

Display board,  
unit demands & status

Bar code management,  
medication and lab orders

Clerk station,  
computerized order entry

Patient binders,  
records management

Alarms & monitors,  
patient vital signs



## Scoping Health Care Informatics

Integrating effective technology into the complex, high-risk environment of health care requires the consideration of fields as diverse as sociology and computer science.



# IPRO Action Plan

- Define medical informatics
- Gain an understanding of the medical informatics field by reading relevant journal articles
- Define direction: focus on issues with automation
- Secondary research on automation
- Hospital visit, field observations
- Draw connections between observations and research

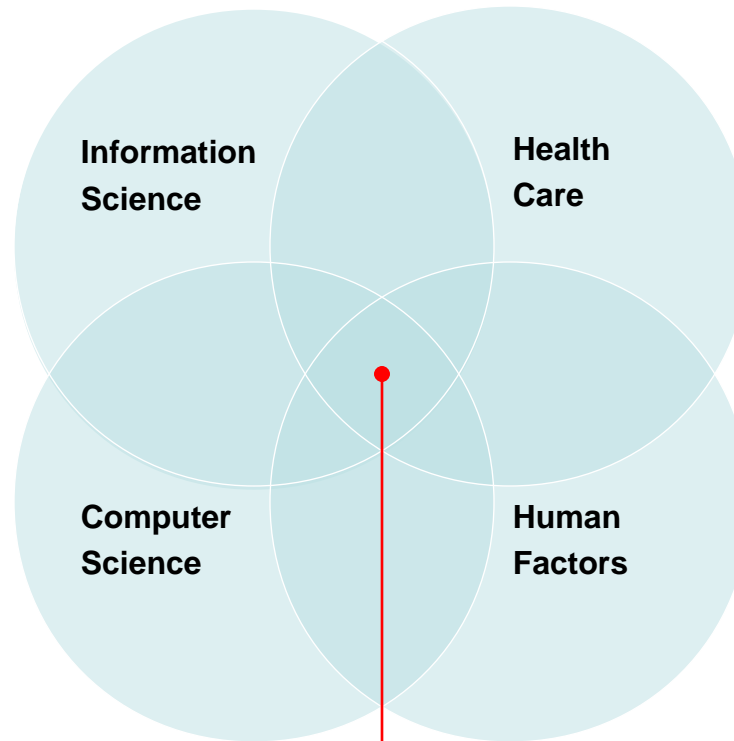


# Medical Informatics

## *Overlapping Domains of Knowledge*

**Information science** studies structures, use, and display of information, with the objective of promoting the communication of desired data, knowledge and meaning.

**Computer science**, the study of computational structures and processes.



**Health care** encompasses large scale organizations like hospitals as well as smaller, long-term care facilities like clinics and private practices.

Seeking to understand the limits and abilities of humans, **human factors** is the applied science of human behavior and physiology.

**Medical Informatics**



## Health Care

### *Cost, Quality & Complexity*

- The health care industry consumes 18% of the GDP every year. In the year 2000, costs associated with health care were estimated to be \$1.31 trillion in the United States.
- The challenge is to improve quality and minimize costs.
- Efficient communication is extremely important when many people of different disciplines are concentrated in one area, such as in a health care setting.



