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17.181 / 17.182 Sustainable Development: Theory and Policy  
Spring 2009

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# ASSUMPTIONS

**If knowledge is power, we must harness the power of knowledge for managing social transformations.**

**Knowledge e-networking creates new possibilities for all types of empowerment**

**eNetworks are powerful catalysts for voicing social demands & forging development trajectories**



## What is GSSD?

- **Global Knowledge e-Network of e-Networks**
- **Structured Knowledge about Sustainability**
- **System for Multilingual e-Networking**
- **Decentralized Knowledge Provision**



# **Global Context 2009**

- **Globalization & World-wide eConnectivity**
- **Increased Knowledge Intensity**
- **Decentralized Knowledge Provision & Management**
- **Persistent Gaps between Knowledge & Policy**
- **New Technologies for Knowledge Networking**
- **Search for 'Leapfrogging Strategies'**



# Sustainability Challenges

**A serious problems facing decision-makers, scholars, & analysts is inability to access to the body of relevant and contextually rich knowledge.**

**Simply locating knowledge of relevance often among to a serious problem**



## II. The IT Connection – Why e-Tools?

### Supporting Sustainability

- de-materialization
- de-spacialization
- de-centralization &
- de-massification

### Reducing Disconnects

- Information & Use
- Stakeholders & Government
- Planning Agencies & Activities
- Policies & Feedback

