Three Driving Forces
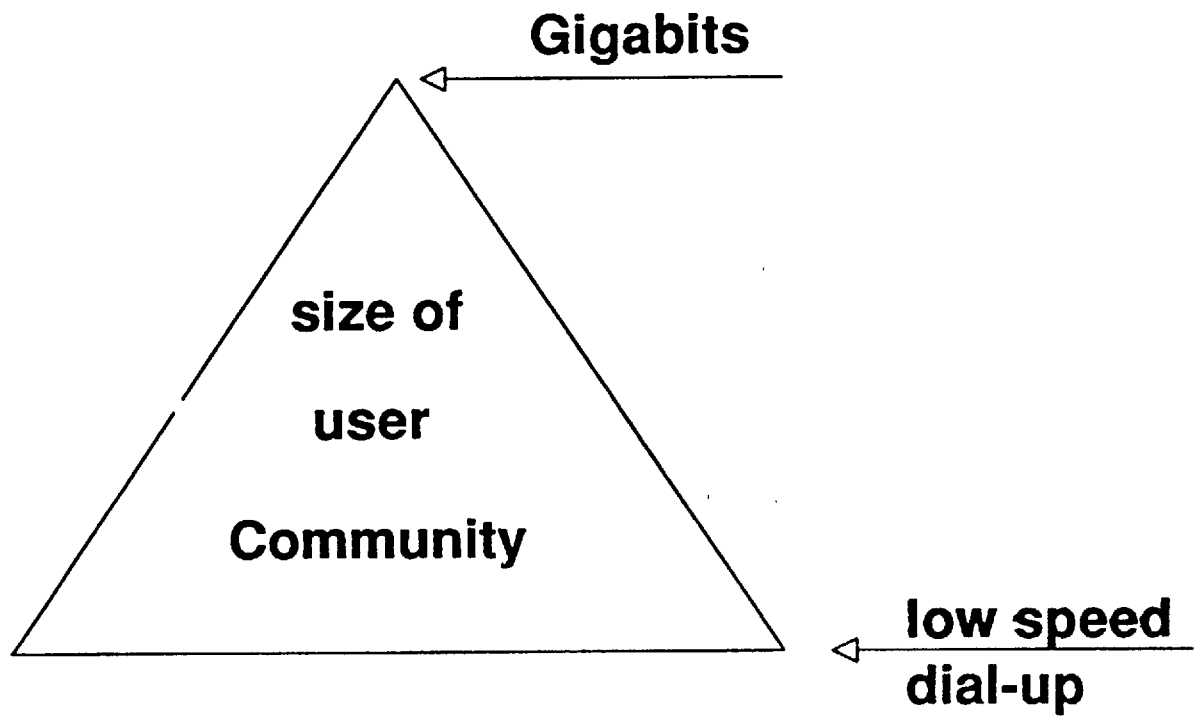
- **Network Growth**
    - the community
    - the size of the networks
    - the amount of traffic

- **Higher Speeds and Technology**
    - Gigabits
    - All Optical Networks
    - Advanced Workstations and
        Supercomputers

- **Grass Roots**
    - K-12
    - Small Businesses
    - Libraries
    - State and Local Governments

