CHESAPEAKE INFORMATION BASED AERONAUTICS CONSORTIUM (CIBAC)

A SCIENTIFIC INFORMATION SYSTEM (SIS)

STUDENTS:
VICTORINE GWEI
ONYEKA NWAOGU
CORNELIUS HAIRSTON
INDIA JACOBS

Advisor:
Dr. LeeRoy Bronner, PhD, PE
Morgan State University
IMIE Department

MANAGING LARGE SCIENTIFIC CENTERS

- **Problem**

  How do you manage large Scientific Centers that support:

  - **multiple research projects,**
  - **in multiple locations,**
  - **with many researchers,**
  - **that work with large volumes of data?**

- **Proposed Research:**

  This research addresses innovative methodologies and technologies available to manage, control and maintain large scientific centers.

AGENDA – SIS ISSUES

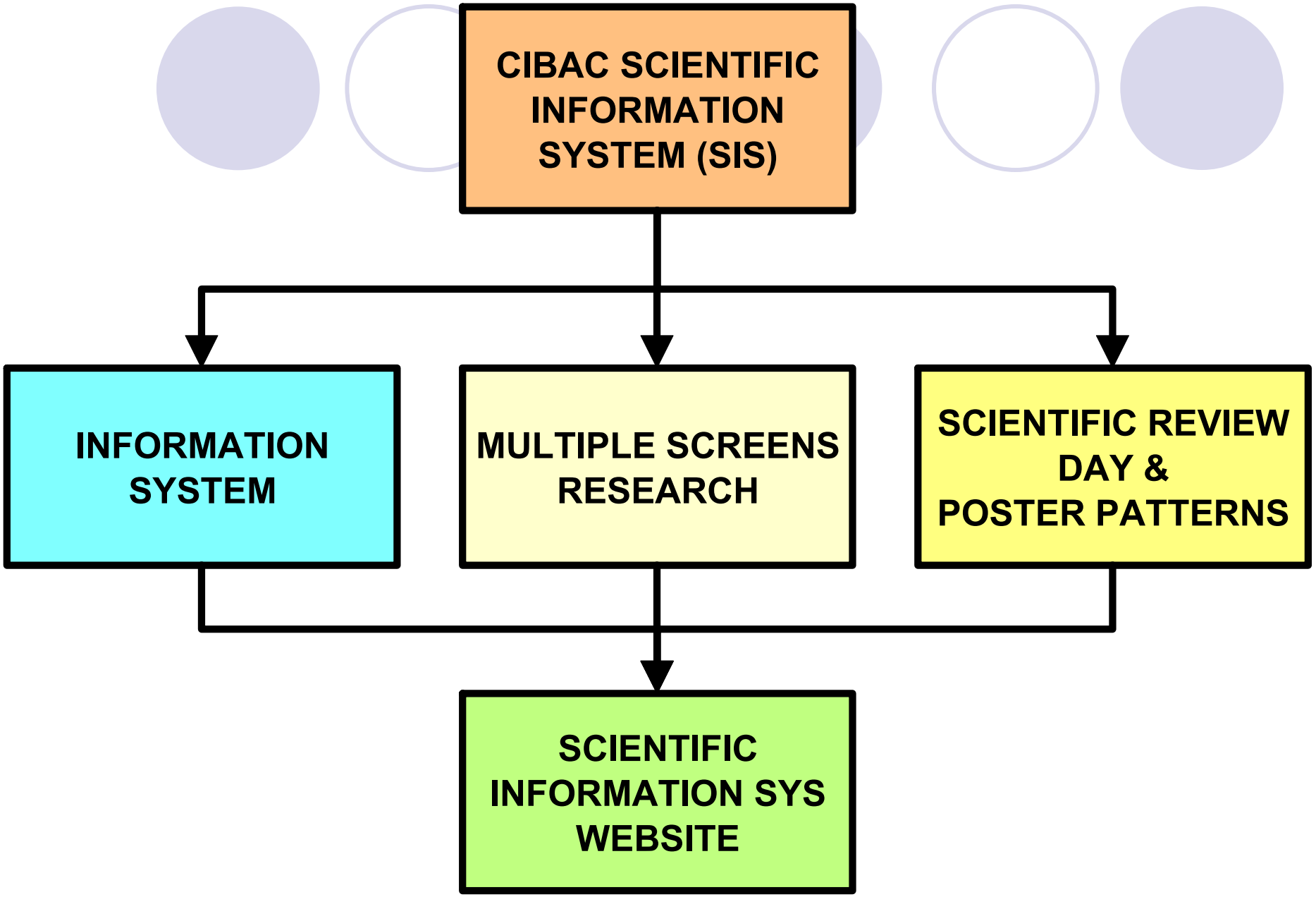
- Problem Definition
- CIBAC Vision
- Requirements/Objectives of Research
- Methodology
- Organizational Structure
- A Model Structure for CIBAC *
- Some Processes That Drive the CIBAC System
  - What is the process used to bring on a new student or researcher?
  - What is the process used to prepare for the yearly CIBAC report?
  - What is the process used to add a new research project?
  - What is the process used to evaluate research progress?