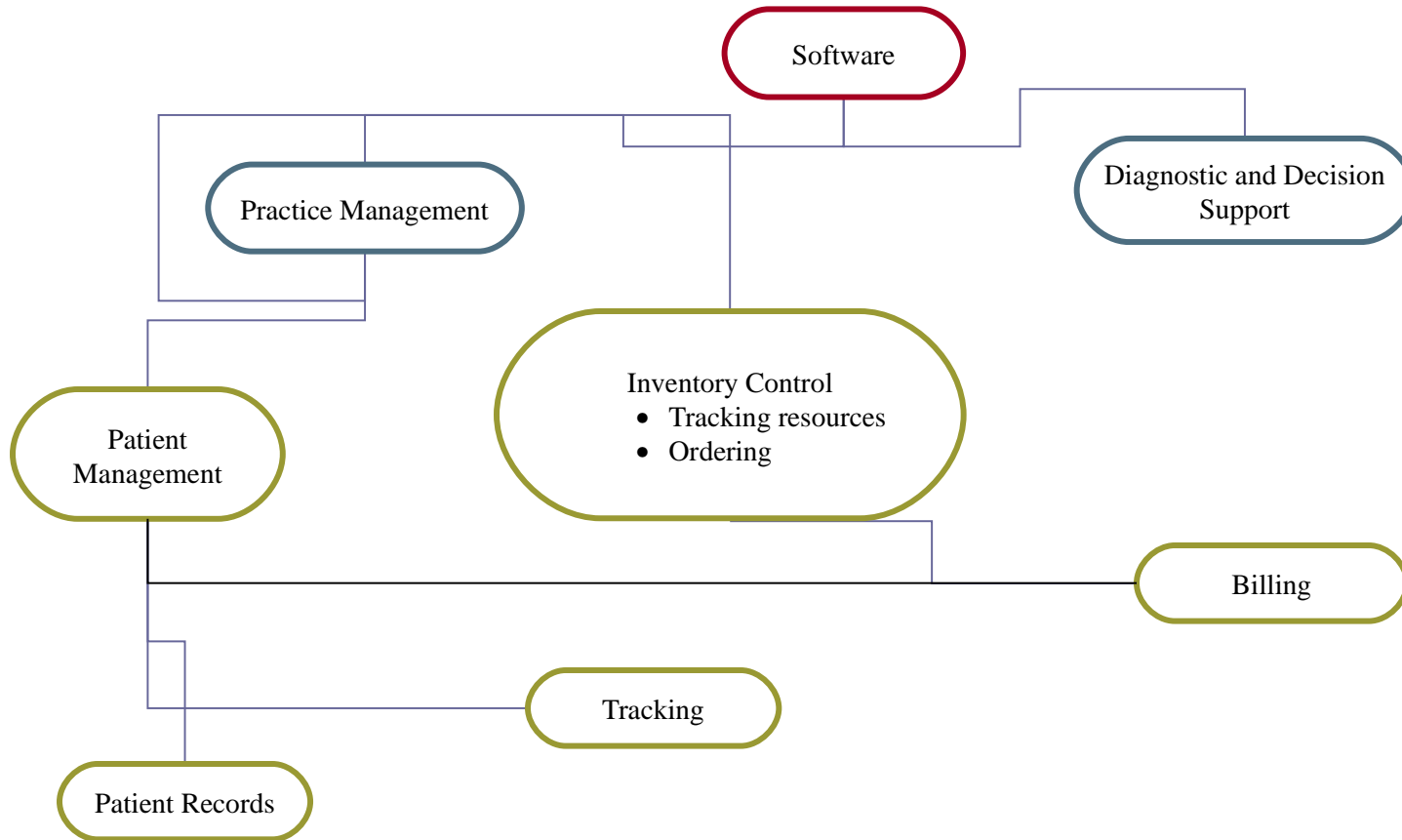
# Patient Safety & Medical Informatics

## *Delivering Safer Health Care*

- With as many as 98,000 hospitalized Americans dying from medical errors, patient safety is a major health care concern.
- Understanding and applying medical informatics to improve patient safety can lead to enormous demands on practitioners.
- The best way to improve the quality of health care is to deeply study the structure of the work environment and view health care as a system in which medical informatics plays a vital role.



# Medical Informatics Software Categories





## Benefits of Medical Software

- Increases the ability to see more patients on a daily basis because of more efficient office procedures
- Reduces costs associated with documentation and chart supplies
- Reduces hospital and office staff used to locate, pull, copy, store, and transport charts



# Automation in Medical Informatics

## *Making Life Easier for Medical Professionals?*

- Automation:
  - exists in informatics products to automate processes previously carried out by humans
- Automation may:
  - Surprise users
  - Fail to deliver appropriate results
  - Transform work





# Case Study of Automation

## *Learning from ACORN*

### *What is ACORN?*

- Decision support system (DSS)
- ACORN collects patient symptom information to provide recommendations to the practitioner
- ACORN illustrates automated system surprise, failure, and work transformation



# Case Study of Automation

## *Learning from ACORN - Surprise*

*As a decision aid, ACORN produced surprising results:*

- Ambiguous recommendations – over 30% of the cases were classified in the middle category, between “send home” and “send to CCU.”
- The ambiguity was a surprise and frustration to practitioners



# Case Study of Automation

## *Learning from ACORN - Failure*

*Some surprises lead to failures, directly impacting patients and practitioners.*

ACORN recommendations:

- Often admitted patients that were not in need of hospital care
- Rejected patients that were clearly in need of CCU care



# Case Study of Automation

## *Learning from ACORN - Transformation*

*Automation often transforms the way practitioners work, as practitioners must incorporate the new software and hardware in their work environment.*

Practitioners use task and system tailoring:

- System tailoring is adapting a system to the users needs
- Task tailoring creates new work methods to adapt to the features of a new system.