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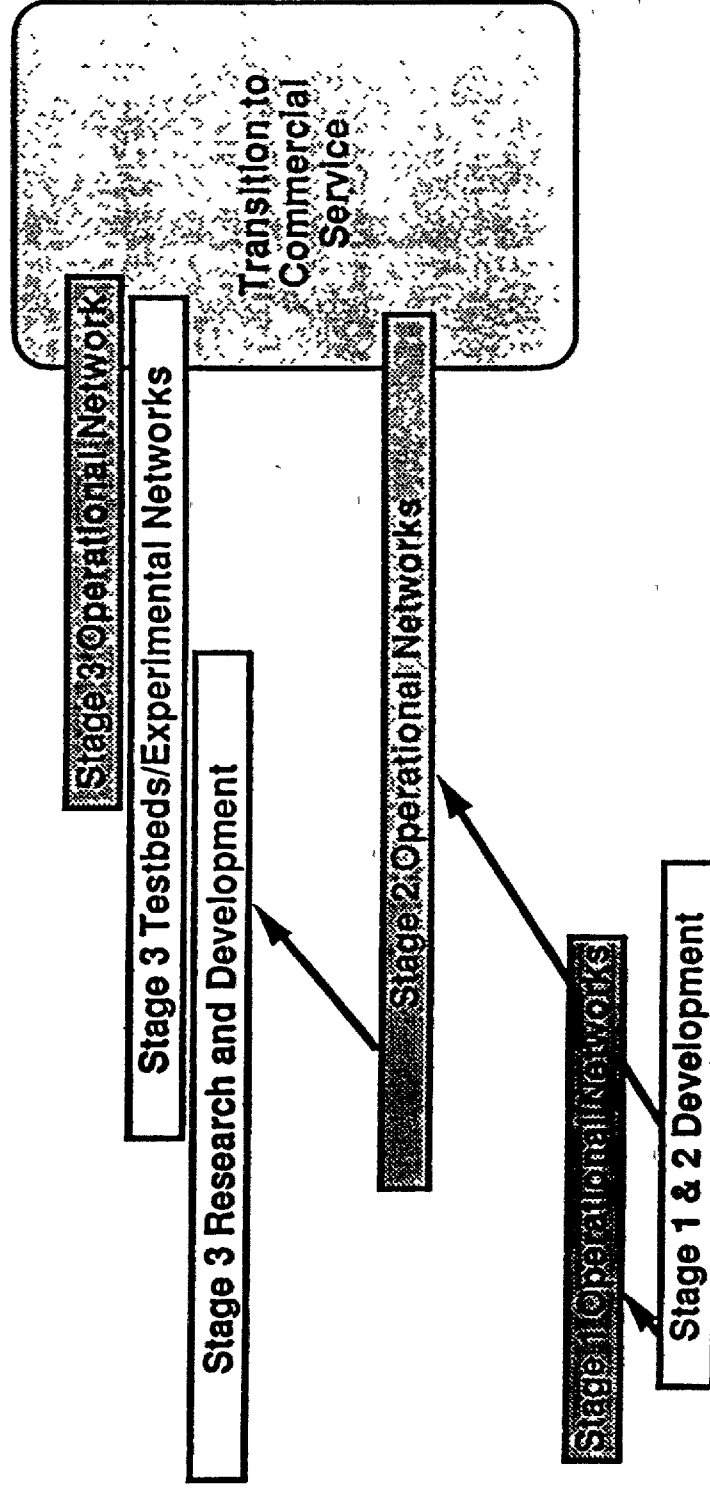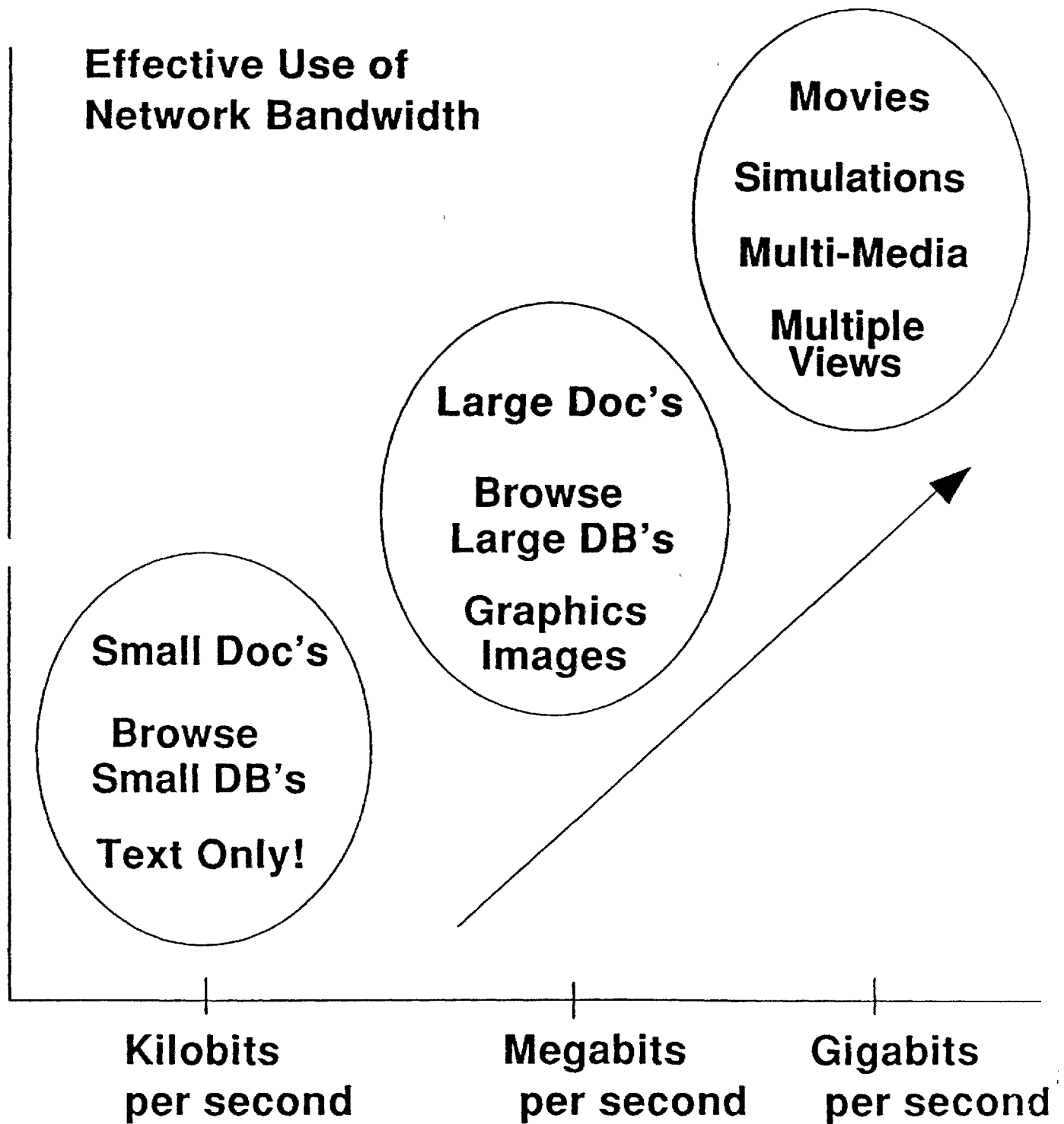Gigabits