AGENDA – SIS ISSUES (Con't)

- Aeronautic Information Based Research
  - Areas of Research
  - Active Projects
  - Pending Projects
  - Required Resources (Hardware & Software)

- Aeronautic Information Based Education Classes
- Research Partners
  - Government
  - Universities
  - Private Industry

- Strategy for Leveraging Funds
  - Demonstration *
    - Using a Website for Development and Ongoing Management of a SIS


CIBAC SCIENTIFIC INFORMATION SYSTEM (SIS)
INFORMATION SYSTEM
MULTIPLE SCREENS RESEARCH
SCIENTIFIC REVIEW DAY & POSTER PATTERNS
SCIENTIFIC INFORMATION SYS WEBSITE

Annual CIBAC Research Review

By: Onyeka Nwaogu
Advisor: Dr.LeeRoy Bronner
Clarence. M. Mitchell, Jr. School of Engineering
Morgan State University

AGENDA

- Problem Definition
- Background
- Literature Review
- Methodology
- Research Review/Flow
- Poster Pattern Discussion
- Conclusion
- Future Work
- Reference

Problem definition

Engineering Research Institutions (BSU, MSU, UMES) support multiple research projects in multiple locations with many researchers that generate large volumes of data.

Research Project: This research will address innovative methodologies and techniques available to manage, control and maintain Research generated by these co-research institutions.

BACKGROUND

- **CIBAC Research Centers carry out research which is inaccessible to co-research institutions.**

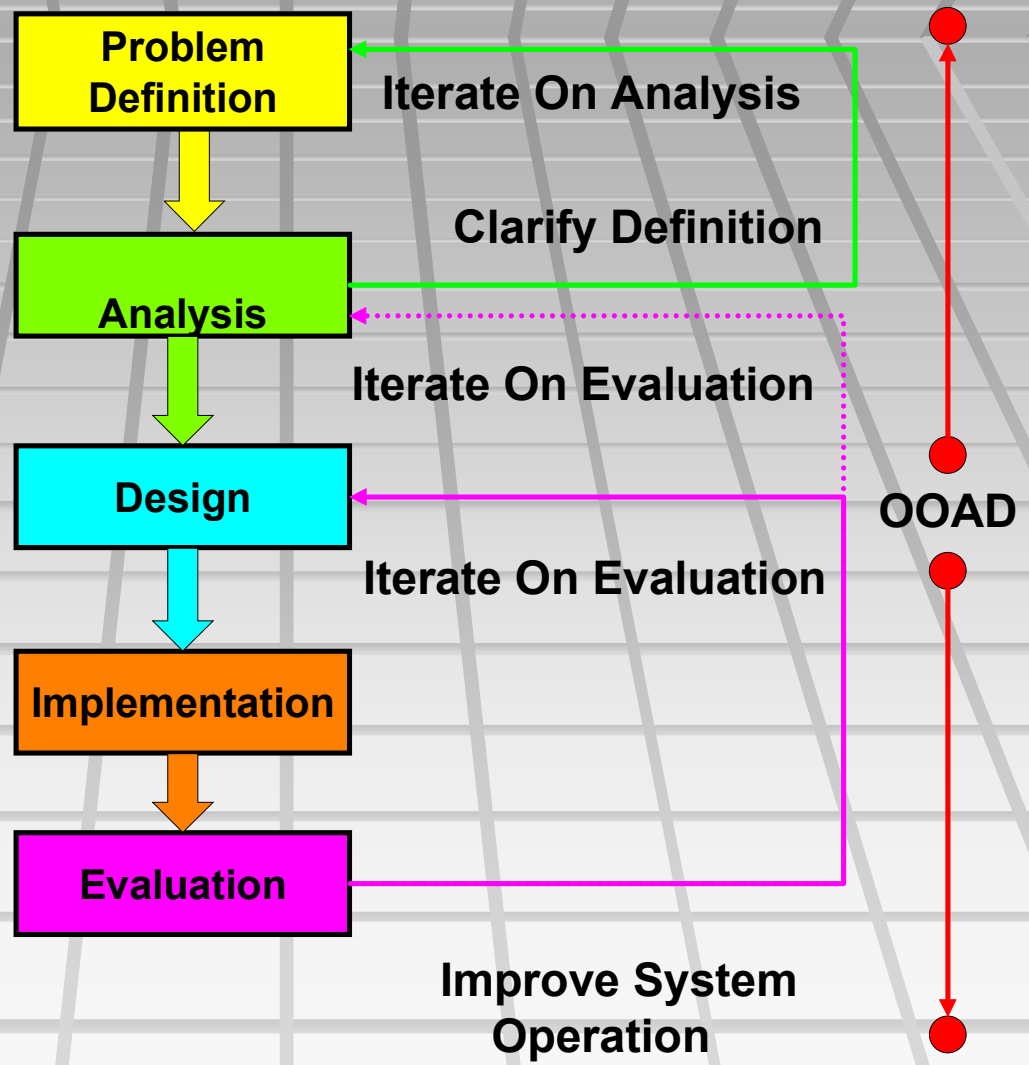
- **Dissemination of Research information:**

  - **Research collaboration and productivity can be enhanced if these co-research institutions meet annually.**

