Improving the Clinician and Patient Experience

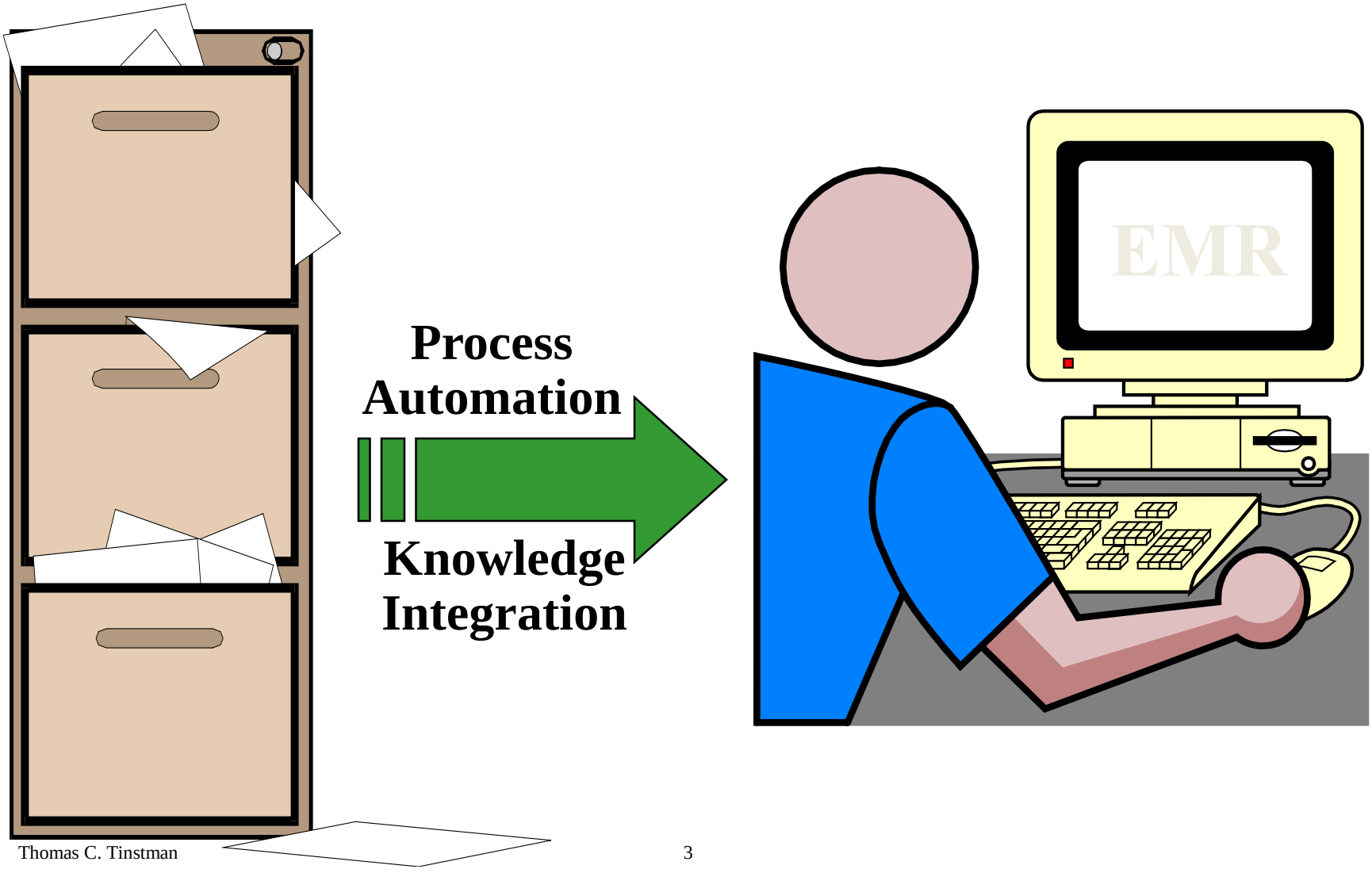
Design Revolution Required

Defining Healthcare

- Service to a patient
- Knowledge of health science
- Applied to a patient's situation

Applied Knowledge Service

Our Role in Healthcare



Healthcare Evolution Since 1968

- **Complexity & Volume Increasing** – Knowledge, Patient Presentations, Operation, Business, Paper Record
- **Shift Work More Common** – Initiating Care, Replacing Continuing Care
- **Documentation Standards –** Growing like tax code
- **Documentation Content -** Driven by billing and legal worries, not communication with the point of care team
- **EHR** - Process & Paper Medical Record Electronification

My Hypothesis

An EHR designed to present information, assist ordering, and support documentation in a format that fits a clinician's cognitive schema and best cognitive information flow will consume less mental energy, improve decision quality, and assist in reducing clinician burnout. This design must push important monitoring information to one's attention while minimizing task interruptions and suppressing "normal" monitoring information, process information, and business information.

