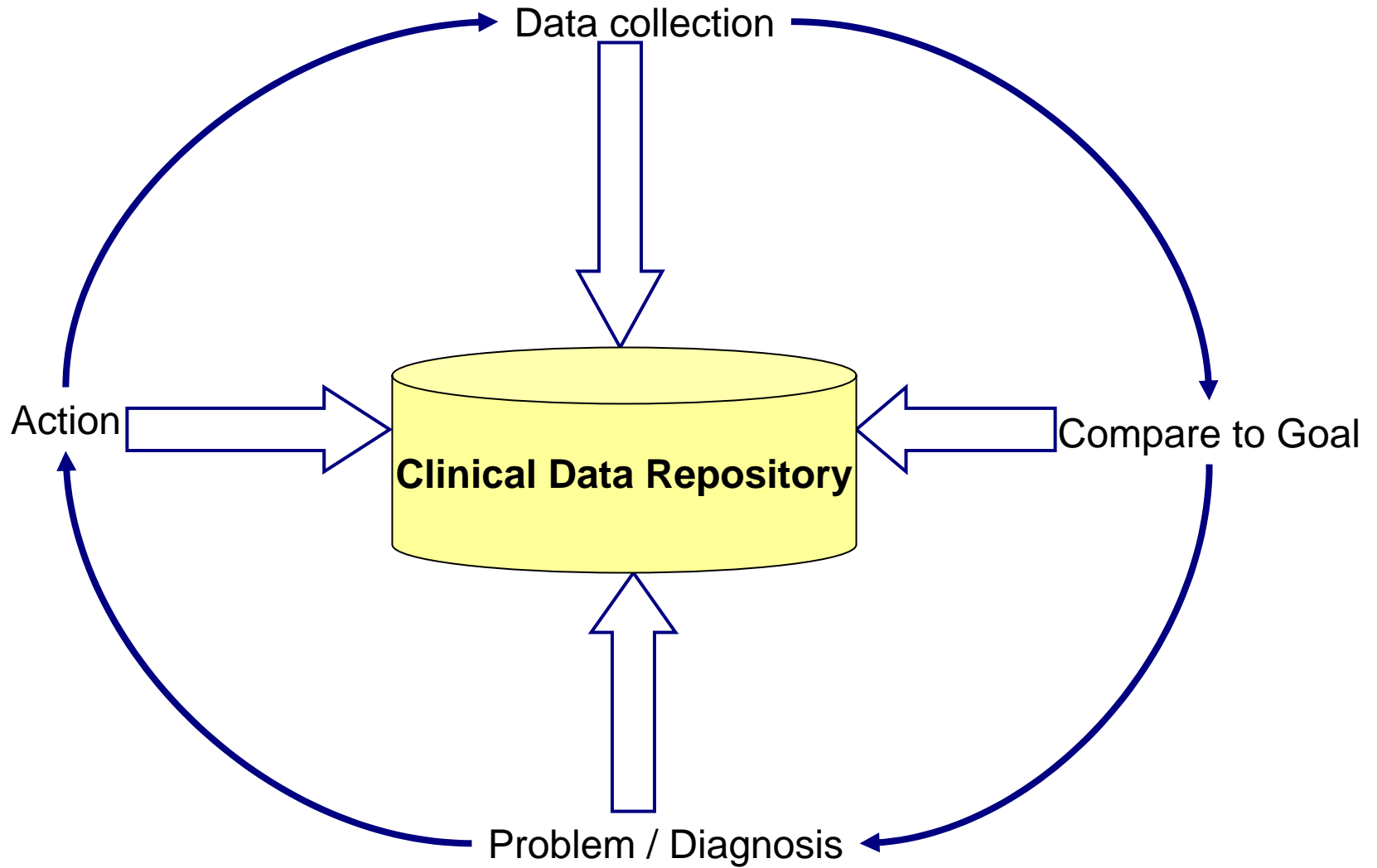


Implementation of an Electronic Medical Record

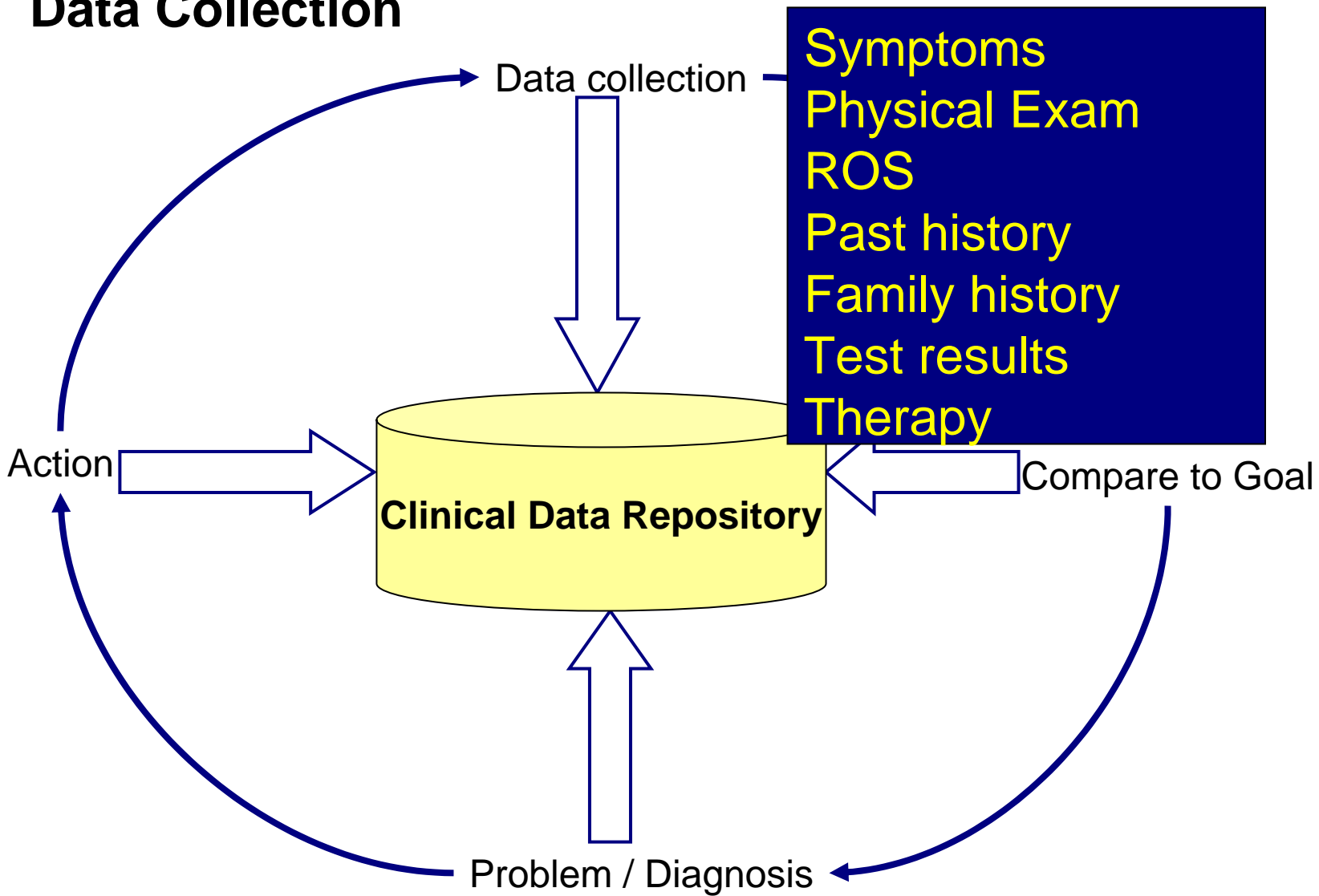
Theoretical Model meets the Real
World

Alan S. Tonnesen, MD

Basic Model



Data Collection



Data Collection

- Providing a real-time data entry tool has been a challenge. Dictated notes depend on a transcription company - problems.
- Structured documentation is very intrusive.
- Typing is difficult for some.
- Handwriting recognition programs are poor
- Speech recognition programs are not yet acceptable.