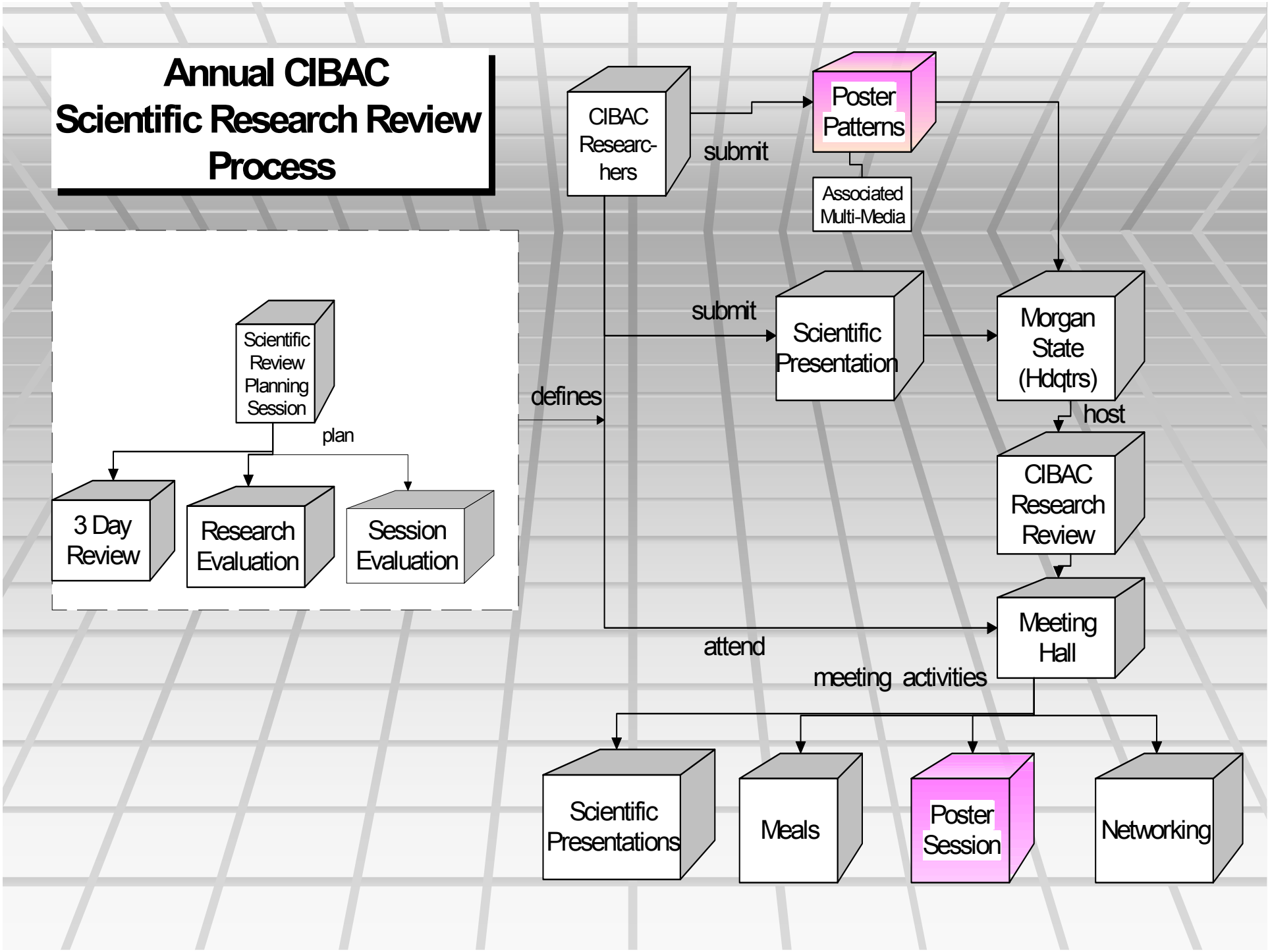
  - **Poster patterns can be used as a very effective means of research dissemination and presentation.**

METHODOLOGY

System Development Life Cycle



Annual CIBAC Scientific Research Review Process



Channel Modifications of the Puyallup River, Pierce County, Washington

Janet Pratt — GIS Certificate Program, University of Washington, Tacoma

Introduction

The purpose of this research is to illustrate the changes of the Puyallup River as a result of channel modifications. Comparison of the river route from the early 1900's to today shows drastic differences. The Puyallup River continually flooded its banks destroying crops and property (Fig. 1.).

Fig. 1. The devastating flood of Dec 1933 caused $13,494,263 worth of damage in 16 WA Counties (TNT 1933). This photo, taken further upstream of the study area, shows the damage to the Ehrlinger Families property (Washington State Historical Society, Tacoma, Brown, 69-614.1).

Attempts have been taken through the years to control the unruly waters of the Puyallup River. The river originates from the Tahoma and Puyallup Glaciers of Mt. Rainier. As the river flows southward for 45 miles, is later joined by the Mowich River, the Carbon River at Orting and the White/Stuck River at Sumner prior to emptying into Commencement Bay and the Puget Sound (TNT 1937). The name Puyallup (from the Indian Tribe of the area) is generally accepted to mean "generous people" (Price 2001). This research illustrates years of changes in the Puyallup Valley/Watershed. (Fig. 2.)