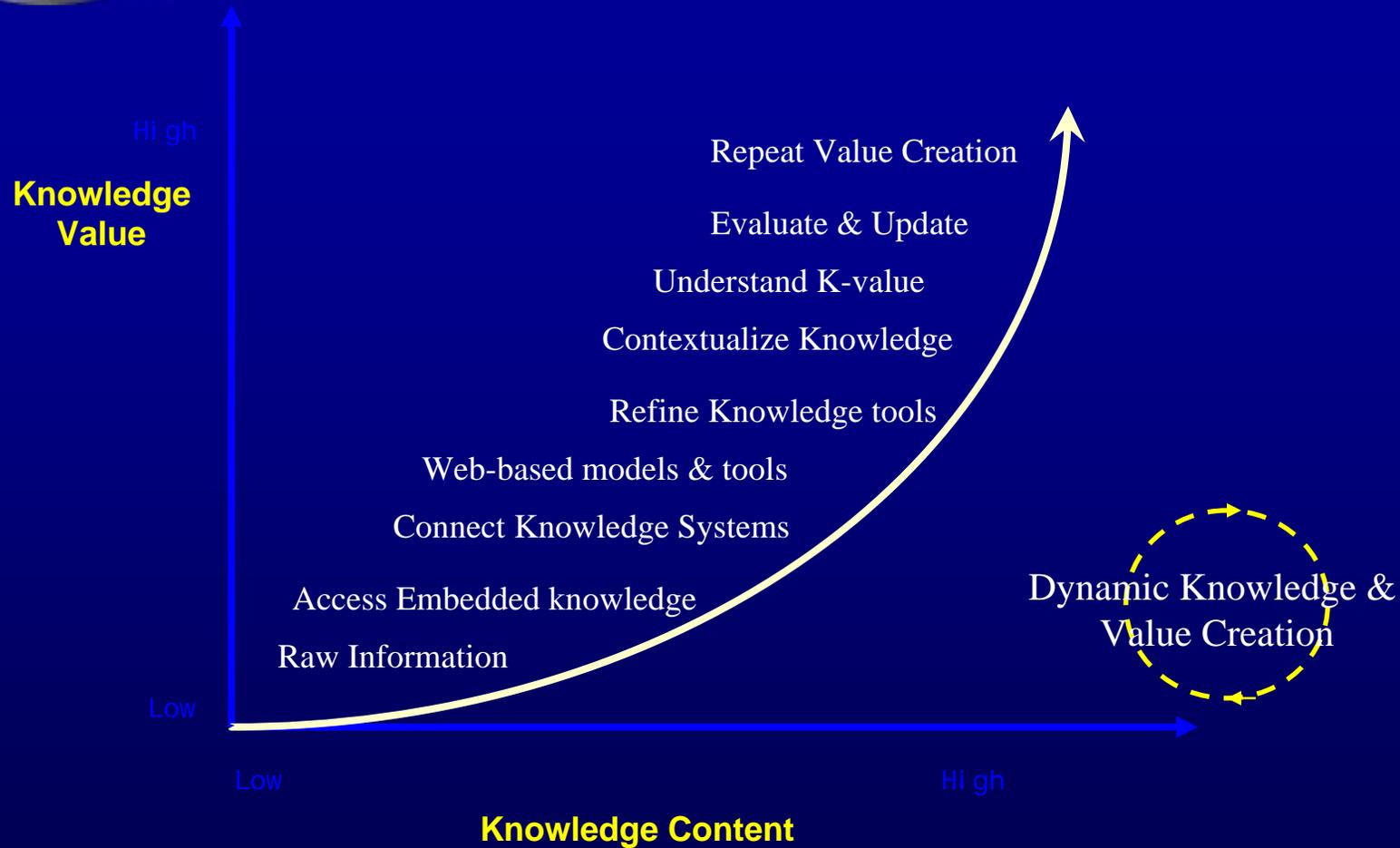


# Internet Global Infrastructure Diffusion

Original graph was removed due to copyright restrictions.  
The graph on the website below is a replacement.  
<http://www.flickr.com/photos/eszter/177313399/>



# Knowledge Value-Chain



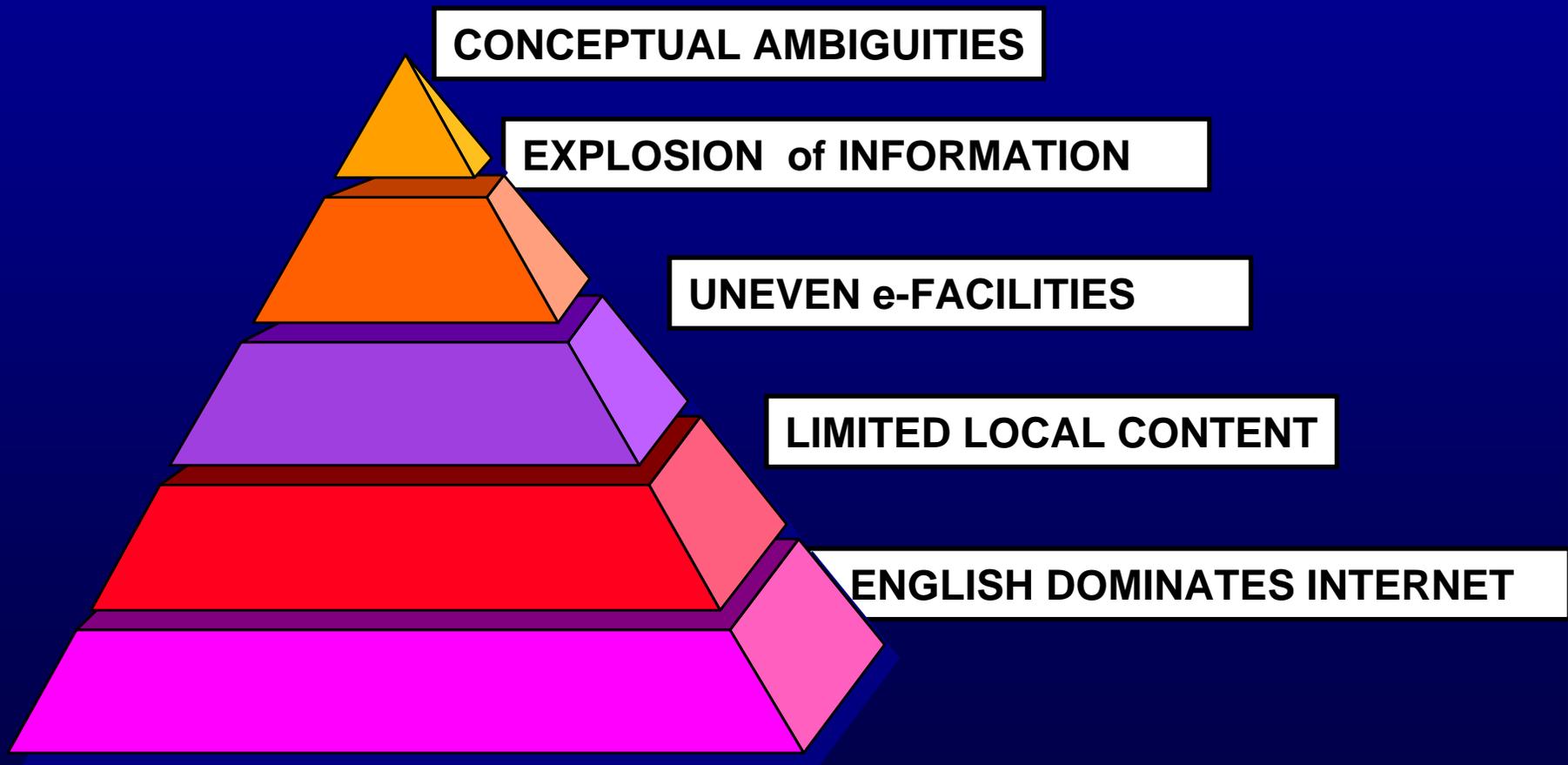


## Identifying Problems & Creating Solutions – Select Issues

- What 'problems'?
- What 'solution' strategies?
- Ontology Matters – Knowledge & its Organization
- Knowledge Provision, Sharing, Management and Distribution