Symptoms
Physical Exam
ROS
Past history
Family history
Test results
Therapy

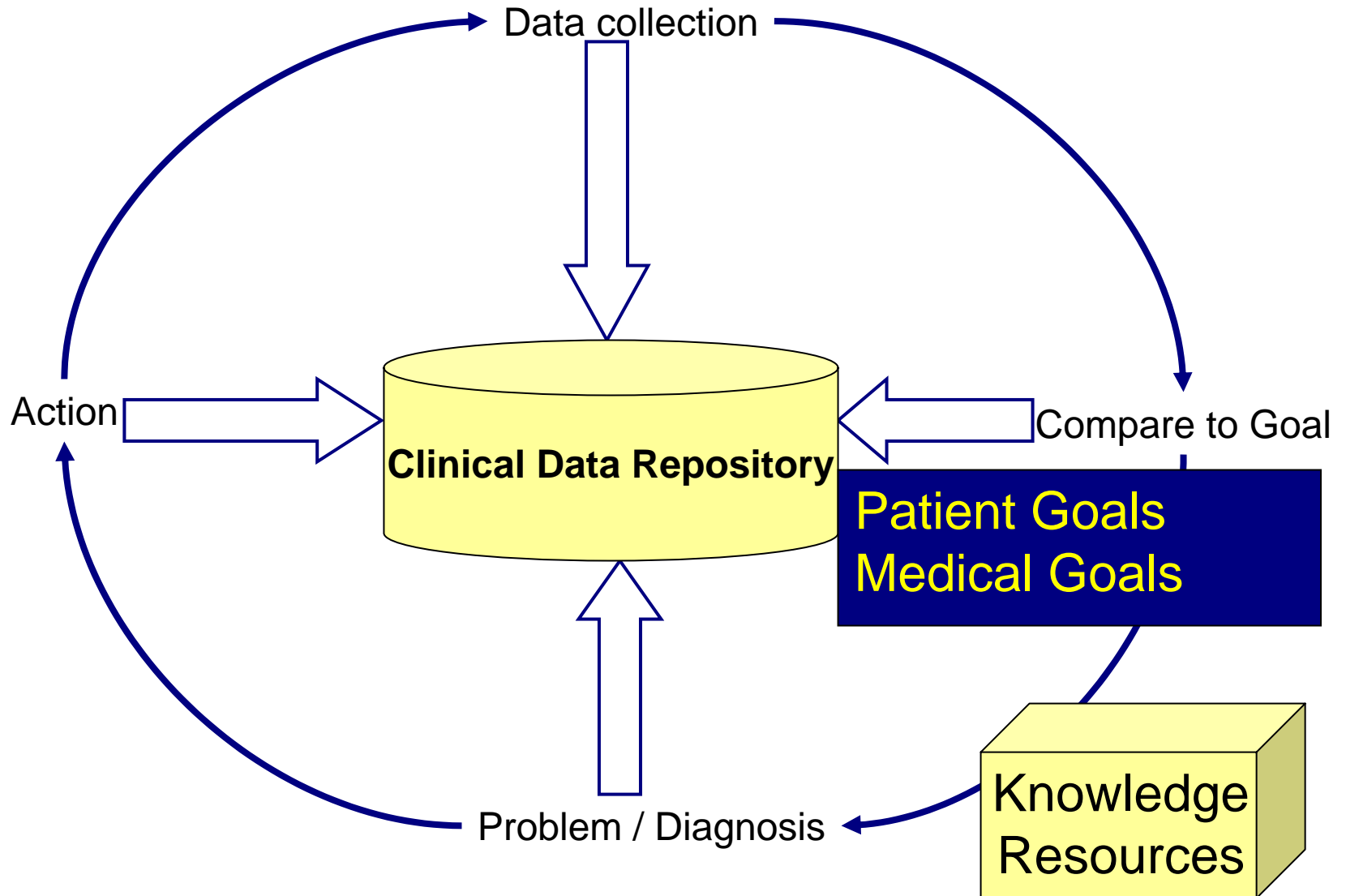
Data collection

Compare to Goal

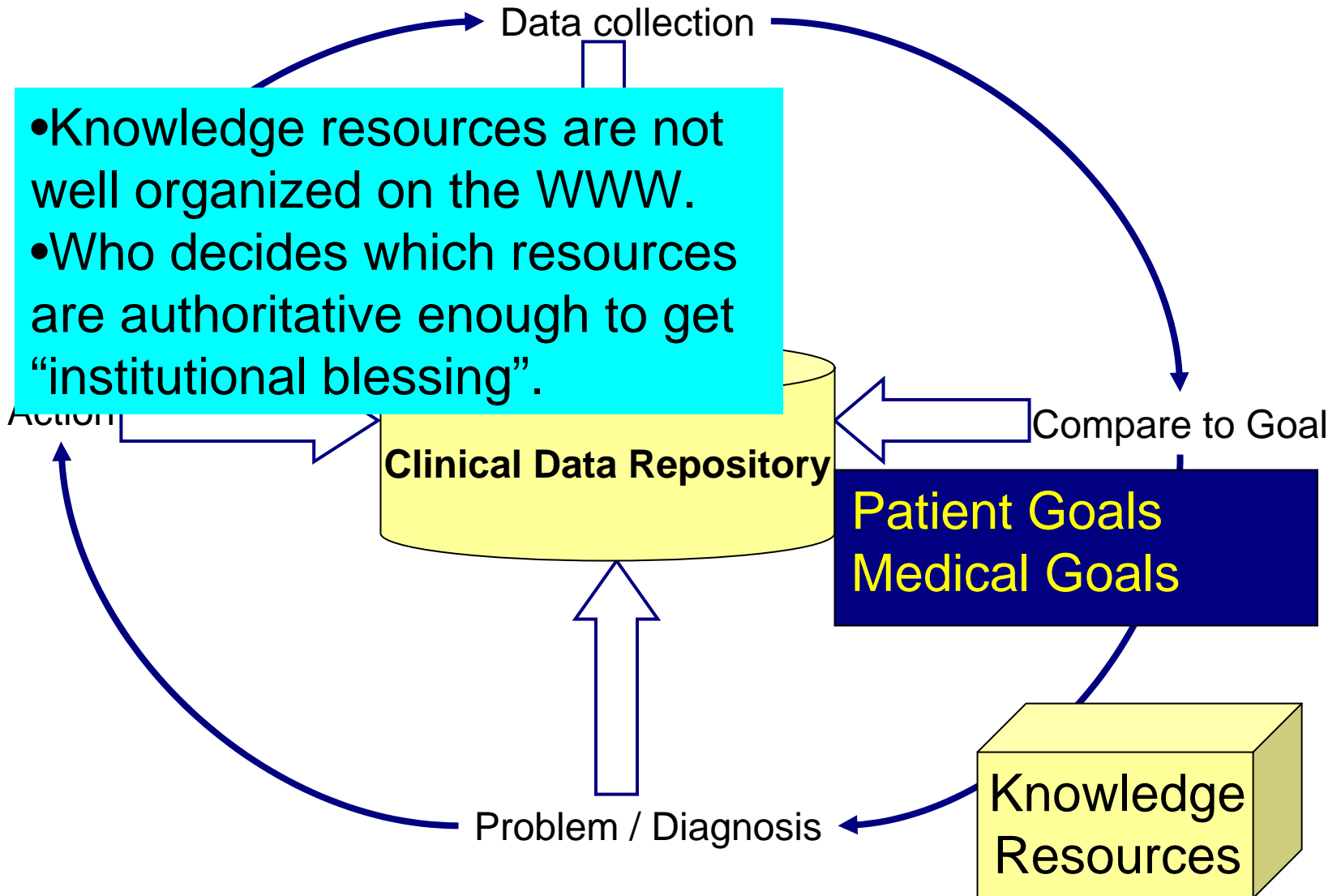
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Goals