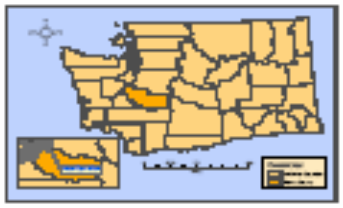


Fig. 2. The Puyallup River (pronounced 'pew-al-up') is located in Pierce County in the western part of Washington State.

Materials and Methods

Using GIS for historical mapping has been limited, although a wide variety of studies have been done. It has been used in teaching history, specifically the Salem Witch Trials (Ray 2002), to map the history of the British population (Gregory and Southall 2002), and for mapping the world in ancient times (Elliot and Talbert 2002). The process of georeferencing and digitizing used for this project was previously used on a project of Civil War Battlefields (Lowe 2002) and comparing cities from past to present (Rumsey and Williams 2002). The following model was developed to document the workflow of this research (Fig. 3.).

Fig. 3. The model above shows steps used for georeferencing the Puyallup River re-channeling project. This model could be incorporated into any historical comparison project.

For this project historical maps were either downloaded or scanned. Ortho photos of 1990 from the USGS DOQQs website were also downloaded. The Coordinate System 'UTM_Zone_10N (NAD-1983) from the ortho photos was used to project the historic maps. Control points were established on the historic map coordinating reference points on the ortho photo. To locate control points either bridges, roads with known points (county lines), or if possible, township or section lines were used. Once control points were established a process known as "rubber sheeting" was used to "line up" the map with the coordinate system of the ortho photo. After completing the georeferencing, a process of digitizing the location of the Puyallup River in each map was completed.

Discussion

Channel modifications of the river began in 1887 when J.P. Stewart, after being rescued from a rooftop, hired 25 workers to dig a canal for $200. Over time this canal became the course of the river (Price). The next major modification happened further upstream with the White River. The White River source (and the ground it chose to flood) fluctuated between King County (joining the Green River) and Pierce County (joining the Stuck River). Finally with the flood of 1906 (or was it due to dynamite efforts?) the route of the White was directed southward into the Stuck (White River Journal, 1906-1906). This "incident" and the disputes it caused between the counties led to the establishment the Inter County River Improvement Commission of King and Pierce Counties. The Commission established a 99 year agreement. In 1911 financial revisions were done establishing that King County contribute $50,000 and Pierce County contribute $10,000 under a 15 year agreement. From 1914-1919 the Commission did the following re-channeling projects from Auburn to the Tacoma city limits: built a drift barrier built across the White about 3 miles above the dam; built the Auburn Dam (Buckley Diversion Dam); did alignment of the river rectified by cutting off sharp bends; and last the banks revetted. The cost for 10 miles of river re-channeling reached $1.3 million from 1907 to early 1924 (Stevenson, 1922) (Fig. 4 a-b.). Numerous debates between King and Pierce Counties continued through the years (Franklin, 2004).

Fig. 4 a-b. Attempts were made to control flooding of the river.
Fig. 4a. Left, taken Dec 26, 1910 shows drift barriers. **Fig 4b.** Right, Dragline Excavator used at the reservation cutoff, Oct 23, 1915. (photos courtesy of the Washington State Historical Society, Puyallup River Re-channeling # 17 and # 22)

Modifications continued with the passing of the Flood Control Act (June 22, 1936) which authorized the Mud Mountain Dam to built providing protection of the Lower White and Puyallup River Valleys (Stubbs, 1997). In 1940 the Commission received congressional appropriation of $300,000 for widening the river 350 feet and establishing 22 foot high embankments (TNT 1940). From 1940-1950 the Army Corps of Engineers spent $3,600,000 on a flood control project to straighten 3 miles from the mouth to the end of the city limits of Tacoma. This project moved over 1,000,000 cubic yards of dirt and increased channel flow from 30,000 feet to 50,000 feet of water per second (TNT 1948).

Results

The digitized images (Figs. 5a-c.) show the shape of the river in 1909, 1914, and 1990. A problem faced with any historical mapping project involves map quality. The 1914 image was done from a drawing of a smaller section of the river so the original map image was not of a high enough resolution to georeference and digitize (Fig. 6 a-b.).

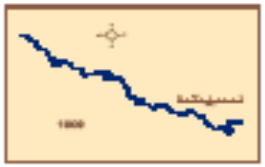


Fig. 5a. Digitized route of the Puyallup River from the end of the Stuck to the mouth of the Puyallup drawn from a 1909 drawing by W.R Hill for A.O. Powell.

Fig. 5b. Digitized route of the Puyallup River from a 1914 construction drawing.

Fig. 5c. The Puyallup River today from 1993 ortho photo (USGS DOQQs 1993)

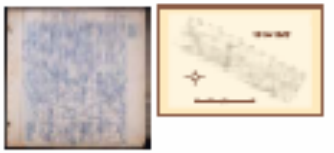


Fig. 6a-b. Resolution of historic maps can be poor due to paper deterioration and scanning quality. **Fig. 6a.** is a 1914 map scanned as a .jpeg image. **Fig. 6b.** is a 1910-1922 drawing made from the 1914 map at left. (Maps courtesy of the Pierce County Public Works and Utilities, Environmental Services, Water Program)

Conclusions

This project sets the stage for endless future research projects. From these existing maps one could do land cover analysis, population density history, percentage of land owners, land elevations and flood zones over the same time period, to name a few. It is true there are challenges with historical mapping in GIS, but the benefits of documentation greatly outweigh the challenges and one can see the beauty of history (Fig. 7.).