# Specific Barriers to e-Knowledge for Sustainability





## The World Today

**350 Million People Speak English  
as their Native Language**

**5.7 Billion Speak Something Else**

*Source:* The World Bank



## **What does GSSD 'Do'?**

- 1. Web-based system of hierarchical, nested, domain representation for complex systems**
- 2. Selective portable knowledge base, multi-disciplinary perspectives, updated as needed**
- 3. Diverse Navigation & Search Options over the knowledge-base extracted from the Internet**
- 4. Customized workflow for multi-lingual knowledge networking and management**



# **GSSD - Strategies to Reduce e-Barriers**

- **Providing Coherent Conceptual Framework**
  - Multidisciplinary views
  - diverse aspects of 'sustainability'
- **Managing Explosion of Information**
  - Knowledge screening for quality
  - Cross indexing of content
- **Enabling Multilingualism and Localization**
  - Mirror sites
  - Partnerships & in-kind contributions



## What does this require?

- A. Knowledge Network and Networking**
- B. Ontology of Sustainability – Structuring and Framing**
- C. Evolving Knowledge Base**



## A. Knowledge Network

- Computer-assisted organized systems of discrete actors with knowledge producing capacity
- Combined through common organizing principles
- Whereby actors retain their individual autonomy
- Networks enhance value of knowledge to actors & motivate further knowledge expansion



## B. Knowledge Base – e-Library & url's

- **Selected from evolving Internet Materials of roughly 250 Institutional Holdings**
- **Over 3000 Indexed Content, with Multi-disciplinary & Diverse Views**
- **Include concepts & theories, indicators & measures, models & cases, agreements & organizations, policy, strategy & decision**