size of

user

Community

low speed
dial-up

300

Proposed National Research and Education Network

Stage 3
Gbits/Sec

Stage 2
45 Mbits/sec
NREN

Stage 1
1.5 Mbits/Sec
Internet

Stage 3 Operational Network

Stage 3 Testbeds/Experimental Networks

Stage 3 Research and Development

Transition to Commercial Service

Stage 2 Operational Networks

Stage 1 Operational Networks

Stage 1 & 2 Development

301

**Effective Use of
Network Bandwidth**

Movies

Simulations

Multi-Media

Multiple
Views

Large Doc's

Browse
Large DB's

Graphics
Images

Small Doc's

Browse
Small DB's

Text Only!

Kilobits
per second

Megabits
per second

Gigabits
per second

302

National and International Networking:

From Non-Commercial to Commercial

———————▷

Arpanet   **Internet**

                                    NREN

                                        Federal
                                        Non-Federal

                    NSFnet
                    Regionals
                    Commercial Backbones
                    International
                    LAN's
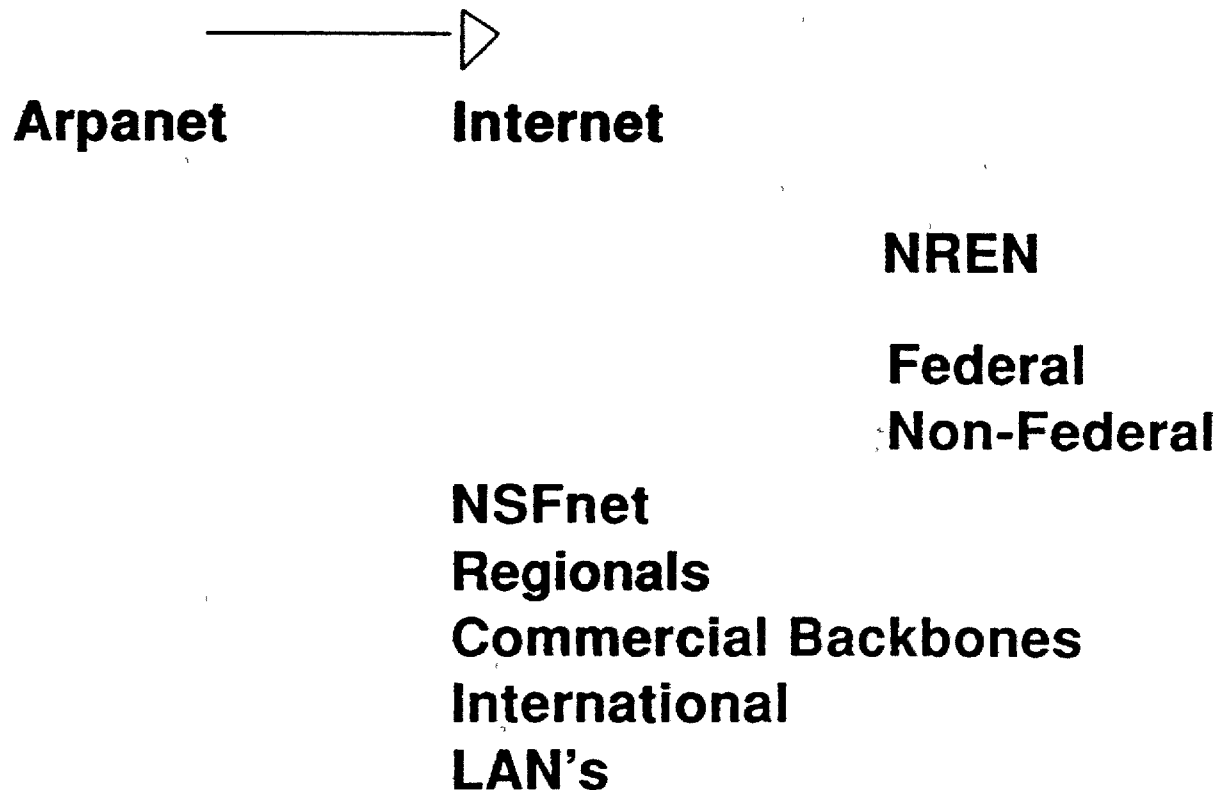
INNOVATIONS FOR CHANGE