Fig. 7. View of Mt. Rainier from Tacoma looking up the Puyallup River. (University of Washington Libraries Digital Collection, Wehe).

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Acknowledgments

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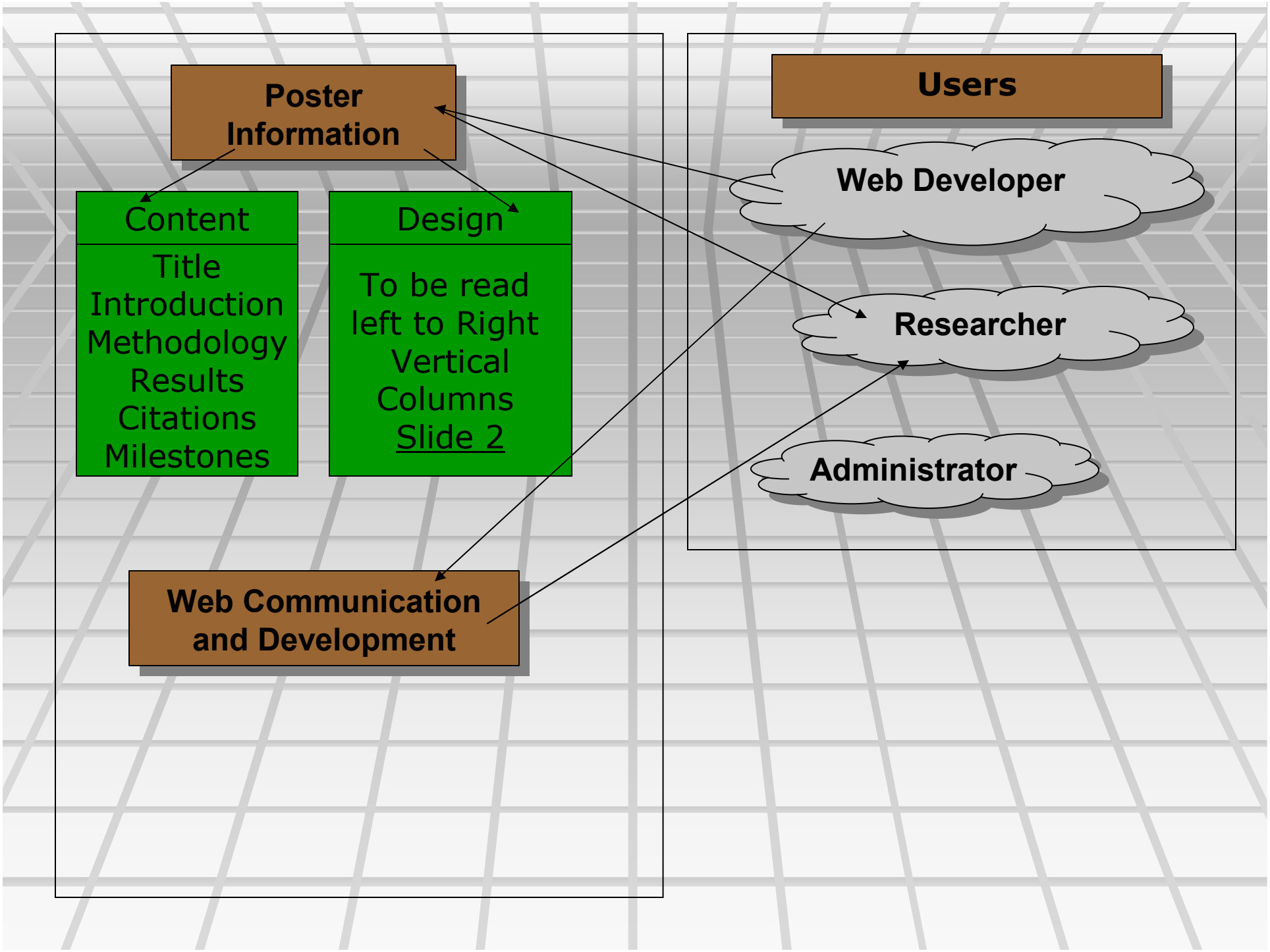
For further information