Acute Care Structured Analysis, Observations, & Interviews*

- Reviewed 100 hospital medical records categorizing each information element as problem-focused, monitoring, or business/process focused and noting how it was filed in the medical record
- Observed twenty physicians across internal medicine specialties to determine how they used the medical record
- Observed five of the twenty physicians who agreed to verbalize their cognitive processes while making rounds with a focus on medical record use
- Interviewed the twenty physicians to find level of commonality with what was learned from the five above

*Completed 1984-87

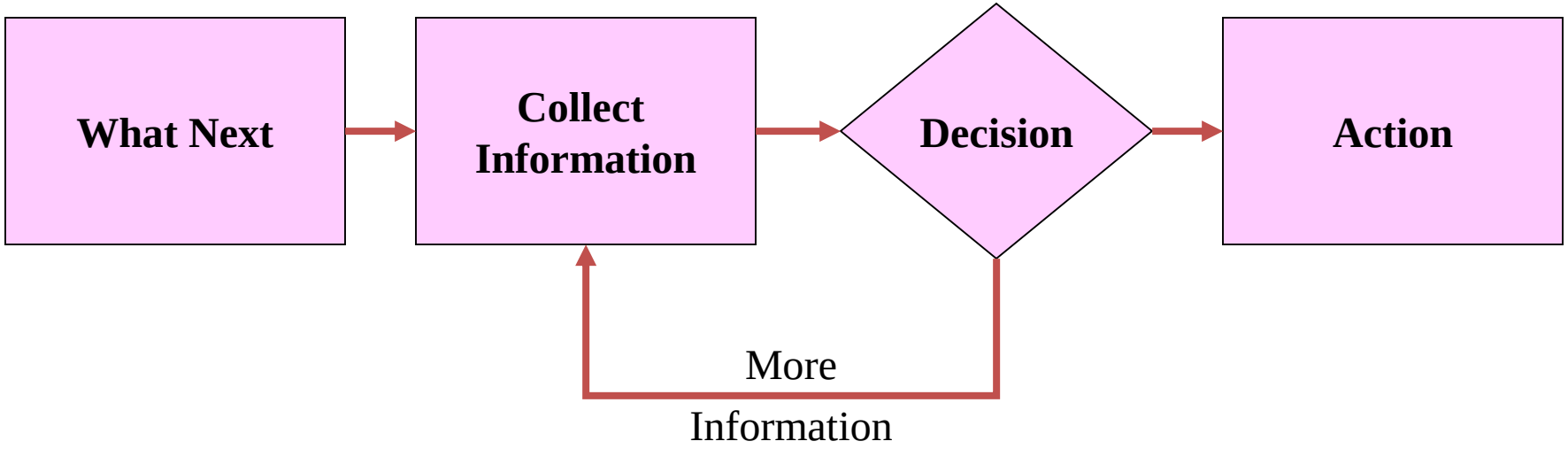
Result: Paper Record Format & Content

- **Format of the Medical Record**
  - Department (source) tabs with forms per test or task organized by chronology (forward for filed medical record or reverse for an active medical record)
  - As complexity grew, departments and tabs were added
  - Department fiefdoms added forms for tests and tasks without considering the whole of the record or the needs of the point of care clinicians
- **Content**
  - Departments battled over who "owned" an information element
  - Information elements were duplicated across forms within a department and across departments