Goals



Patient / Medical Goals: Outcomes

- Patient Goals

- longevity
- absence of pain
- functionality

- Medical Goals

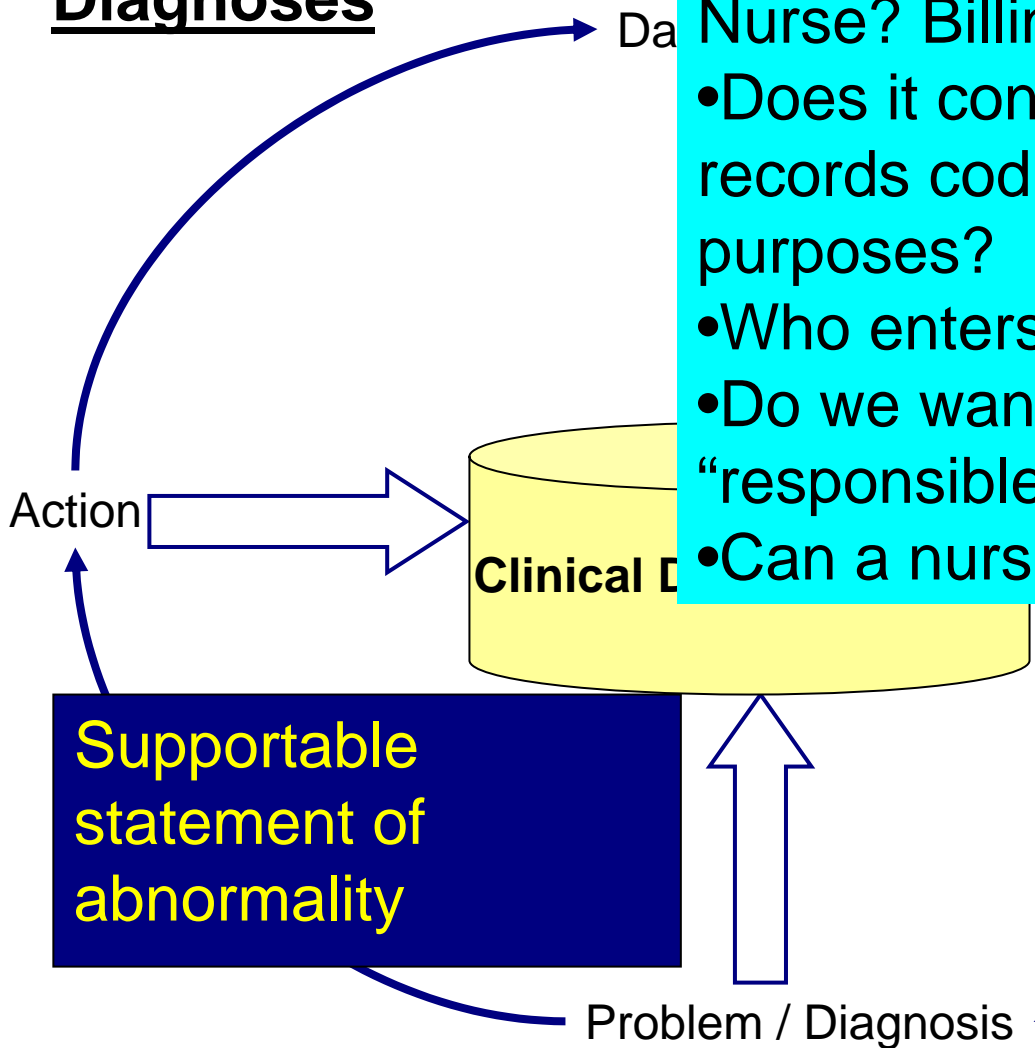
- prevent disease
- cure disease
- control disease
- reduce symptoms

Problem List

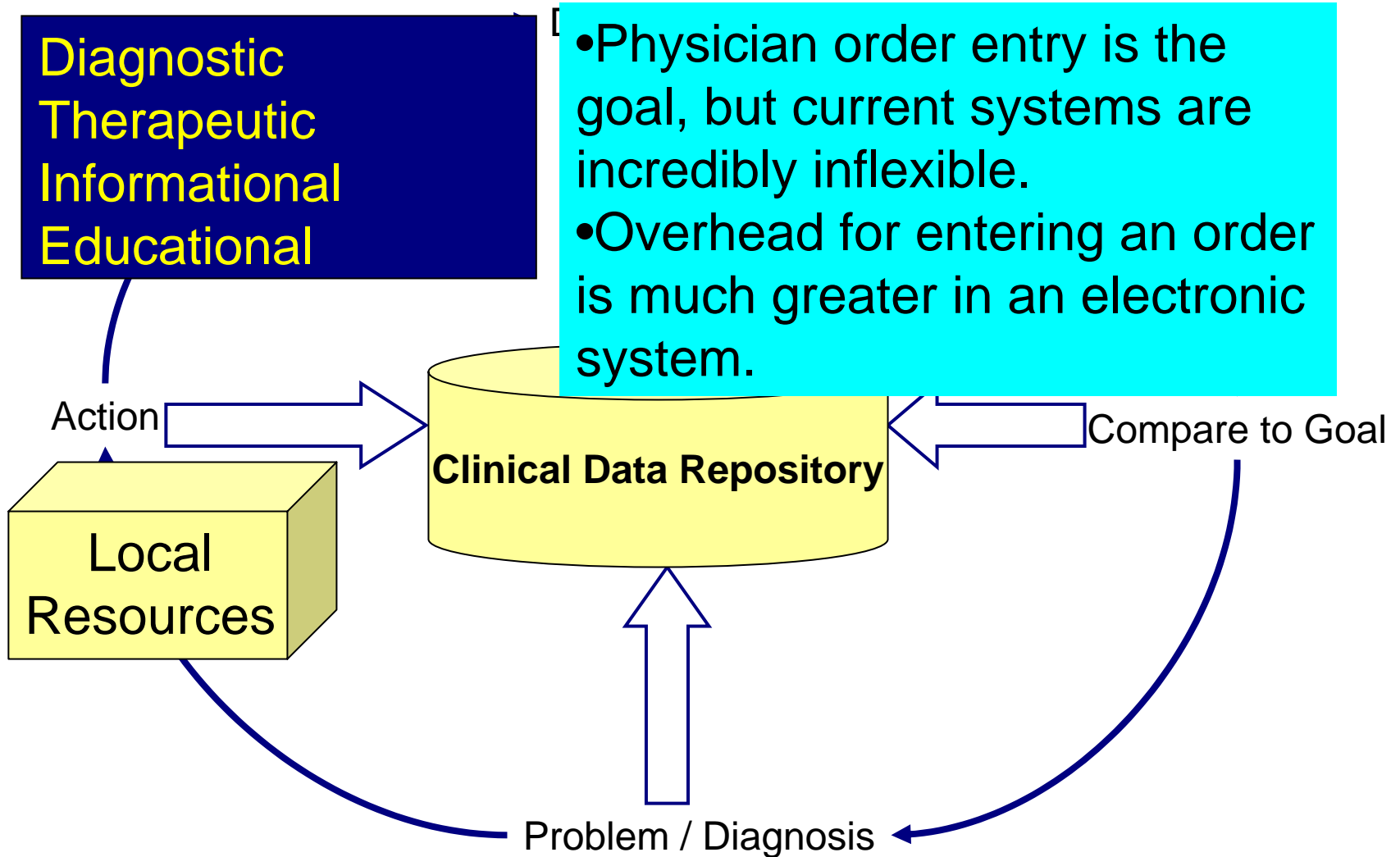
- Supportable statement of abnormality
 - Requires current or periodic diagnostic or therapeutic action
 - Stated at supportable level of understanding

Problems & Diagnoses

- Whose problem is it? Doctor?, Nurse? Billing office?
- Does it conflict with medical records coding for billing purposes?
- Who enters it?
- Do we want to assign a “responsible provider”?
- Can a nurse be a “provider”?



Actions (Plans / Orders)



Test Results

- Laboratory
- Radiology
- Cardiology
- Neurophysiology

Test Results

- Laboratory
 - Radiology
 - Cardiology
 - Neurophysiology
- How do we convince external laboratories to send us their data electronically?
 - How do we convert the current paper-based system of reporting of test interpretations to electronic format?
 - Who “owns” the format of a specific report?