Please contact: jpratt@u.washington.edu

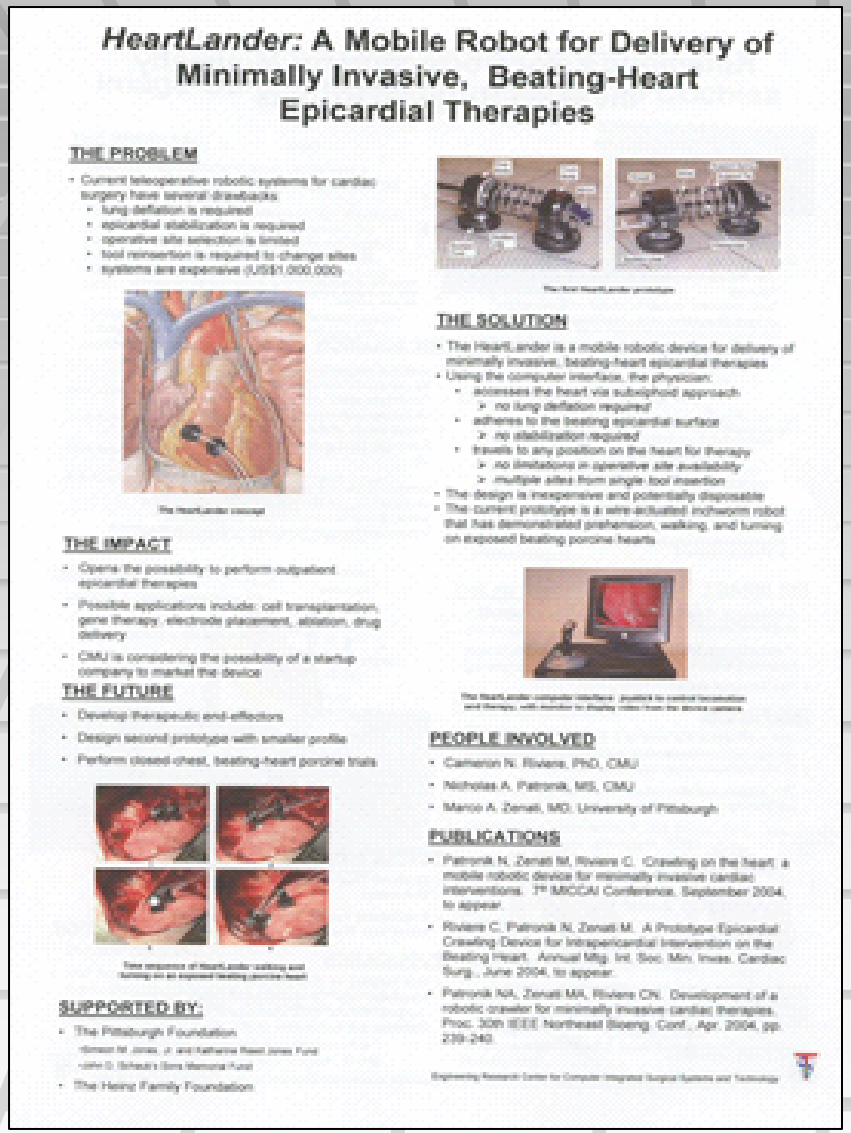
Poster Patterns

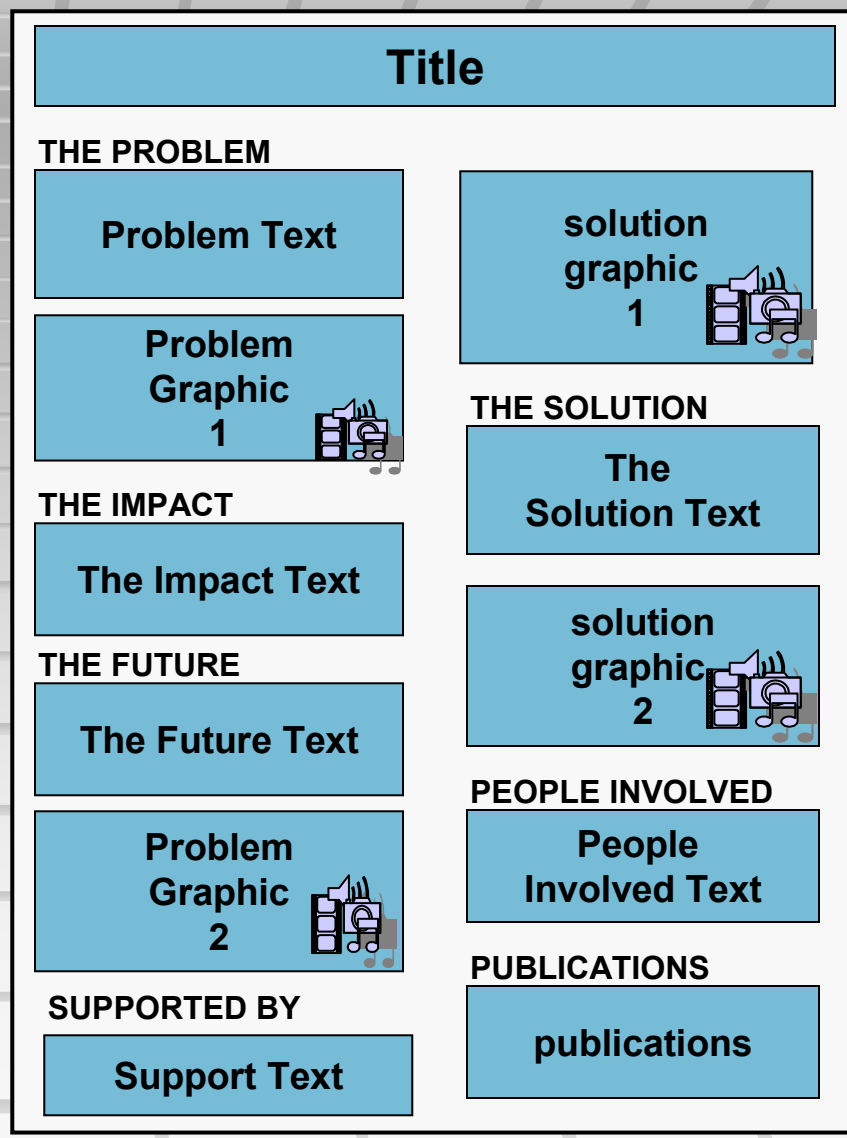
Definition: A document that communicates Research information using comprehensive diagrams and minimal text.