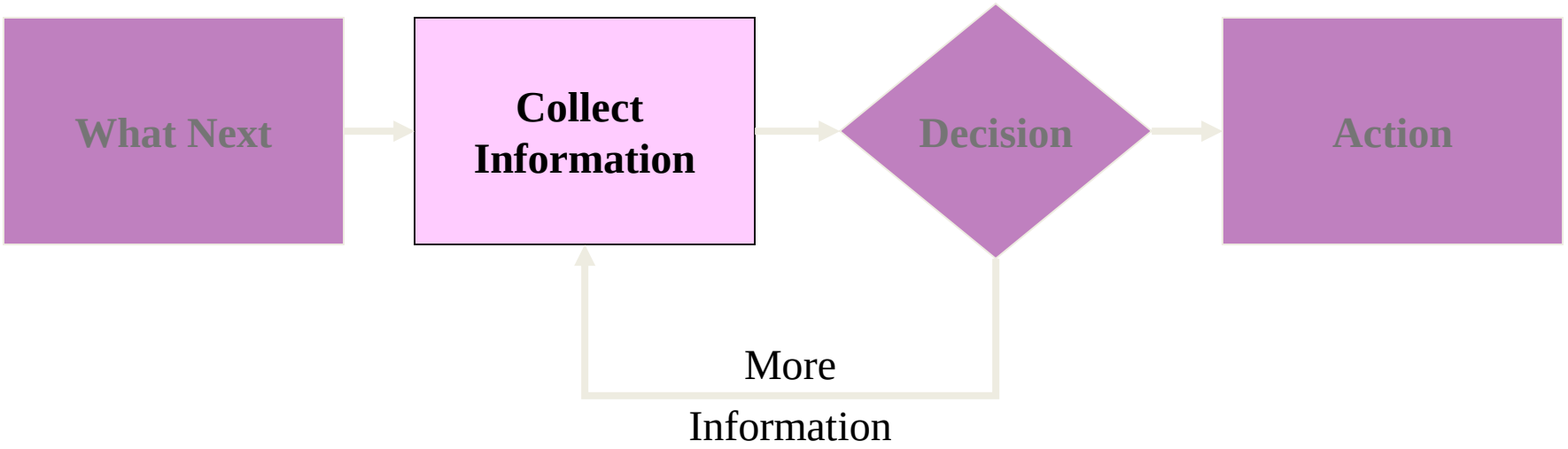
Result: Inpatient Record Information Elements

- **Distribution by Category**
  - Problem-Focused – 10%
  - Monitoring – 80%
  - Business & Process – 10%
- **Questions**
  - Did we have the correct categories?
  - What would the volume distribution be today?
  - How do either change in ambulatory records?

Clinician Work Flow



Presentation Focus



Review Medical Record

Interview Patient, Family, Staff

Physical Exam

Return to Medical Record

Result: Physician Methods of Record Use

- **Group 1 - <u>One Time Through</u>**
  - Asked unit staff for update
  - Continuing care - Reviewed record by tab and form in reverse chronological order to time they last saw patient
  - Initiation of care - As above except in forward chronological order
- **Group 2 - <u>Hunt and Peck</u>**
  - Bounced from tab to tab and form to form within a tab
  - Consulted staff intermittently
- **Group 3 - <u>Brownian Motion</u>**
  - No pattern could be identified with record use or staff

Result: Group 1 Cognitive Process
One Time Through

- **Each Information Element**
  - Important or not important
  - Not important – Forget it
  - Important – Mentally file element
    - By problem
      - Major/strategic
      - Minor/tactical
    - By body system for important monitoring & elements

Result: Group 2 Cognitive Process

Hunt and Peck

- **Worked by Problem – One at a time**
  - Important or not important
  - Important – Remember element
  - Write problem specific orders
- **Monitoring Information - May or may not review**
- **Staff Consultation - Variable**

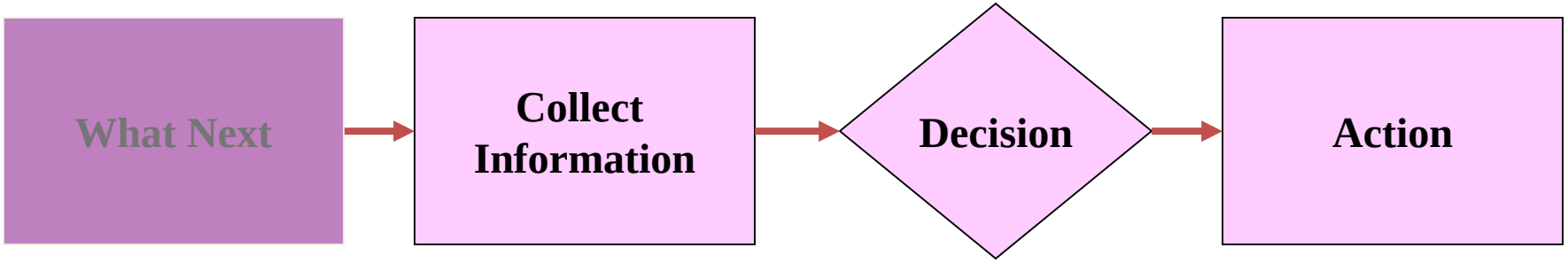
Result: Patient Focused Care Design Circa 1990

