countries
- 
- All data is from Health Ministry publications, peer-reviewed journals, standard textbooks, WHO and CDC websites and data from conferences.
 - User may access 30,000 graphs of disease incidence, rates, and other statistics

Epidemiology: Fingerprint and Synonym Searches



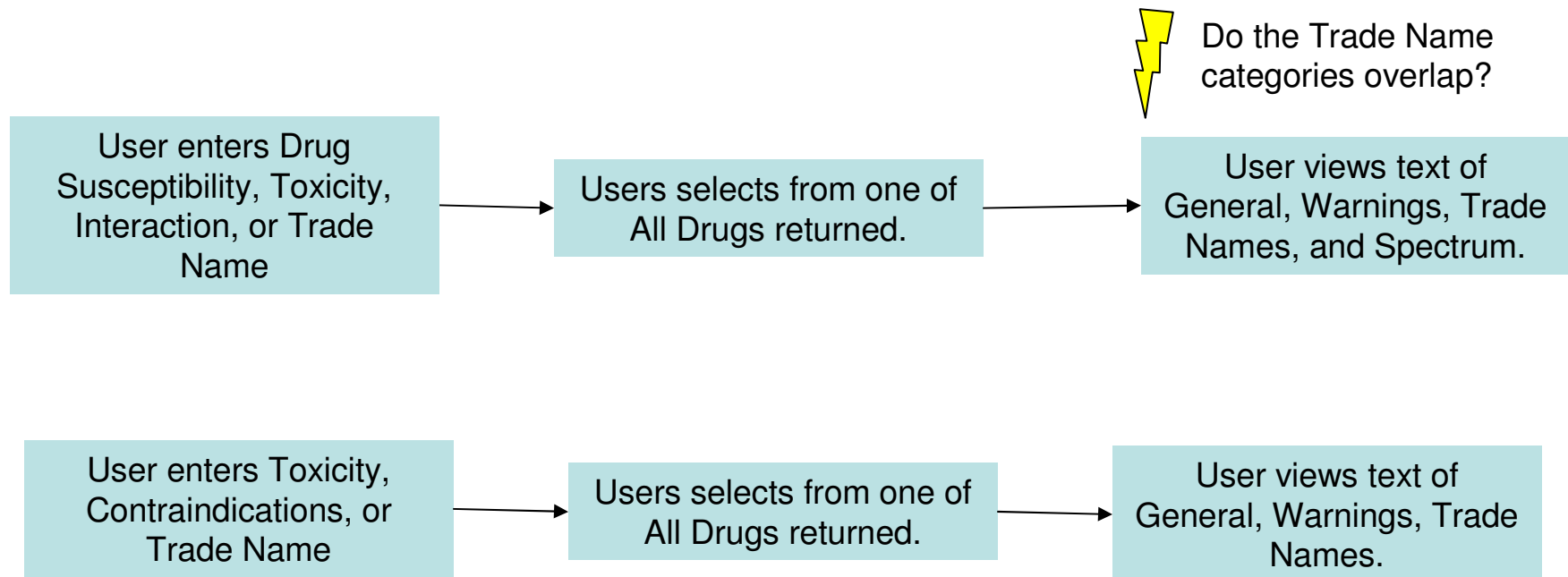
Epidemiology: Graph Searches



Therapy Module

- Synonym list contains 9,500 trade names. Users may also add notes.
- Follows the pharmacology and application of all drugs and diseases used in Infectious Diseases
 - Current version contains 264 generic drugs and 64 vaccines

Therapy Module



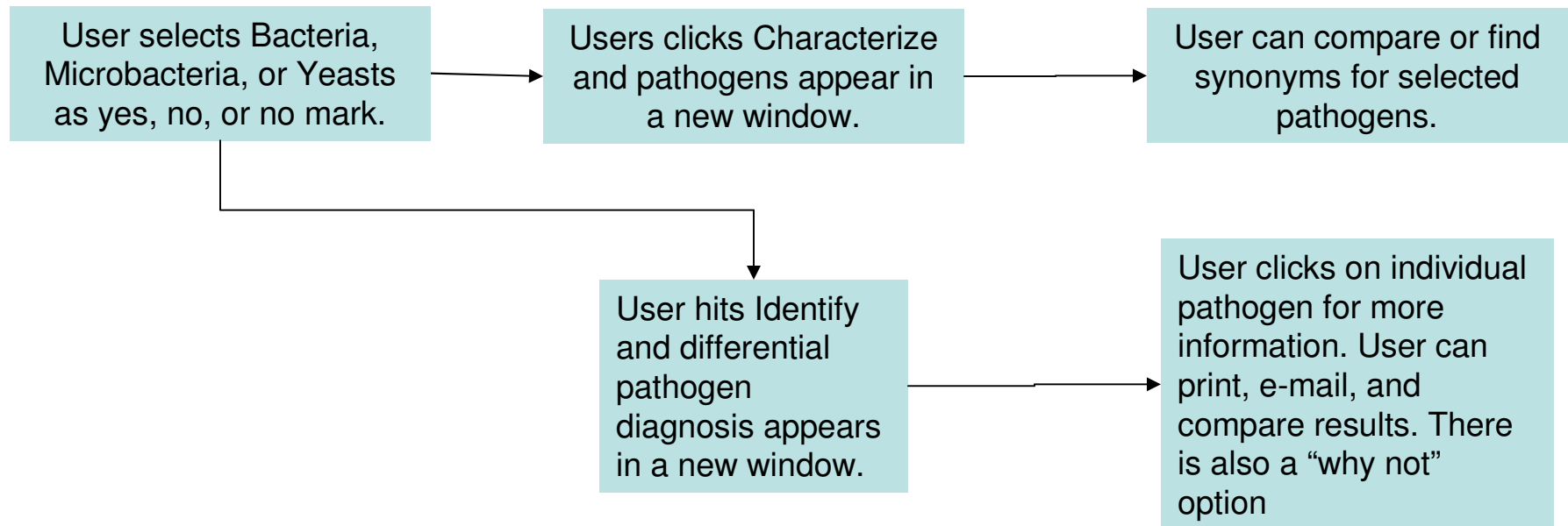
Microbiology Module

- Users can enter any combination of phenotypic tests, and get a ranked listing of compatible bacteria.
 - Current version incorporates over 1,300 taxa
- Follows the pharmacology and application of all drugs and diseases used in Infectious Diseases

Microbiology Module



What is the practical difference between Characterize and Identify?



GIDEON Weaknesses

- The data presentation lacks granularity — GIDEON treats individual countries as whole units. You cannot diagnose epidemics in specific regions (Example: malaria in Venezuela). However, this problem is in some ways corrected by the associated country-specific notes.
- Quality of Data is a problem. Disease reporting varies widely from country to country. GIDEON uses “true estimates” when possible. In addition, some countries do not report disease information at all such as cholera in Thailand.

Questions

- Is there a way GIDEON could visually let users know whether the data is high quality?
- Does GIDEON need 4 different modules?
- Describe the database you would develop if you had the same data as the GIDEON developers?