- MOVING TO AN IMAGE BASED
  NETWORKING ENVIRONMENT

- INUNDATING WORKSTATIONS OR
  LANS WITH AN ABUNDANCE OF
  INPUT FROM WHICH TO SELECT

- LINKING HIGH PERFORMANCE
  COMPUTERS AT GIGABIT SPEEDS

- INTEGRATING REMOTE SOURCES
  OF HIGH SPEED DATA AND
  LARGE DB'S

- TIME-COMPRESSION

304

THE NATIONAL NETWORK

- AS A COMMUNICATIONS
  INFRASTRUCTURE

- AS A HIGH SPEED BACKPLANE

- AS A METACOMPUTER

- AS A CATALYST FOR CREATIVITY
  AND INNOVATION

- AS THE SPRINGBOARD FOR
  ITS SUCCESSOR

305

MOTIVATION

- ECONOMICS

- COMPETITIVE REQUIREMENT

- BIG ENABLER

    SCIENCE
    MEDICINE
    BUSINESS
    NATIONAL SECURITY
    FINANCIAL
    GOVERNMENT
    EDUCATION

306

Main Goals of the Project

- Evaluate the Utility of "Gigabit Networks to the End User"

- Explore Architectural Alternatives for Gigabit Networks

- Obtain Hands-on Experimental Use of Gigabit Networks and Applications

Note: Assumes availability of carrier facilities and supercomputer resources at no cost to the project.

307

Basic Approach

- **Establish Five Gigabit Network Testbeds**

  Aurora
  Blanca
  Casa
  Nectar
  Vistanet

- **Enable a Small Set of Realistic Applications for demonstration and Evaluation Purposes**

- **Promote Cross-fertilization and sharing of insights and results**

- **Engage Carriers and Computer Vendors in the process**
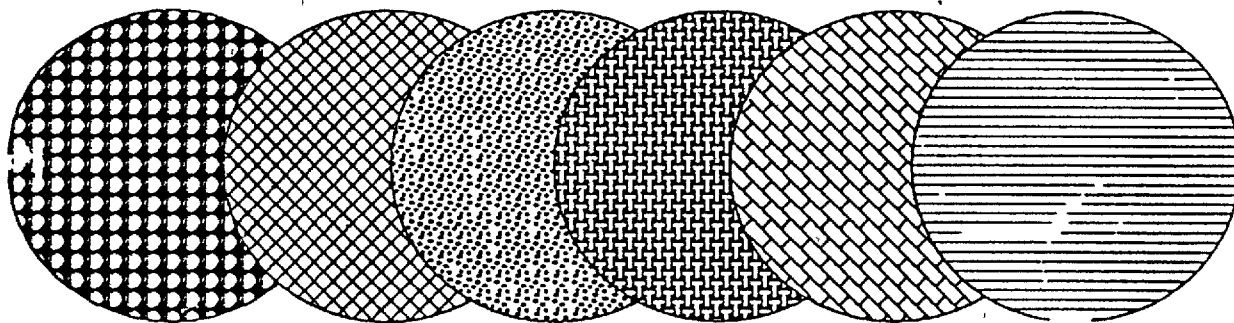
308