- **Pulmonary Group Adopted**
  - Problem and medication lists
  - Problem oriented notes in the hospital and clinic with the addition of a problem titled prevention
- **Hospital**
  - Medical Records Committee created and enforced standards for forms across all departments (tabs remained)
  - Monitoring information elements were reduced
  - A single, shared form was developed for all monitoring documentation that used symbols to replace text– Chart by Exception using symbols
  - Monitoring changes required a free text note
- **Prototype EMR Clinician UI – Standardized view**
  - Problems – Strategic & tactical, information filed based on order
  - Monitoring & test results/reports – Shown by body system

Opinion: EHR Evolution of Views for "Collect"

- **EHR Version 1** **1970-~2005**
  - Department tabs
  - Forms per test or task
  - Graphical displays
- **EHR Version 2** **2006 - Present**
  - Adopted user-centered design, selected web page features, and usability testing
  - Some attention to information element location and viewing
- **EHR Version 3 – Healthcare Specific Design Revolution Required**

Opinion: Physician's Best Cognitive Schema & Information Flow



1. <u>New Problem</u> – Monitoring changes, order & document *by body system*
2. <u>Problem Care</u> – Order & document by *problem*
3. <u>Prevent Problems</u> – Order & document by *body system*
4. Resolve conflict & authenticate recompiled orders and documentation
5. Create the bill

Proposal: EHR V3 Design Revolution

- **Vision –** Reimagine the work and redesign the technology using cognitive science and focus on high quality, efficient decisions and actions
- **Objective** – Reduce point of care clinician (POCC) cognitive workload and time on task
- **New Learning Required**
  - Understand **cognitive science**
  - Utilize **cognitive systems engineering** principles and methods
  - Learn how best to use **icons and symbols** to improve information viewing
  - Use clinician feedback to determine volume of change

Proposal: EHR V3 Design Revolution – cont.

- **Steps**
  - Create a new knowledge worker-centered design process that incorporates cognitive science and cognitive systems engineering
  - Define the POCC teams' (by role) cognitive model, information flow, & time on task using cognitive science not clinician opinion
  - Catalog task interruptions and use their effect on cognitive load to remove or improve the interruptions
  - Innovate ways to document and present monitoring information, i.e. icons and symbols
  - Develop usability testing that incorporates cognitive workload measurements during and after a supervised learning period
  - Suppress normal monitoring information, business information, and process information or move to department system
  - Comprehensive scenario, team-based training program that starts with cognitive schema and information flow (How I learned H&P, not rounds)

Proposal: EHR V3 Design Revolution – cont.

- **Anticipate Resistance and/or Obstruction**
  - Software suppliers
  - POCC professional organizations
  - Medicare & other payers
  - Regulators – State and Federal
  - Legal opinion
  - POCCs' culture of individual or role over team
  - Habits of POCC
  - AI believers
  - POCC and their managers
- **Supporters**
  - Problem Oriented View & Concept Mapping – Joel Buchanan, JBuchanan@uwhealth.org

Appendix

Clinician Burnout

- **Definition**
  - Emotional exhaustion
  - Cynicism
  - Perceived clinical ineffectiveness
  - Sense of depersonalization in relationships
- **Prevention and Treatment**
  - Personal values and choices
  - Time with family
  - Religious or spiritual activity
  - Self-care
  - Supportive spouse or partner
  - Control over workload
  - Setting limits
  - Mentor
  - Adequate administrative support

Cognitive Systems Engineering

- **Questions**
  - How can tasks best be allocated to clinician or automation?
  - What information can help with the task?
  - What is the best presentation of this information?
  - How can the implementation of decisions be assisted?
- **Cognitive Work Analysis**
  - Domain – What are we working with?
  - Control – What must be done?
  - Strategies – How can it be done?
  - Organization & cooperation – Who can best perform each task?
  - Worker Competencies – How can humans best be supported?