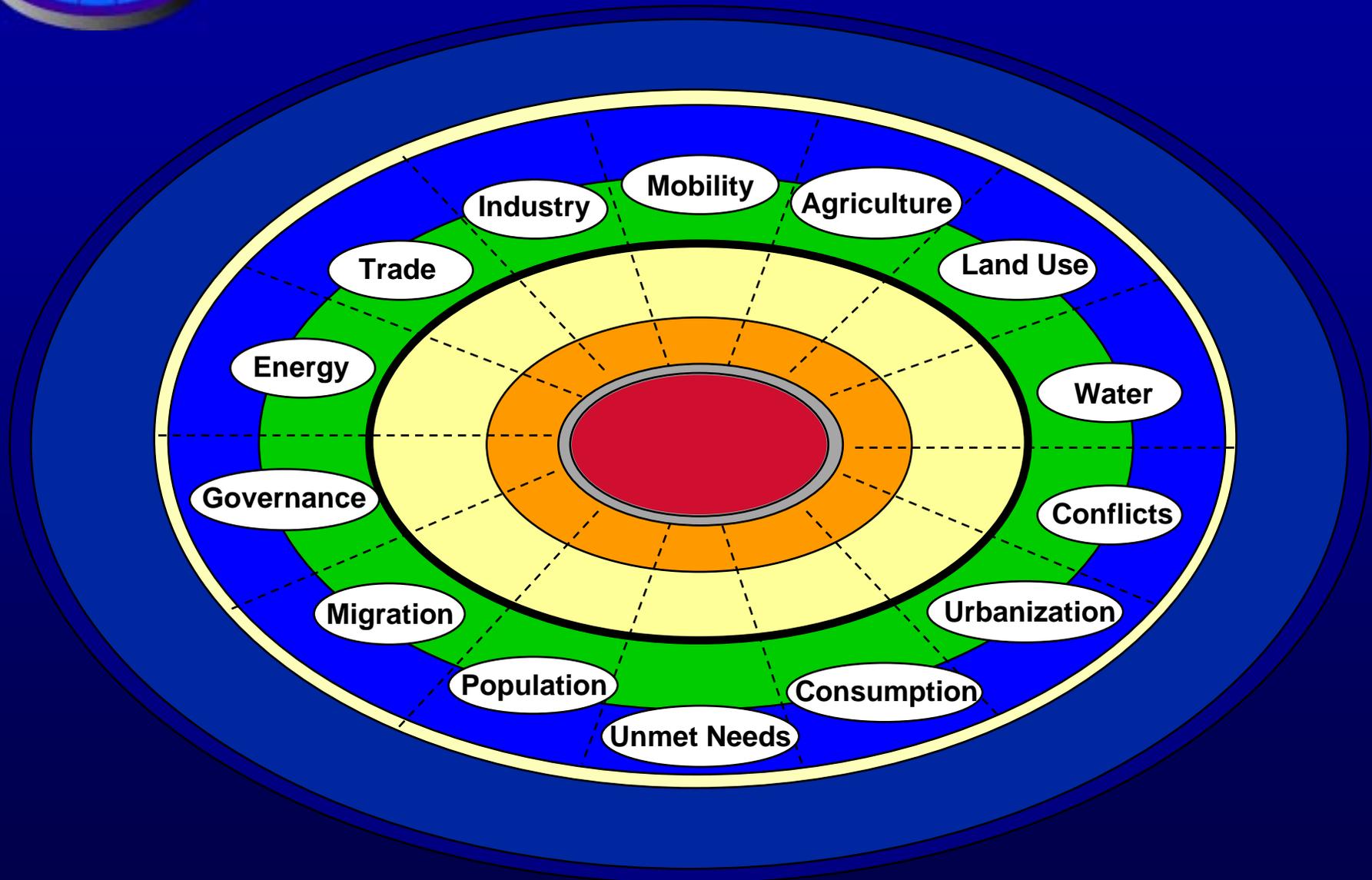


## C. Ontology of Sustainability

- **Domains – topics**
- **Dimensions – issues**
- **Connectivity – linkages**
- **Frames – skeletons & slots to fill out**
- **Knowledge base – e-library'**