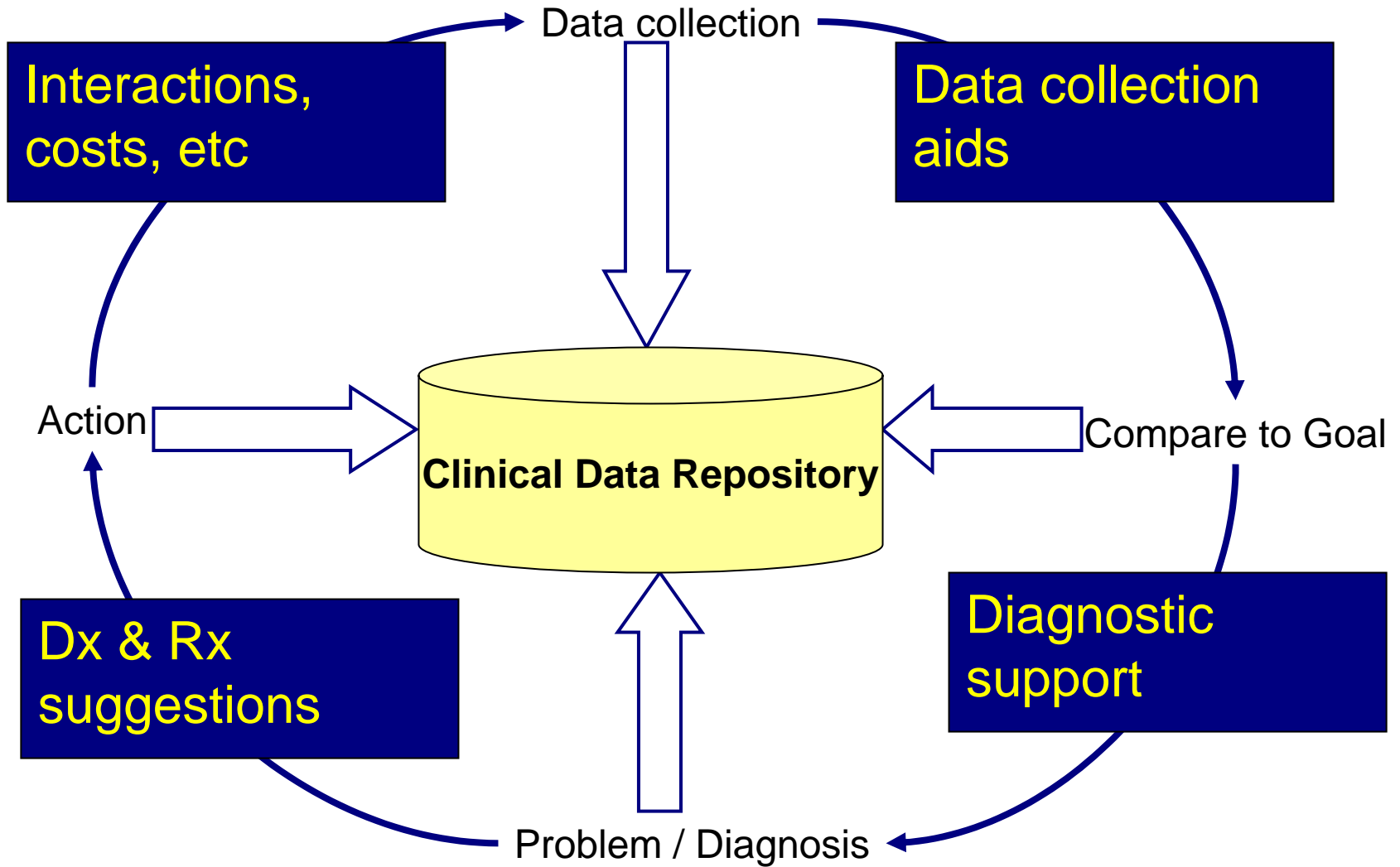
Therapeutic Categories

- **Diet**
- **Drugs**
- **Exercise**
- **Physical Rx**
- **Psychotherapy**
- **Radiation**
- **Hygiene**
- **Immune**
- **Thermal**
- **Surgery**
- **Transplantation**
- **Biomedical device**

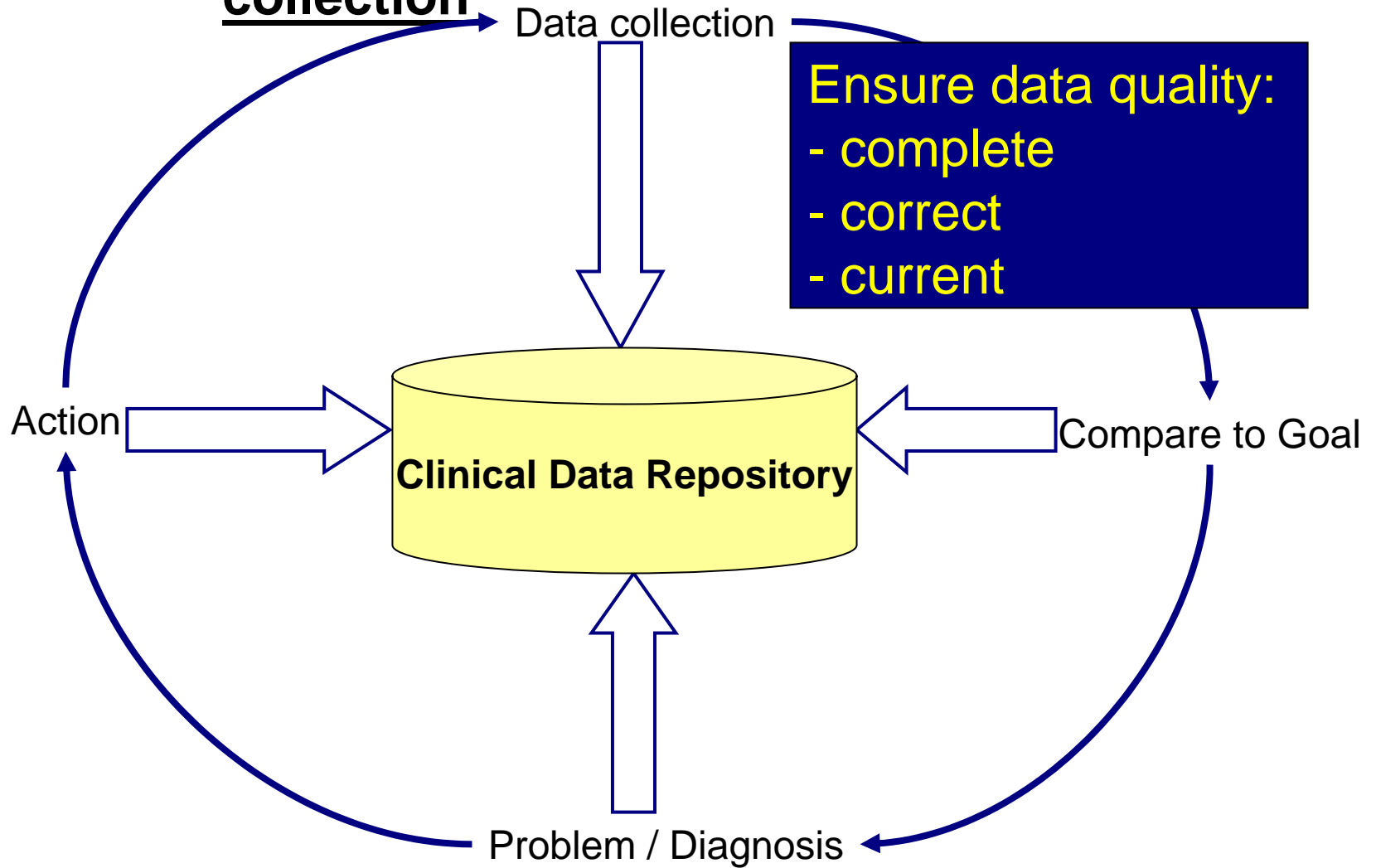
History & Physical

- **Text blob**
- **Discrete data**
 - symptoms
 - signs
 - family history
 - social history
 - review of systems