Knowledge Structures

Executable Programs

Sensor Data

Databases

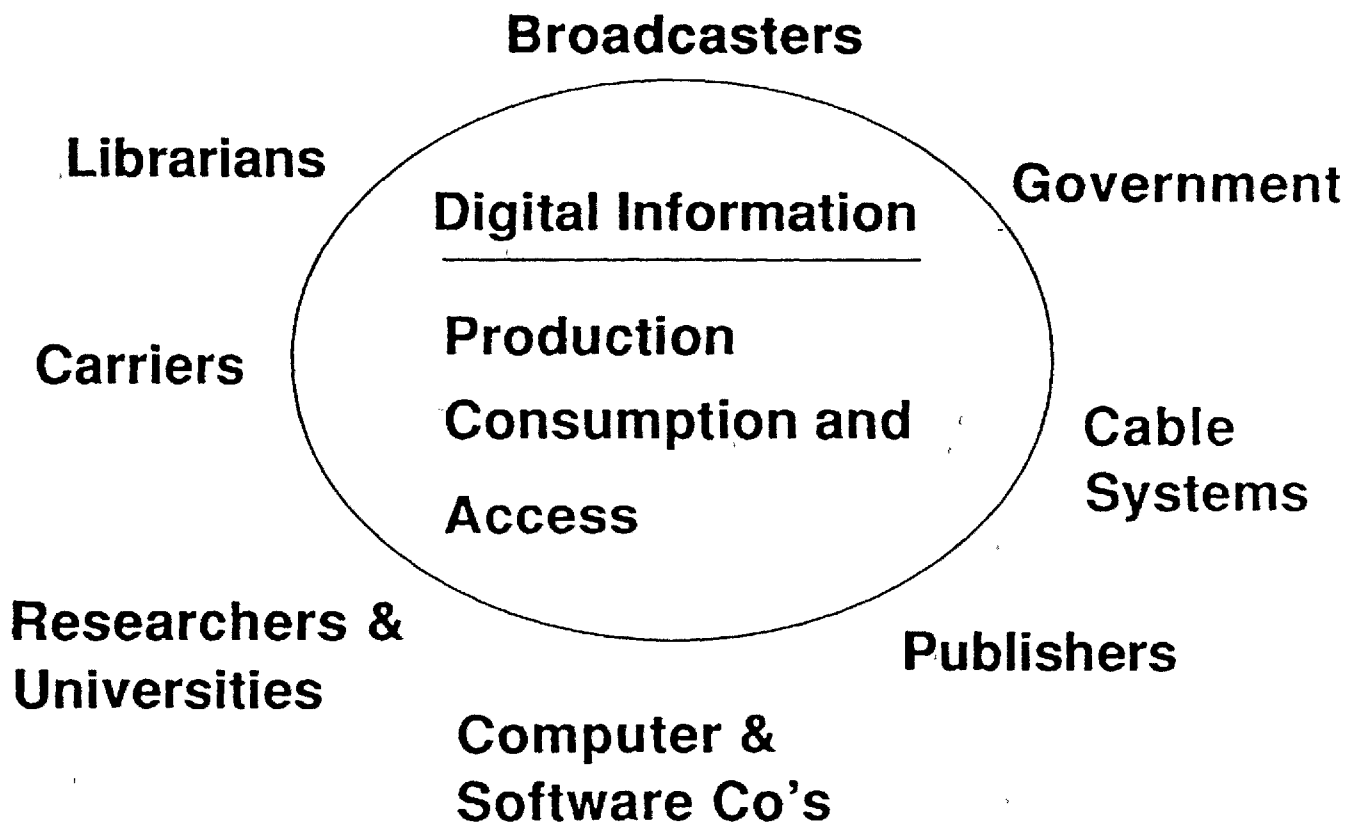Fixed Content

Fixed Presentati n

Software   Data   Printable
Documents

309

Interested Parties

A partial List of Interested Parties is shown below:

Broadcasters

Librarians

Digital Information

Government

Carriers

Production

Consumption and

Access

Cable Systems

Researchers & Universities

Publishers

Computer & Software Co's

WHAT IS "IP"?

- Information Processing

- Internet Protocol

- Intellectual Property

- Important Person

- Interested Party

- Information Provider

- NOT! in Public!

311

IP IN THE NETWORK ENVIRONMENT

- Copyright in the Network Environment

- Electronic Copyright Management

- Copyright Owners and Users
  Government; System Providers

- Opportunities and Concerns

- NREN Internet and the Future

- Multiple Electronic Libraries and DB's

3ι2

Intellectual Property Issues

- Ease of Reproduction and Manipulation
   in a Computer Network Environment

- Lack of Control by Rightsholders

- Authenticity of Material

- Warranties
   Accurate Citations
   Best Efforts Protection & Preservation
   Errors & Omissions Exemption

- Copyright Management Systems in a
   network environment

- Rights beyond the canonical five
   reproduction, distribution, derivative works
   public performance, public display