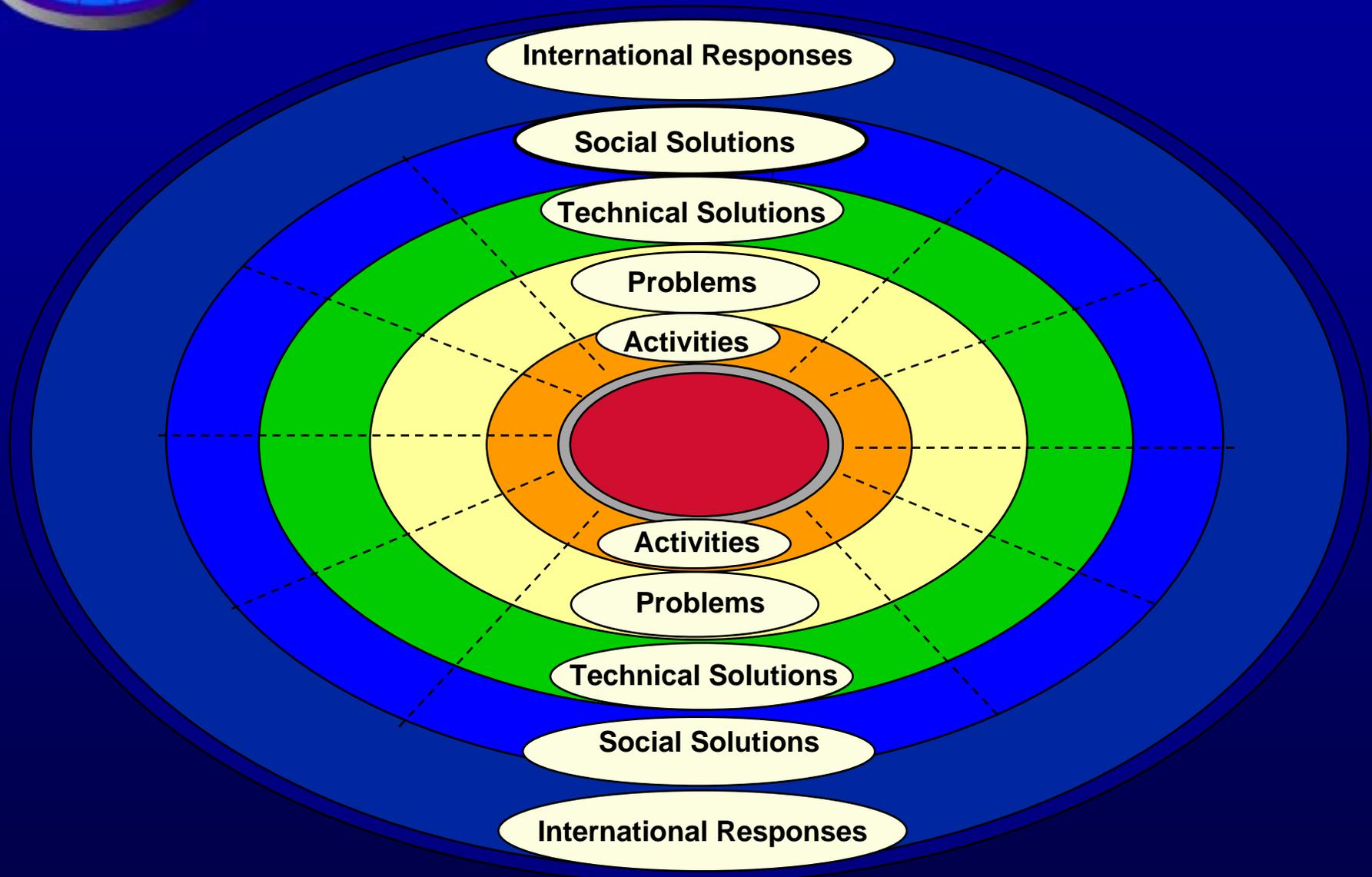


# Conceptual Framework - Slices





# Conceptual Framework - Rings



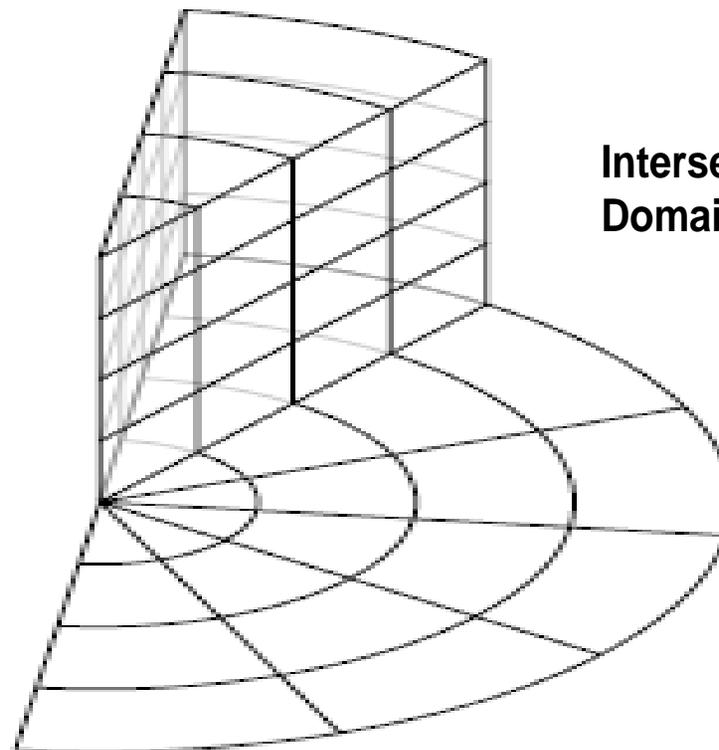


*Organization  
Provision  
Management  
Retrieval*  
*of*  
*Knowledge*



## The Frame System

Domain – The Topics\*