ACORN has transformed the work environment by giving nurses the authority to admit patients to the CCU.



# Case Study of Automation

## *Learning from ACORN - Conclusions*

- Technology alone is not enough to achieve a well-functioning electronic information or decision support system; organizational aspects must be accounted for as well.
- The adaptation process has to begin with an in-depth analysis of the needs and processes of the work environment.



# Improving Medical Informatics *Training is Necessary*

- Adequate training is essential for all users of an information system.
- Training programs vary widely by institution and even department.
- Circumstances of health care environments necessitate training outside of normal work hours.



# Improving Medical Informatics

## *Training is Necessary*

- Without adequate training:
  - users may become frustrated
  - sophisticated tools may be under-utilized
  
- Training is the solution to this problem:
  - It takes untrained users an average of 22 hours to get to the same skill level that can be gained after 5 hours of training.
  - Training is an essential tool for making sure any organization benefits from new software and hardware.



# Improving Medical Informatics

## *Smart Automation*

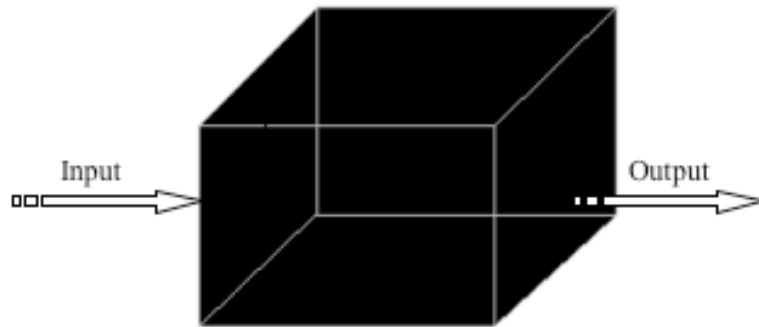
### Smart automation incorporates:

- Support at the cognitive level of the user
- Appropriate input prompts
- Concise menu structure
- Governance structures
- Filters to ensure relevant data
- Support for user speculation
- Appropriate output



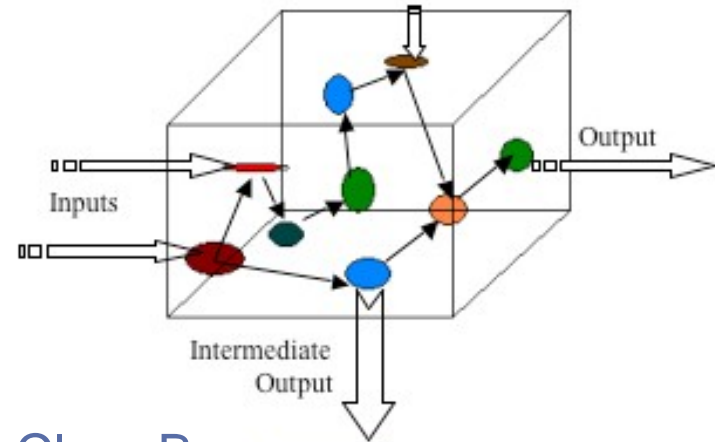


# Improving Medical Informatics *Transparent Processes*



- Black Box

- User's view is obstructed
- No information on internal processes



- Clear Box

- User is able to see internal processes (●)
- Intervention is possible
- Supports input at multiple stages
- Facilitates user understanding of internal processes



# Improving Medical Informatics

## *Creating Software Regulations*

- Provide industry wide standards for automation
- Standards should be monitored by software oversight committees
- The direct input of health care professionals who will be using the software is an indispensable component of any new system design



# Improving Medical Informatics

## *Conclusions*

- Health care is big business in the United States.
- The current focus in informatics is to increase the efficiency of patient care administration while maintaining patient safety and privacy.
- Automation of tasks is the means to increased efficiency.
- Regulations must be in place to protect patient safety.

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*Thanks*

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