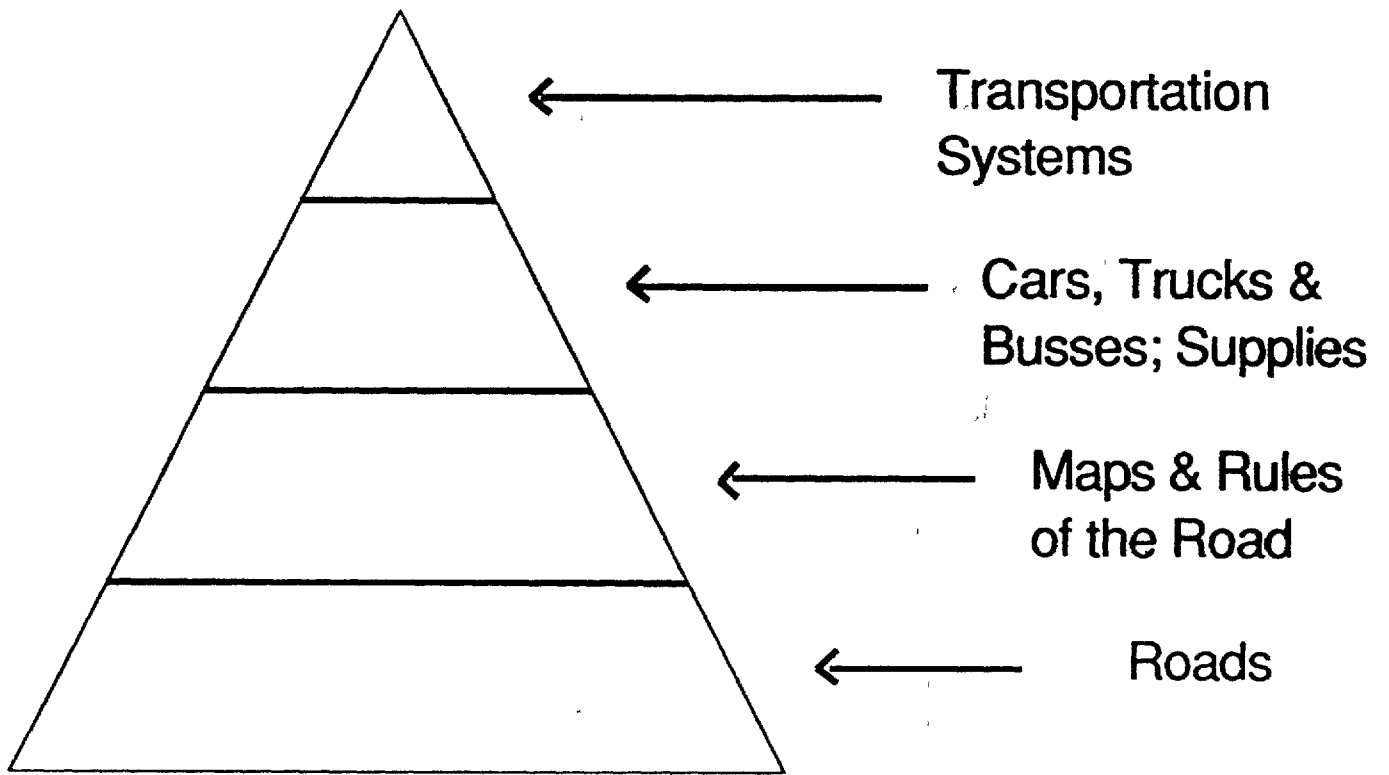313

Intellectual Property Issues

- Role of the Library as a Carrier? Supplier?

- Fair use in a Database System?