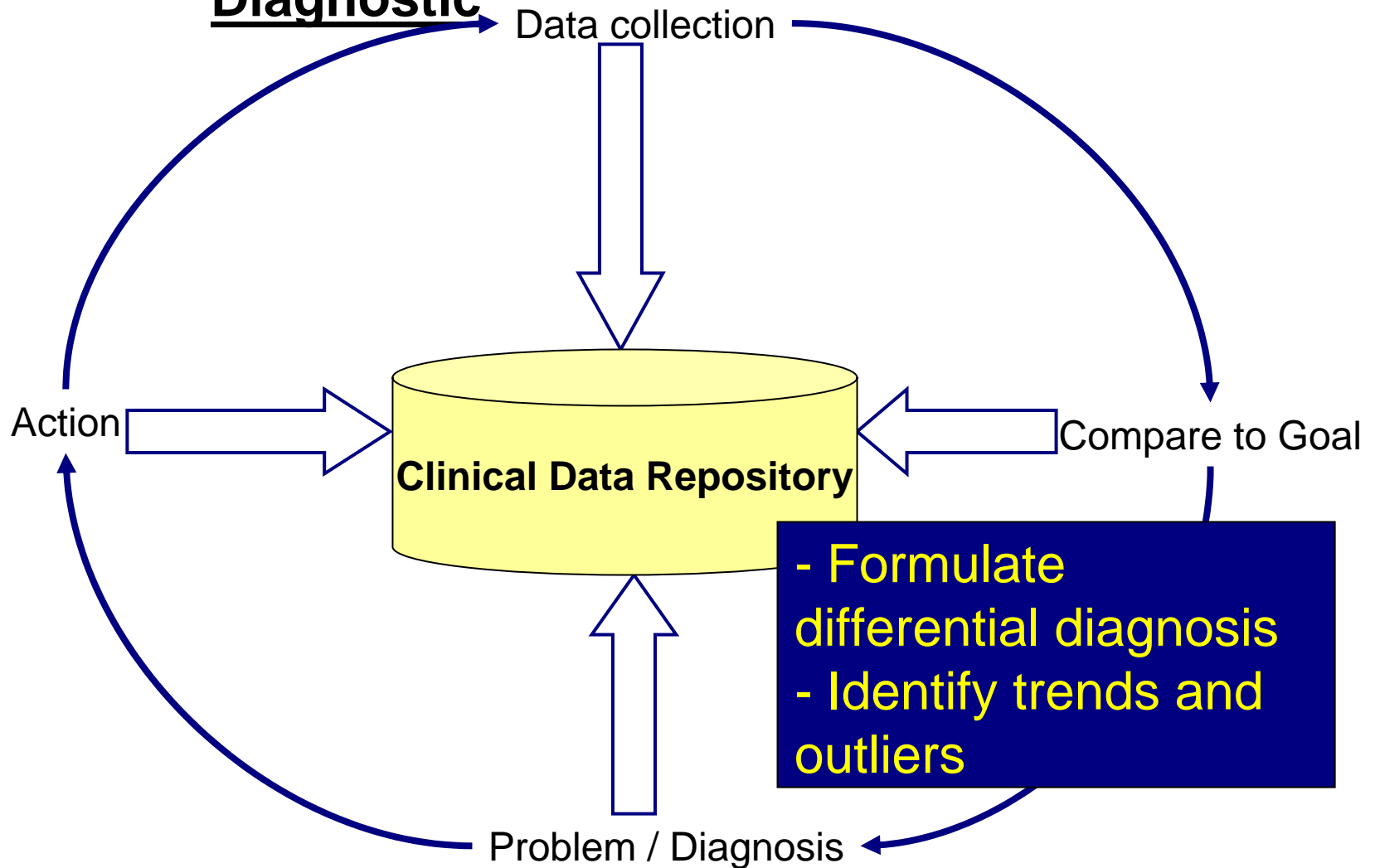
Decision Support



Decision Support: data collection

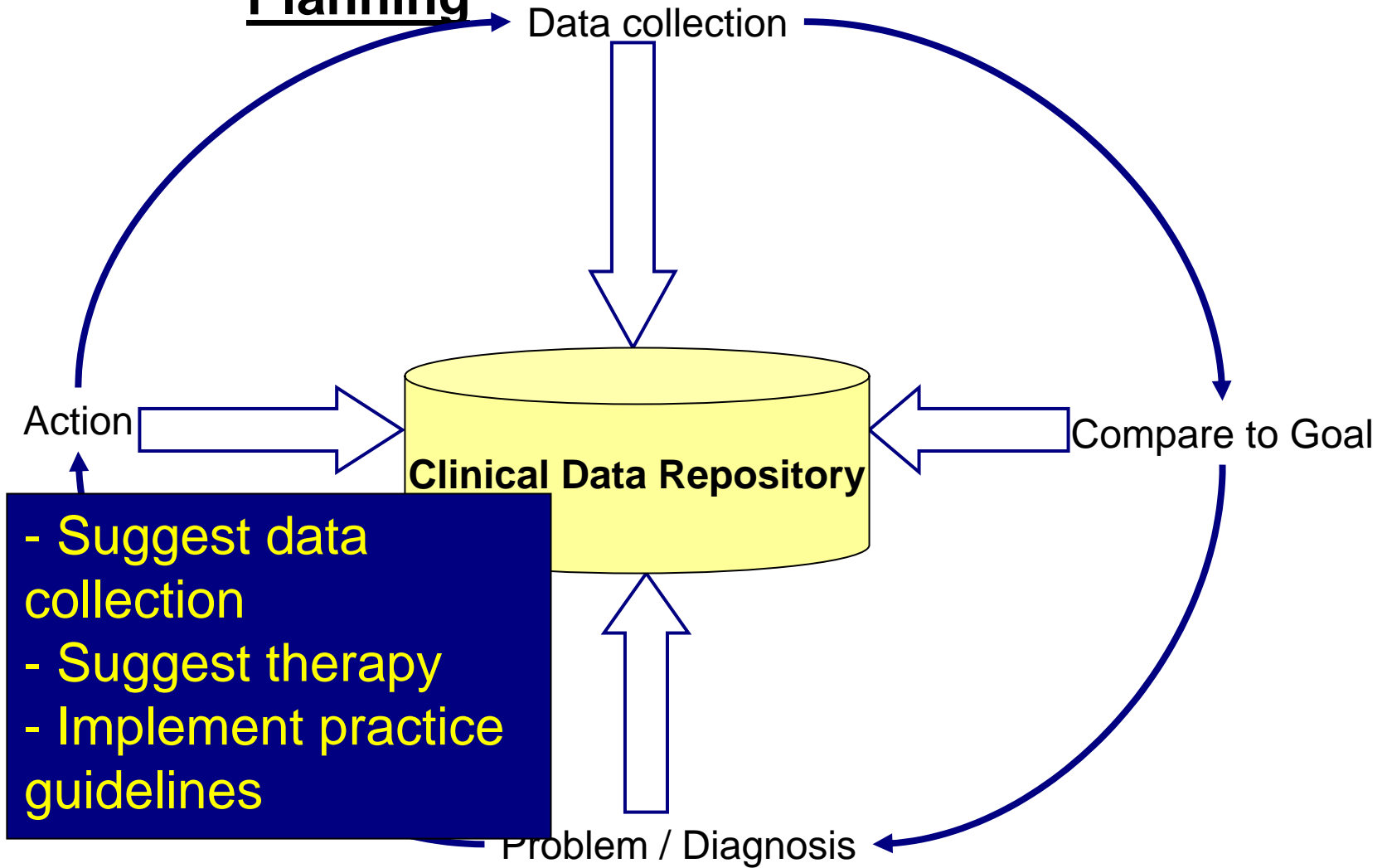


Decision Support: Diagnostic



Decision Support:

Planning

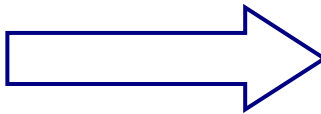


Decision Support:

Planning

- Decision support depends on data being available.
- You must deliver the message to the decision-maker, not a transcriptionist.
- The message needs to be highly important.
- The message needs to be timely.
- The message needs to be non-threatening and accompanied by a suggested “way-out”.