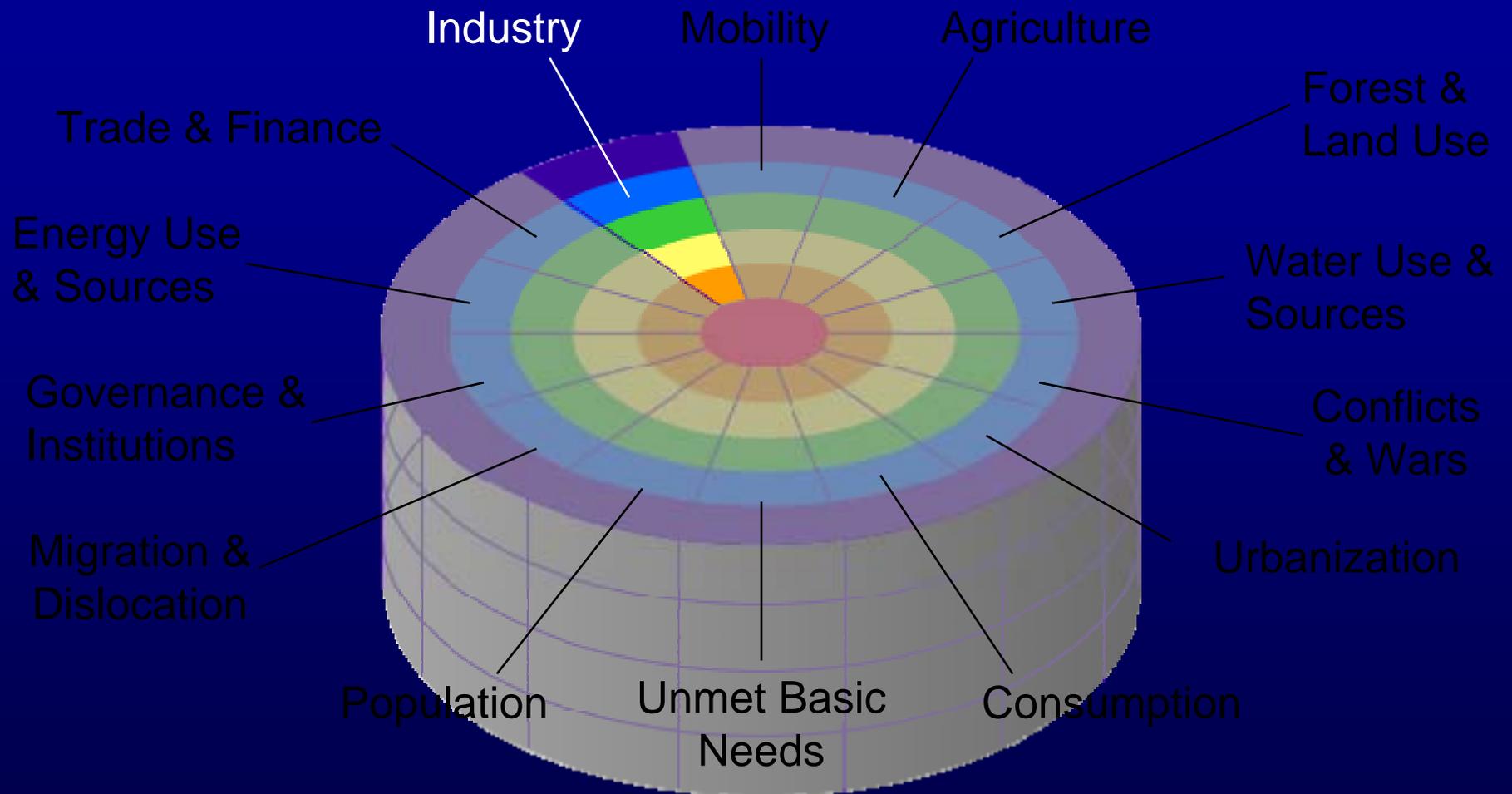
Intersection of  
Domain and Dimension

Dimension – The Issues\*\*

Notes: \* Recall Figure 4.9  
\*\* Recall Figure 4.10



# Industry & Manufacturing Example





## Slice: Industry

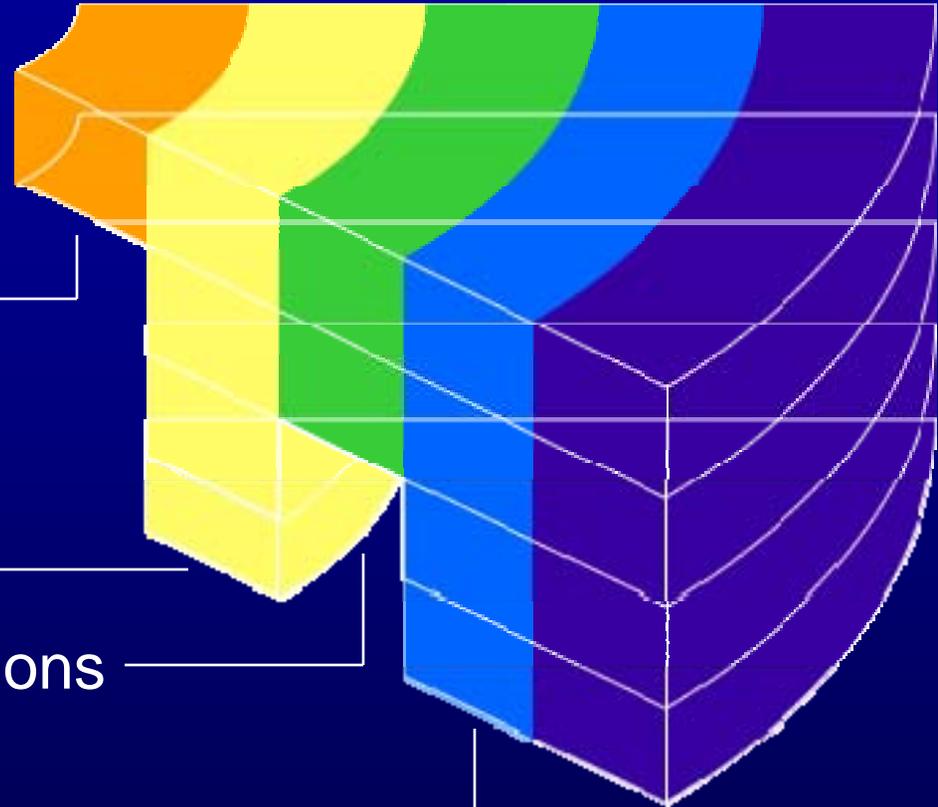
### Rings:

Activities &  
Conditions

Sustainability Problems

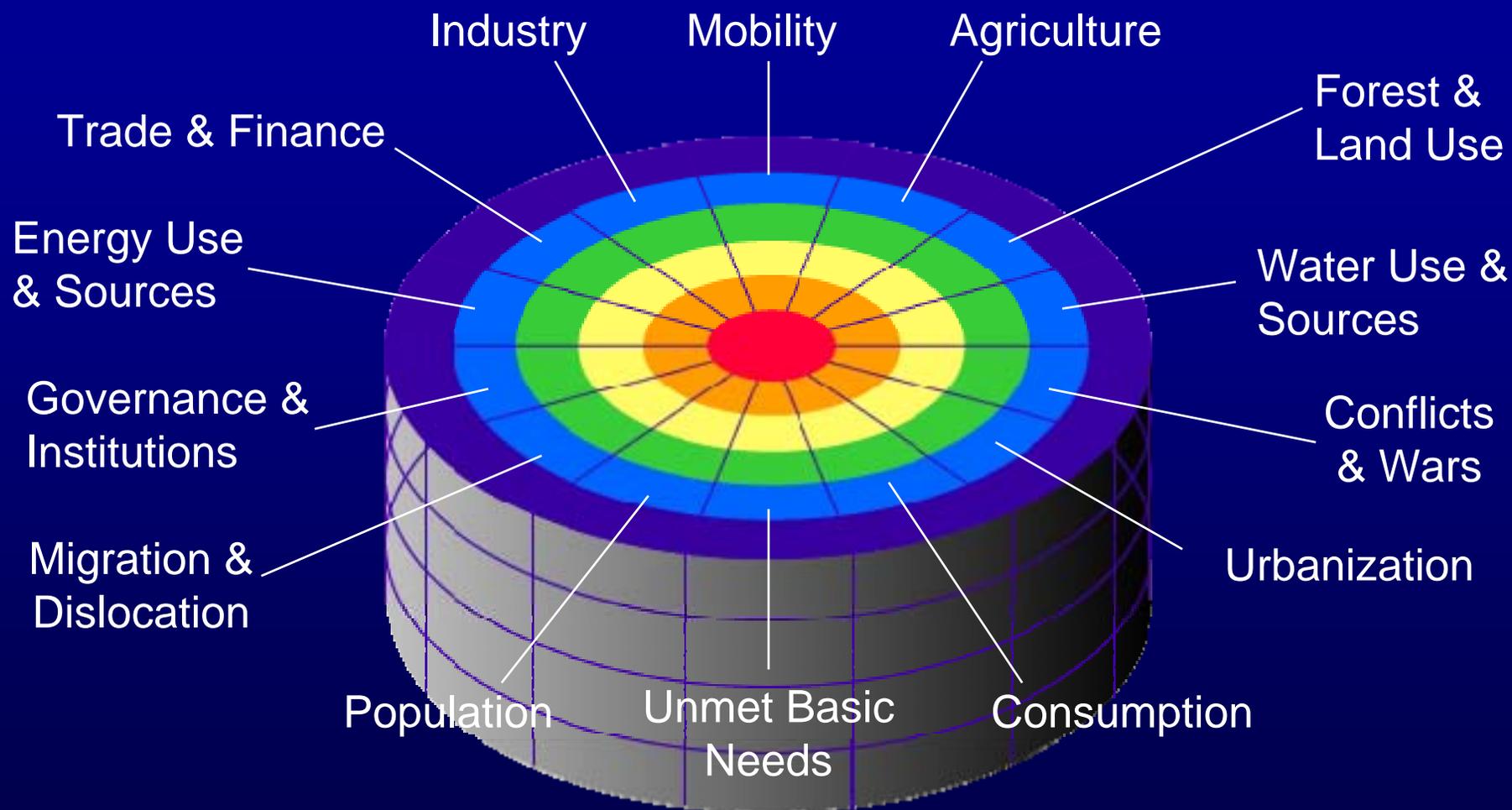
Scientific & Technical Solutions

Social, Economic, Political,  
& Regulatory Solutions





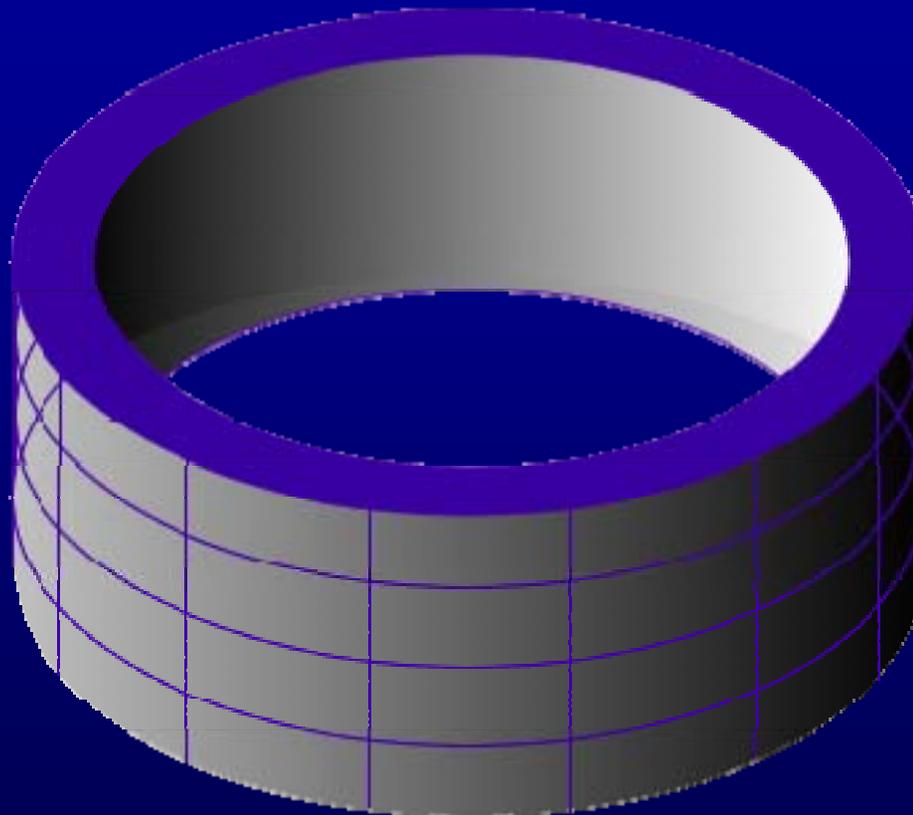
# Conceptual Framework





## International Response & Global Accords

Conventions  
Trade Regimes  
Tech. Agreements  
Agenda 21  
Population Policies  
Dev. Mechanisms  
Peace Strategies  
Environment Accords



Private-Public  
Partners  
Economic  
Adjustments  
Monitoring  
Investment  
Modes  
Institutional  
Strategies  
Codes of Conduct

# Agriculture

## Activities & Conditions

Agriculture

Agricultural Production  
Management of Supply and Demand

## Sustainability Problems

Impacts of Chemicals and Pollutants

Impacts on Land, Water and Air  
Damages Due to Irrigation Systems

Damage to Natural Systems

Damming/Diversion of Rivers  
Wasting of Water via Evaporation  
Impacts of Production Choices

Socio-Economic Dislocations

Ecological Dislocations  
Economic Impacts  
Social Impacts  
Hazards and Wastes  
Mismanagement and Misuses of Technology

## Scientific & Technological Solutions

Improved Agricultural Practices

Better Farm Machinery and Irrigation Systems  
Less Damaging Fertilizer Application Methods  
Improved Capital/Labor Balances  
Minimizing Use of Hazardous Chemicals  
Principles and Practices