- Feist v. Rural Telephone

- Transactional, Block and other forms of
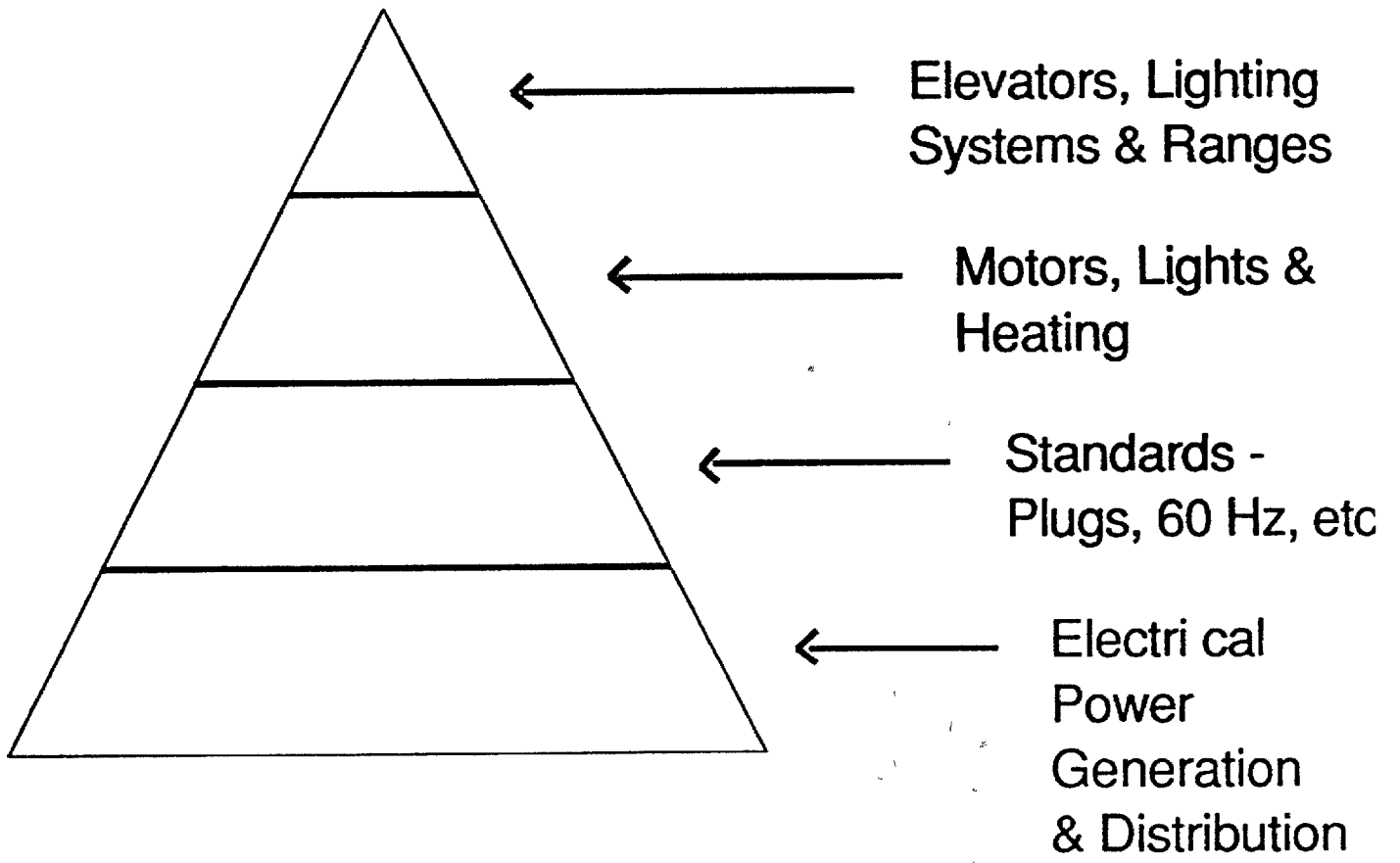   Billing

- Digital Works in Copyright

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ROLE OF THE TESTBED

- Explore Architectural Models for
     Managing IP in a Network Environment

- Develop Techniques for Handling
     Electronic Rights and Permissions

- Demonstrate Integrated Distributed Systems
     for Automated Management of Copyright

- Obtain "hands-on" experience with
     Electronic Copyright Management in
     the Network Environment

- Work together with Interested Parties in the
     IP community to understand the issues,
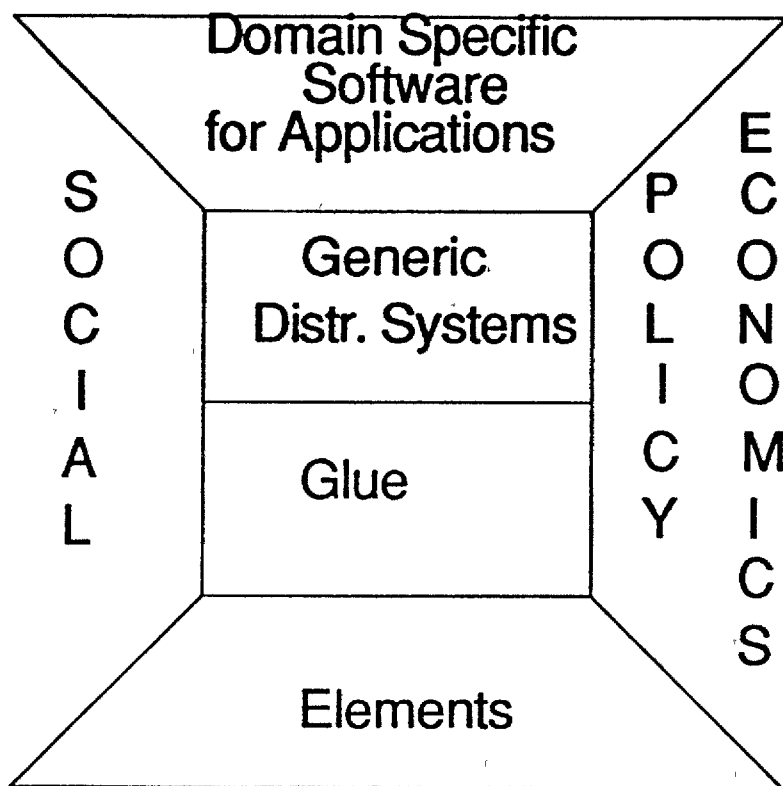   concerns, problems and opportunities

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PROPERTIES OF INFRASTRUCTURE