Action

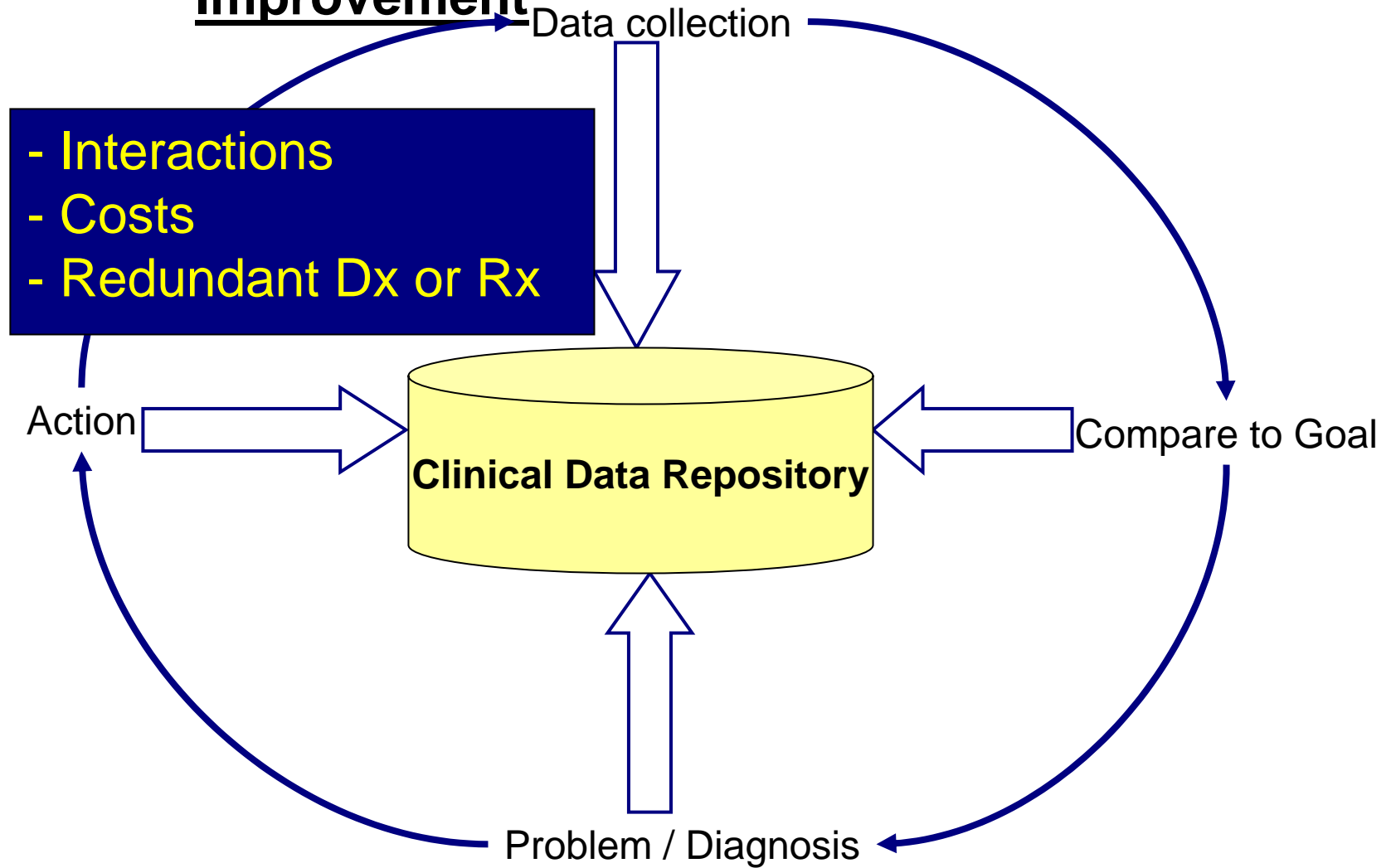


- Suggest data collection
- Suggest therapy
- Implement practice guidelines

Problem / Diagnosis

Move to Goal

Decision Support: Order Improvement

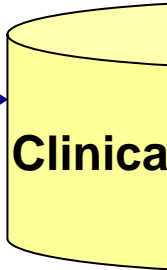


Decision Support: Order Improvement

- Interactions
- Costs
- Redundant Dx or Rx

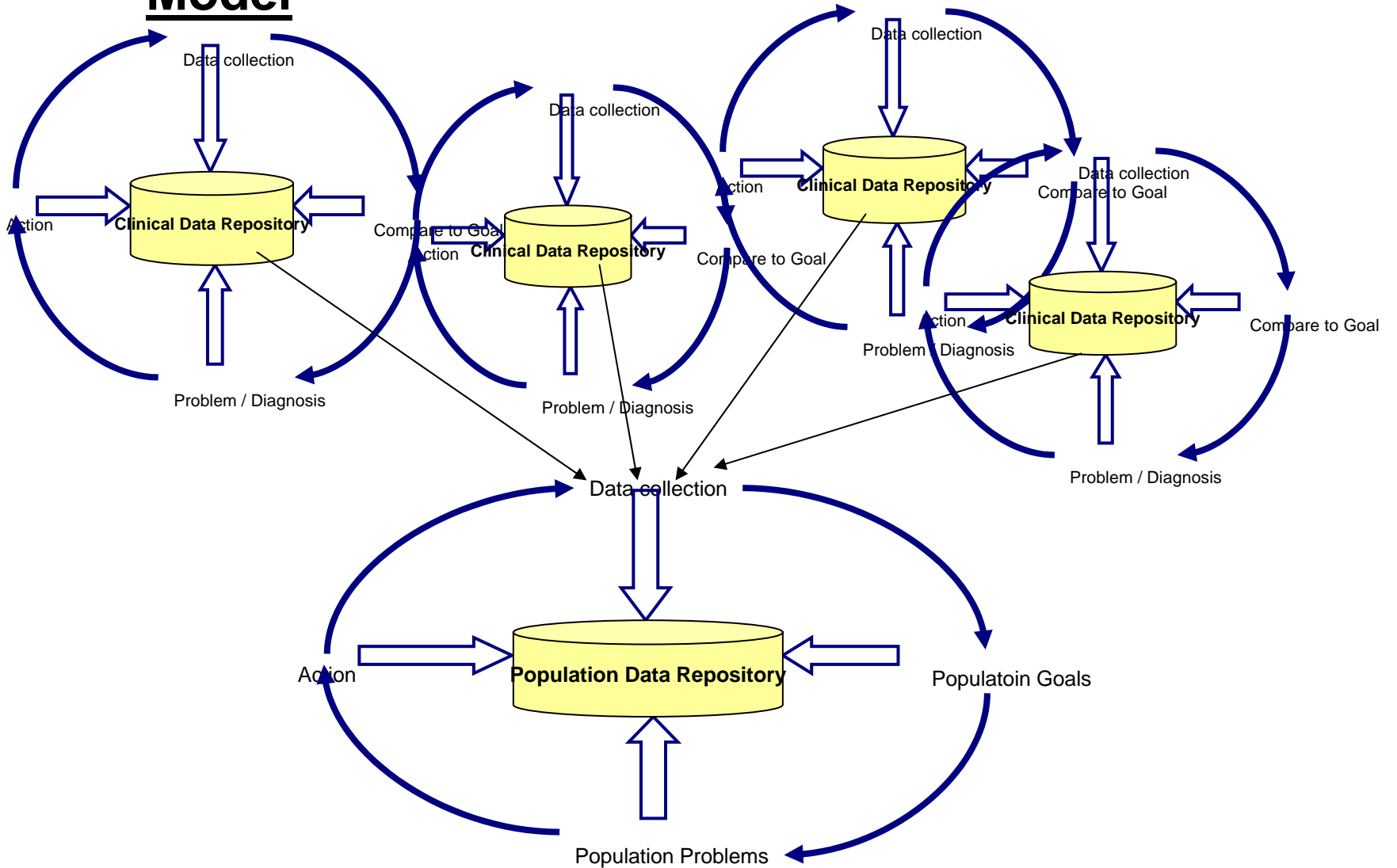
- Pharmacy decision support has great value.
- The pharmacy system is not interfaced with the EMR.
- The system will choose a pharmacy system based on many factors, only one of which is the EMR.
- If the new pharmacy system is not integrated, with the EMR, then we can not implement useful drug decision support.