- **All scientific poster patterns should include an introduction, materials & methods, results, conclusions or result, literature cited, acknowledgements, and further information.**
- **Text and graphics adequately spaced and nice to look at.**
- **Points should be clear and main points explicitly labeled.**
- **Can be implemented in various situations.**

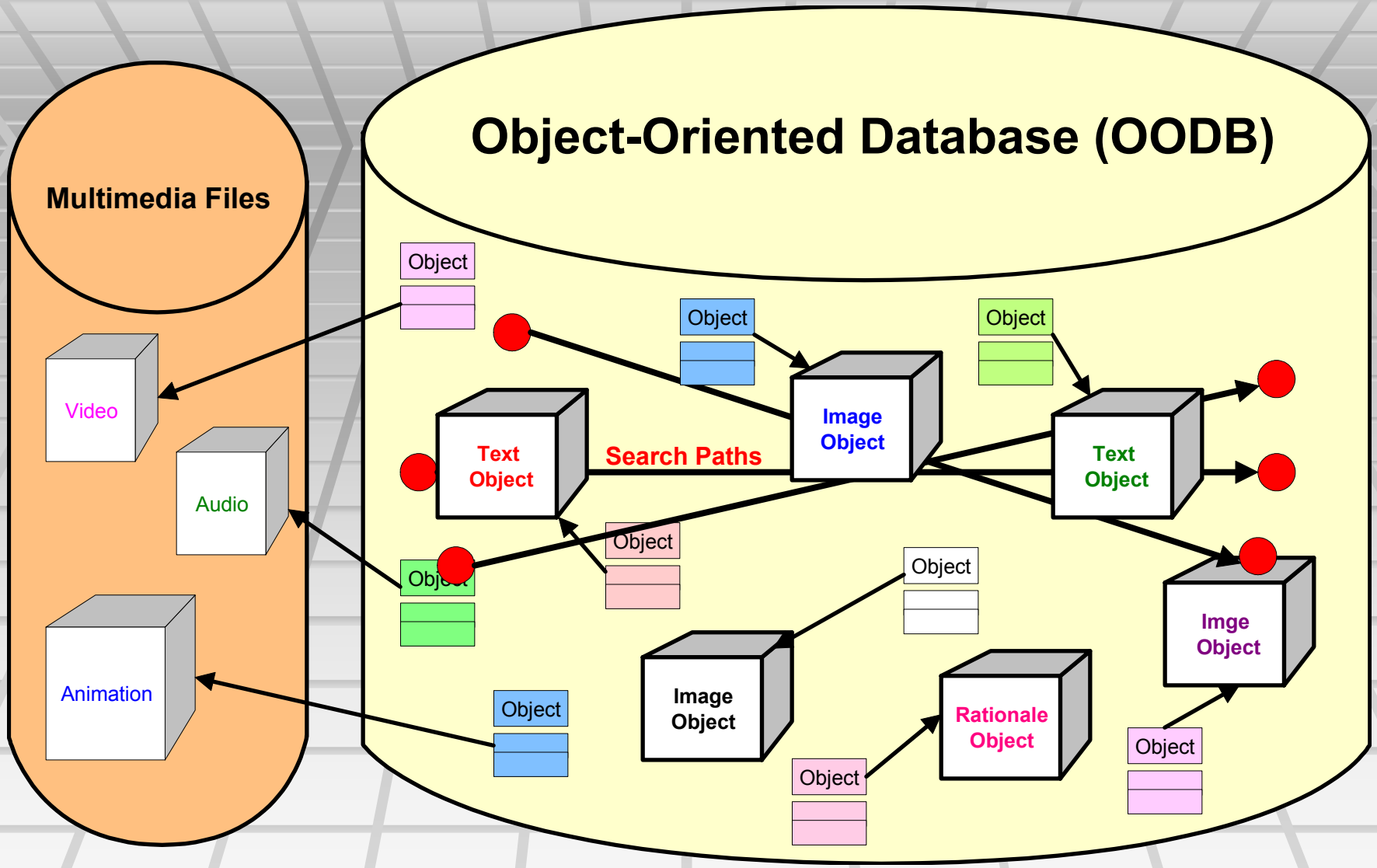

Poster Information
Content
Title
Introduction
Methodology
Results
Citations
Milestones
Design
To be read left to Right
Vertical
Columns
Slide 2
Users
Web Developer
Researcher
Administrator
Web Communication and Development

JHU MEDICAL POSTER PATTERN
(Input To Design Pattern Transformation Process)