Cognitive System Training for Acceptance

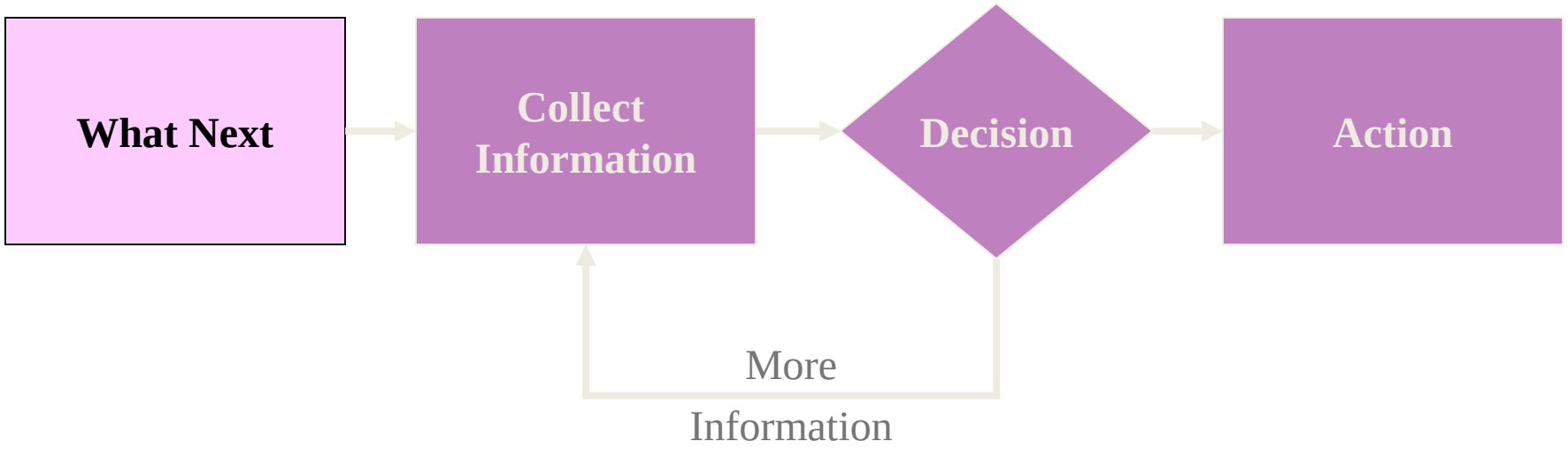
- Teach a cognitive schema and information flow
- Use role-based scenarios
- Team-based scenarios
- Create with the software supplier to support the specific design
- Test and credential each role and individual in the role

Stanford Medicine Harris Poll*

- Findings are similar to all other polls with more detail
- View related responses
  - 97% want a good user experience
  - 72% want improved user interface design to eliminate inefficiencies and reduce screen time
  - 50% of office-based physicians and 30% of hospital-based physicians use work-arounds
  - 59% believe EHRs need a complete over-haul