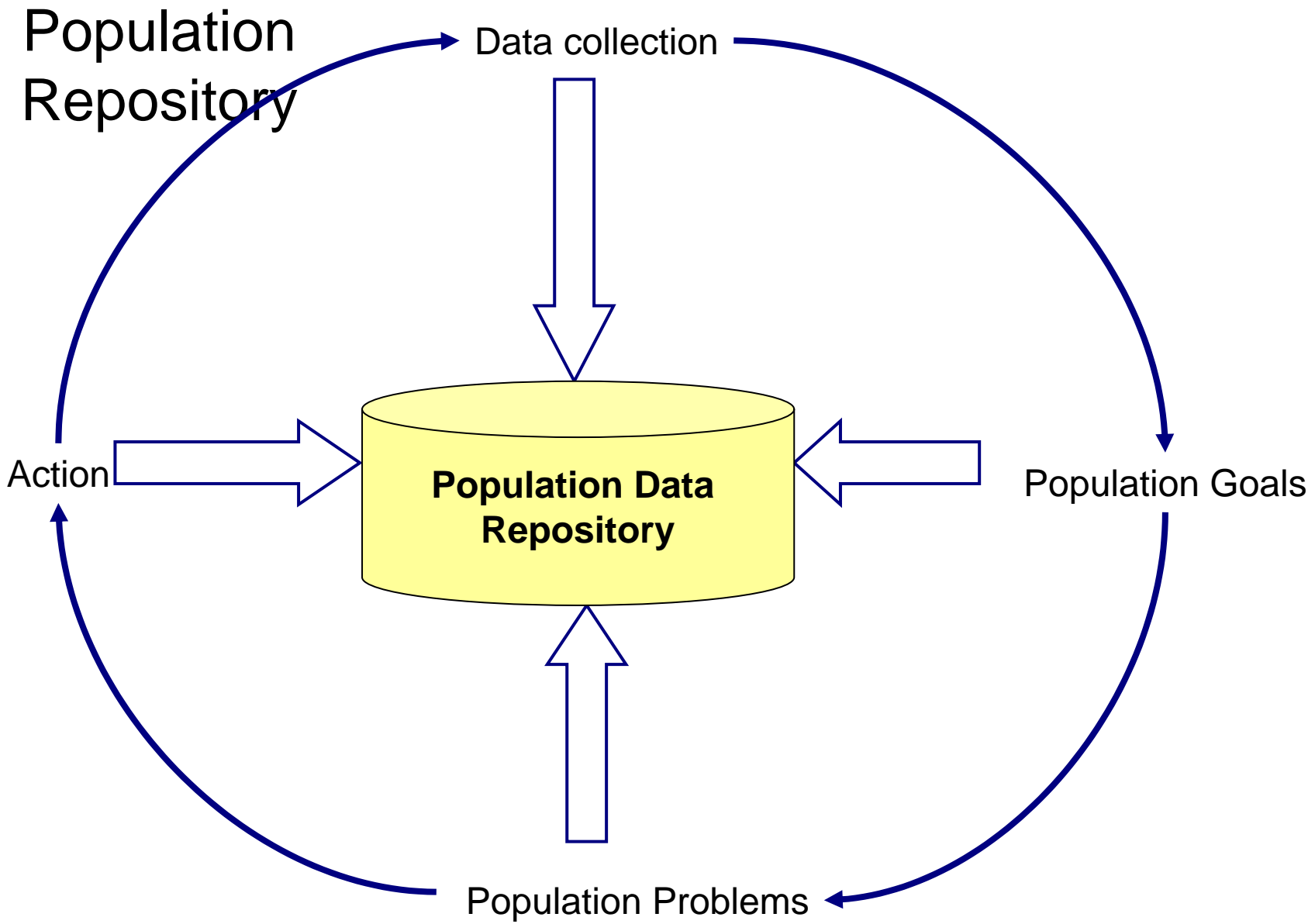
Action



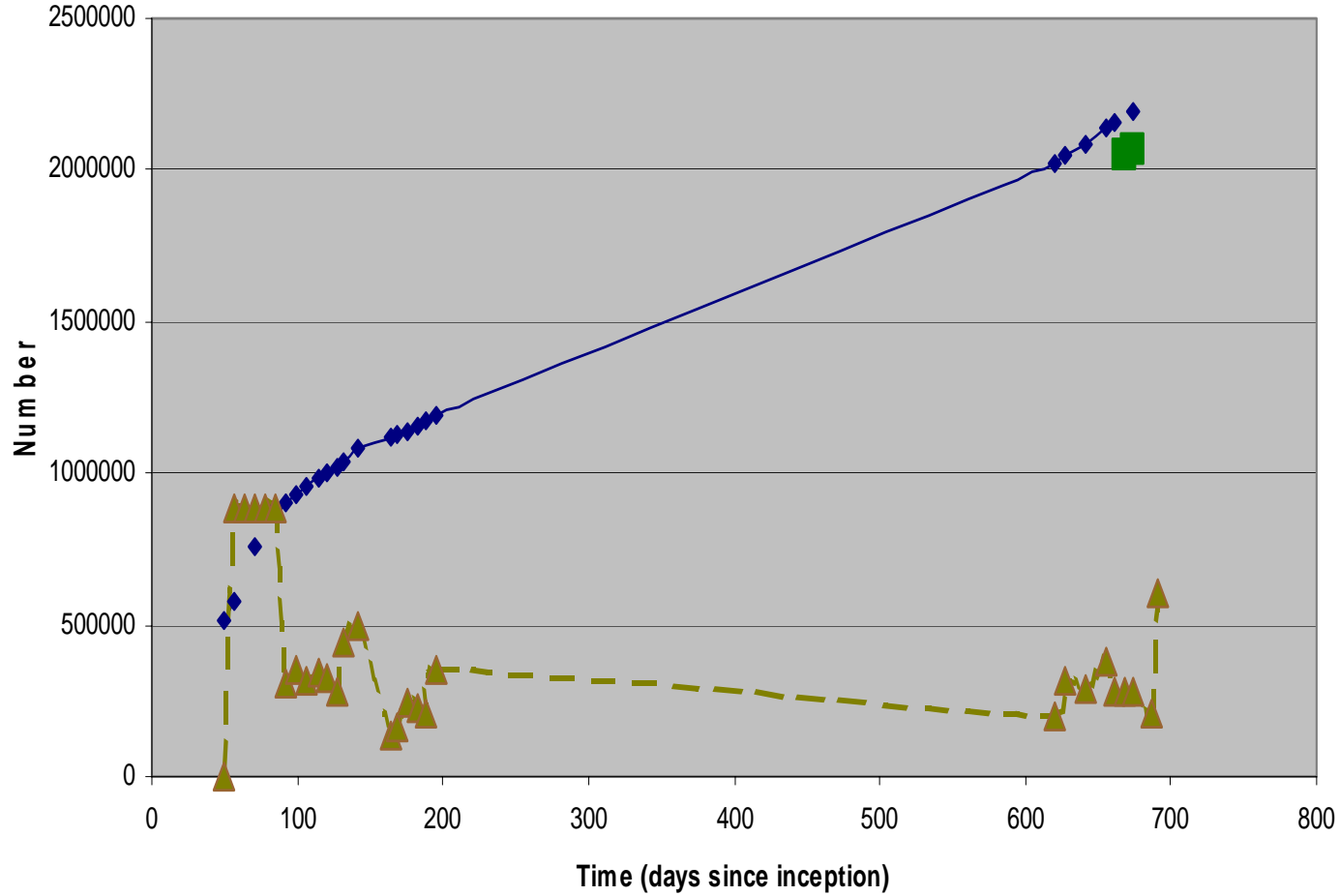
Problem / Diagnosis

Population Model



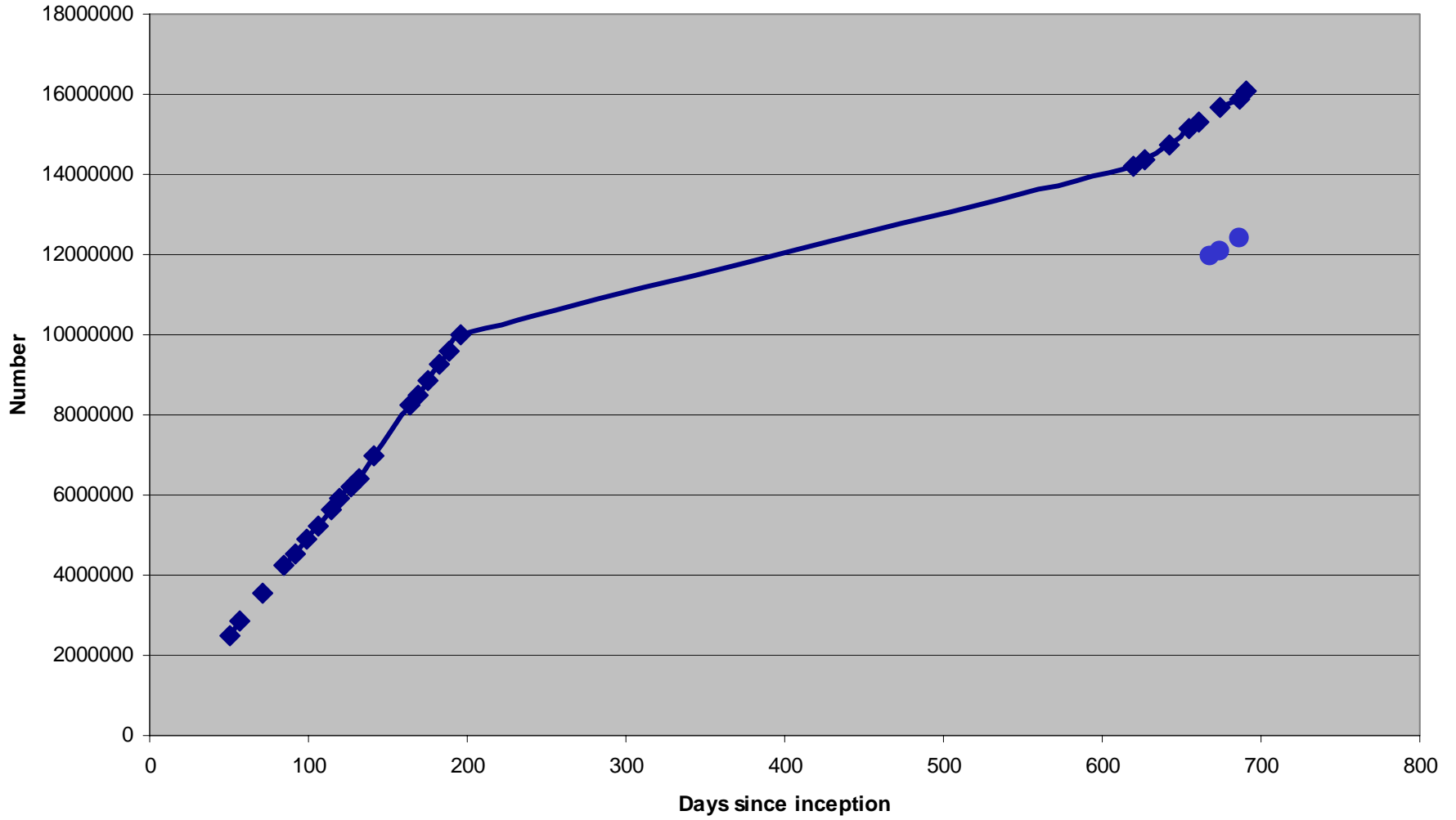


Persons in Database



—◆— Table Rows —■— Persons —▲— growth rate / day

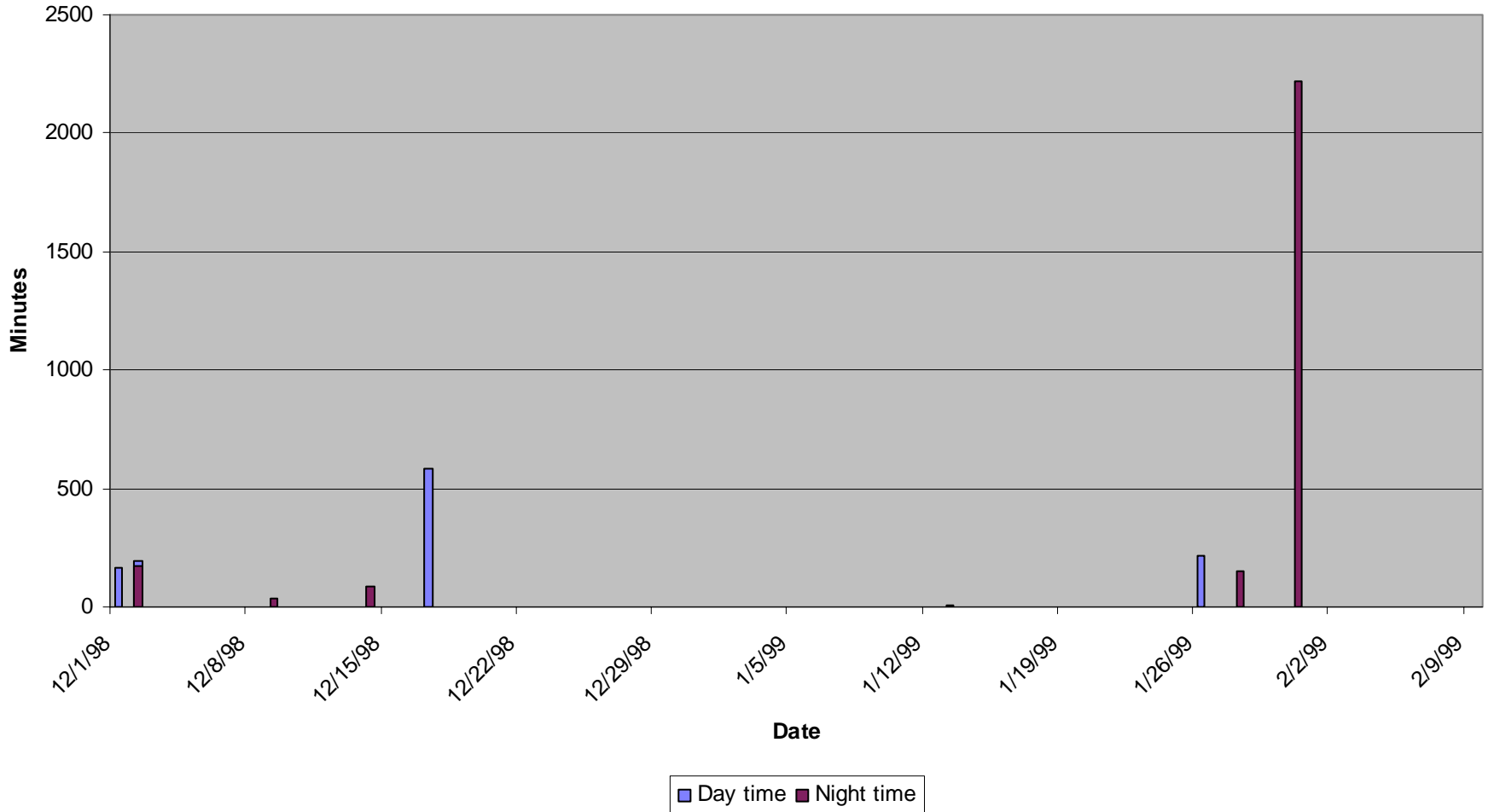
Results in Database



—◆— table rows ● — Unique results