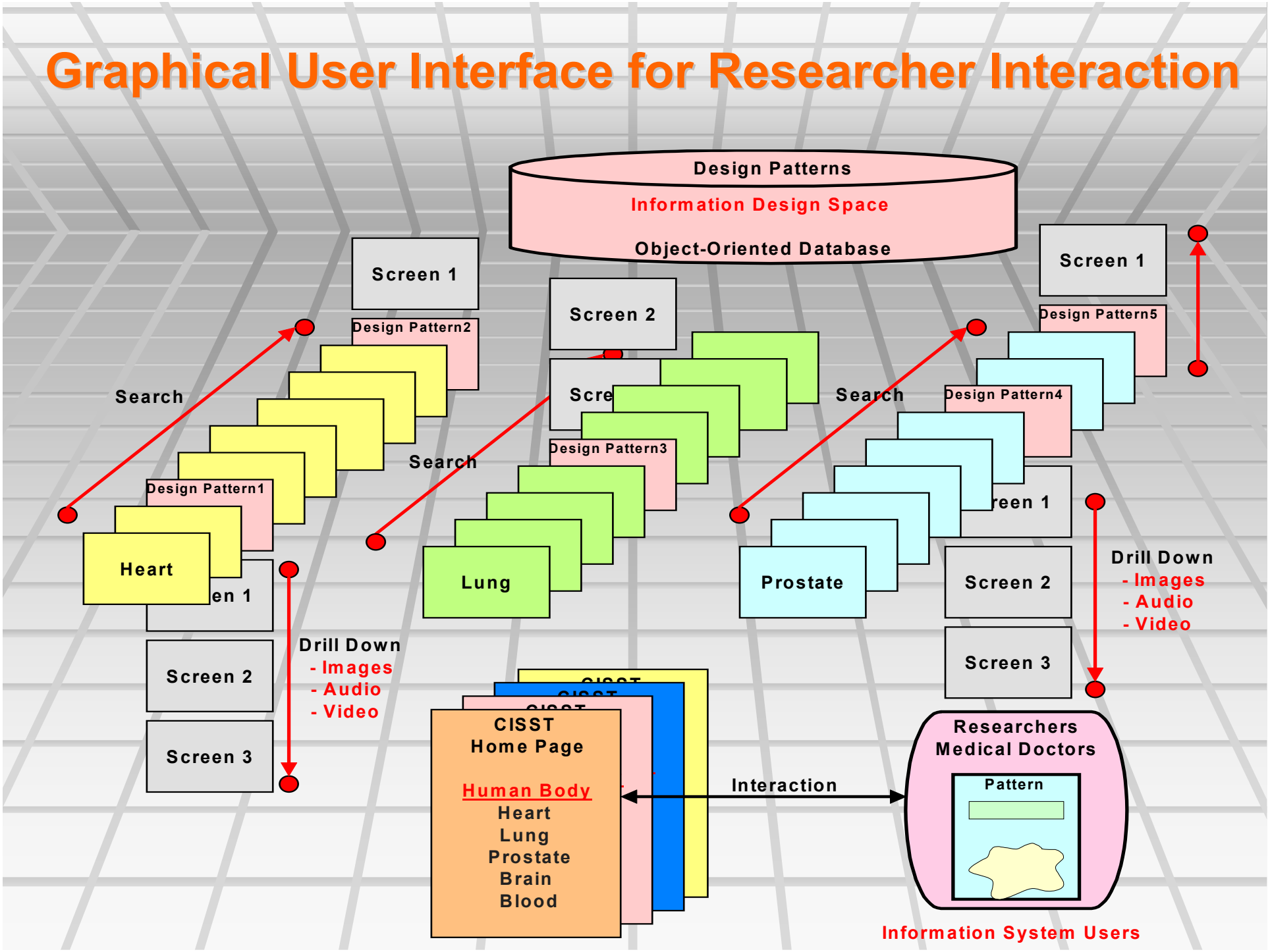




Proposed OODB for Design Patterns & Multimedia



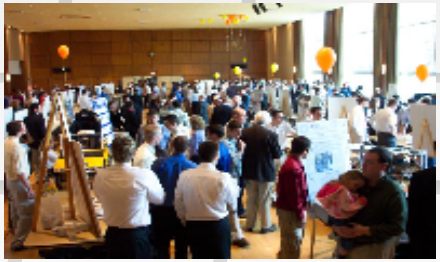
Graphical User Interface for Researcher Interaction

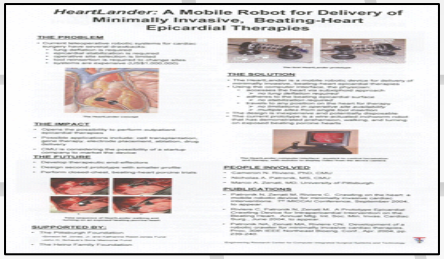


Conclusion

- A large database of research information can be managed and maintained if once every year, co-research institutions can convene to review research information.

- Research can be effectively presented and disseminated through the use of Poster Patterns.





FUTURE WORK

- Create a standard poster pattern template to be submitted to and reviewed by each research center for feedback.
- Continue the development of the strategy for the research center review day
- Determine how and when the research should be submitted to the central research information network system.

References

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