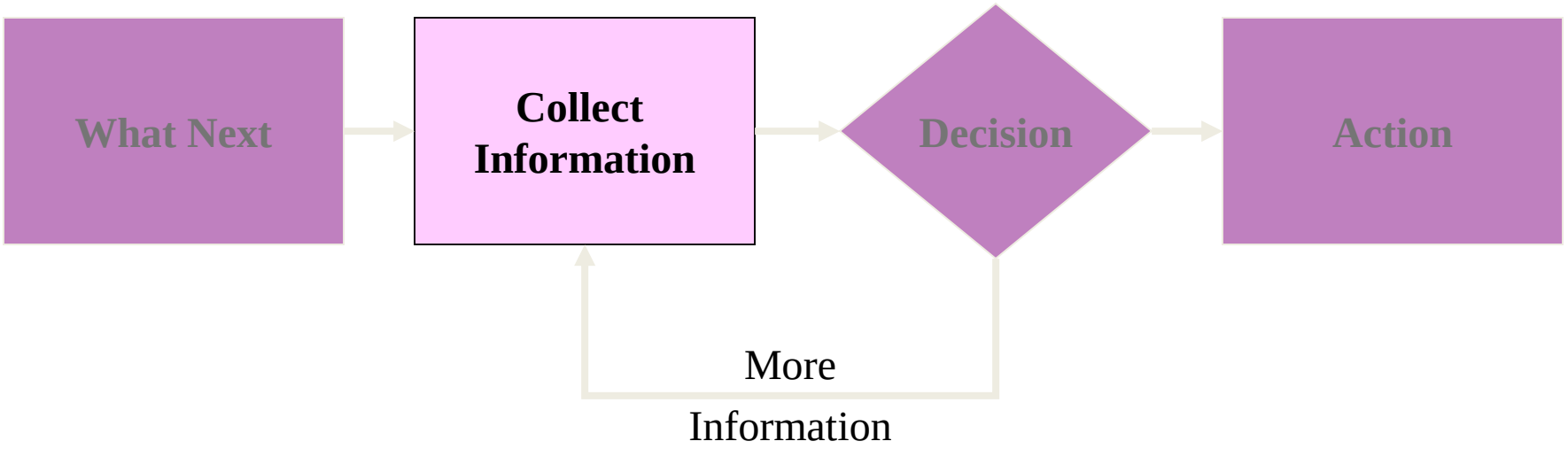
*March 2018
http://www.med.stanford.edu/content/dam/sm/ehr/documents/EHR-Poll-Presentation.pdf

Clinician Work Flow



	Clinic	Hospital
Visit	Schedule	List/Tracker
Procedure	Schedule	Schedule/Tracker
NonVisit	In-Basket	-
Business	In-Basket	In-Basket

Clinician Work Flow



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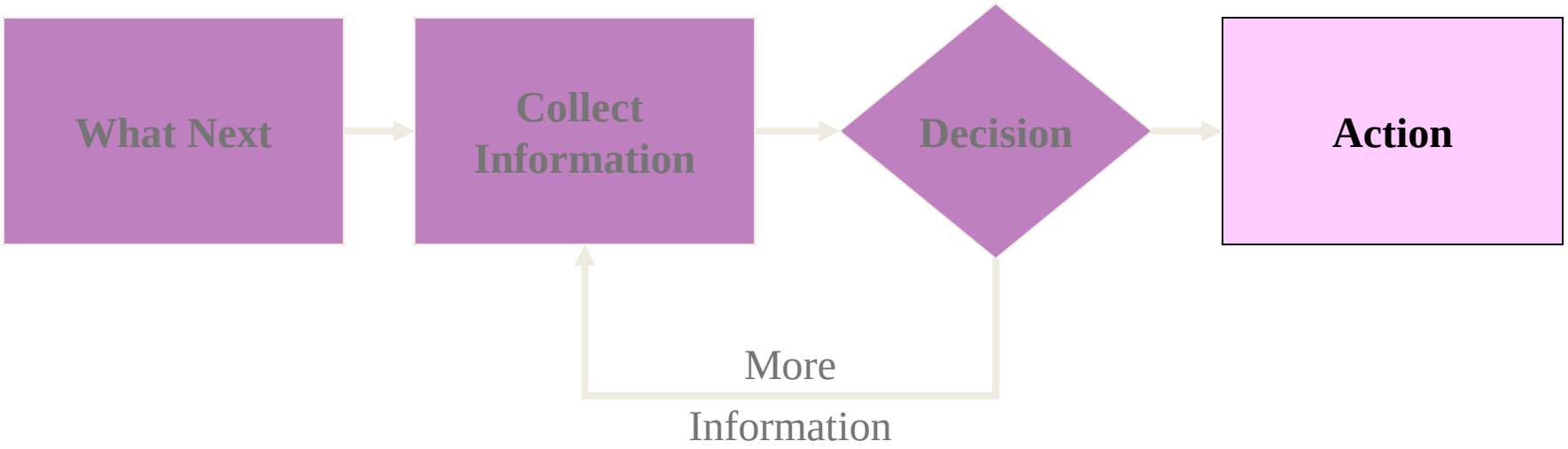

Procedure or Activity

Document--Findings, Analysis, Plan

Order--Tests, Observations, Treatments

Charge--Facility, Supplies, Professional