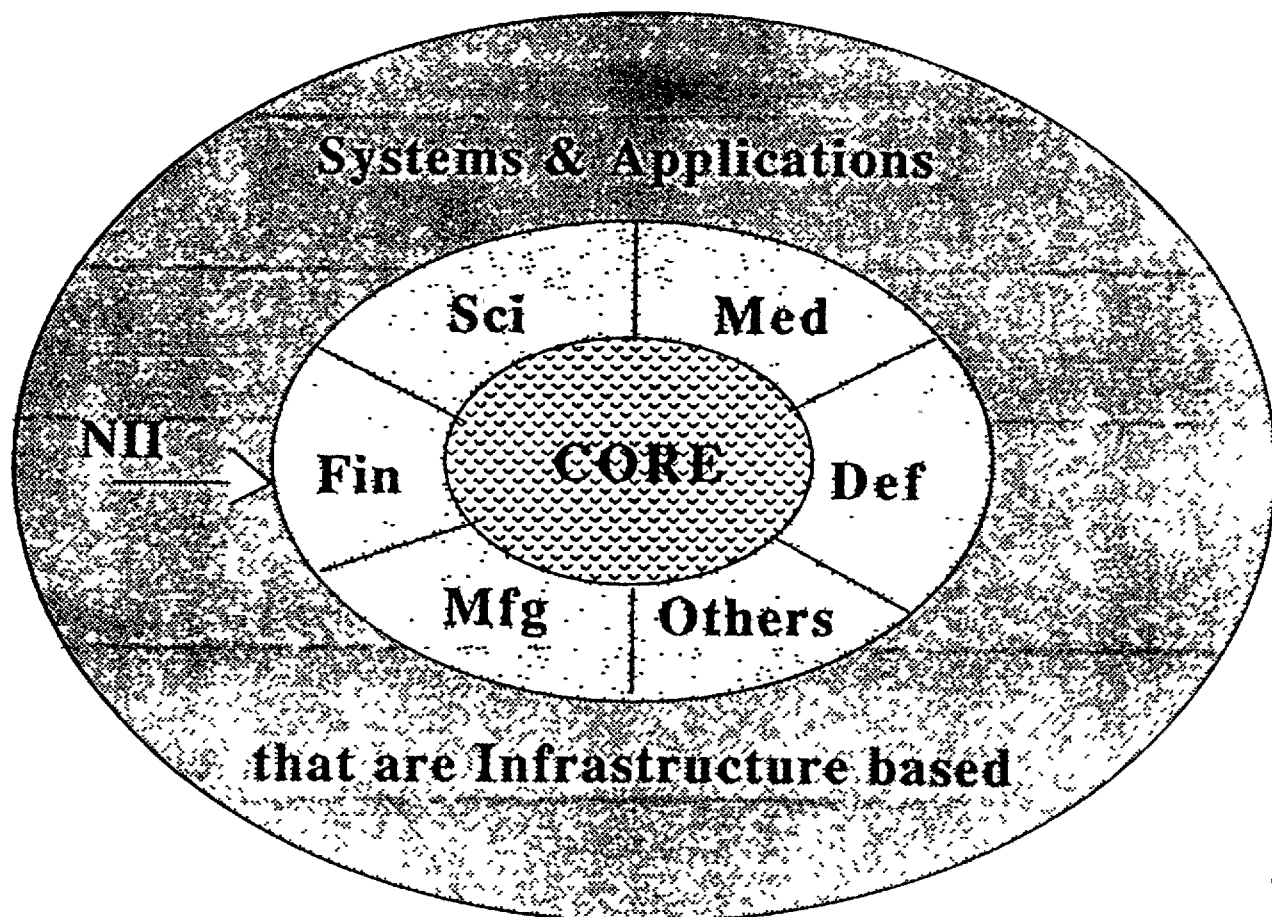* Shareable

* Ubiquitous

* Easy to use

* Cost Effective

316

Transportation Systems

Cars, Trucks & Busses; Supplies

Maps & Rules of the Road

Roads

317

Elevators, Lighting
Systems & Ranges

Motors, Lights &
Heating

Standards -
Plugs, 60 Hz, etc

Electri cal
Power
Generation
& Distribution

318

NETWORKING INFRASTRUCTURE

Domain Specific
Software
for Applications

S
O
C
I
A
L

Generic
Distr. Systems

Glue

Elements

P
O
L
I
C
Y

E
C
O
N
O
M
I
C
S

3i9

A National Infrastructure for

Information Technology and its Application

Systems & Applications

Sci   Med

NII   Fin   CORE   Def

Mfg   Others

that are Infrastructure based

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FIRST INTERNATIONAL SYMPOSIUM: NATIONAL SECURITY & NATIONAL COMPETITIVENESS: OPEN SOURCE SOLUTIONS Proceedings, 1992 Volume II - Link Page

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