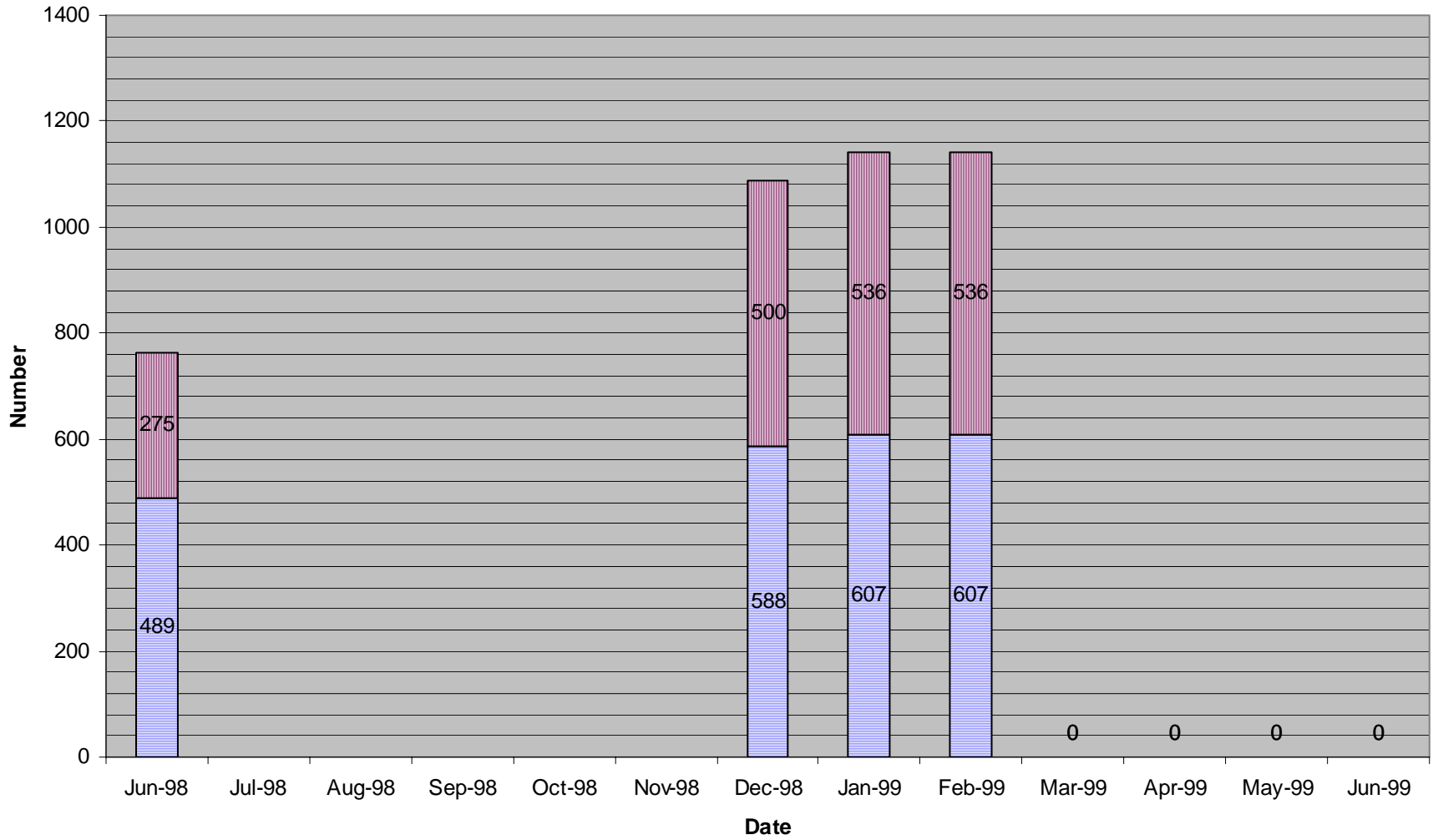
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Tonnesen

HIN Downtime
Record continuous up-time 12/16/98 - 1/17/99 = 37 Days
Restart the uptime clock 1/31/99 @ 13:00: 59 hours
Continuous up-time as of 2/9/99 = 9 days



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Number of Trainees by Date



Physicians Others

Thank you!