Biotechnology Innovations and Use

Improved Genetically Engineered Plans  
Improved Breed Productivity  
Advances in Tissue Culture

## Social Economic, Political & Regulatory Solutions

Improved Markets and Mechanisms

Effective Financial Instruments  
Improved Market Access and Performance  
Reliable Sources of Finance for Agriculture  
Market-Based Measures for Regulation

Government Oversight

Provision of Resources  
Enforcing Standards in Inputs and Processes  
Monitoring of Stocks, Performance and Quality  
Innovation in Policies and Credit Facilities

Improved Socio-Economic Conditions

Reduction/Termination of Debt  
Improved Income Distribution  
Better Working Conditions  
Enhanced Role of Women  
Improved Health and Sanitation Conditions

New Policy Responses

Formal Intra and International Cooperation  
Informal Intra and International Activities  
Enhanced Institutional Collaboration  
New Policies and Principles

\*\*\*\*\*



# Agriculture

Activities &  
Conditions

Agriculture

Impacts of Chemicals and Pollutants

Sustainability  
Problems

Damage to Natural Systems

Socio-Economic Dislocations



# Agriculture

Scientific &  
Technological  
Solutions

Improved Agricultural Practices

Biotechnology Innovations and Use

Social  
Economic,  
Political &  
Regulatory  
Solutions

Improved Markets and Mechanisms

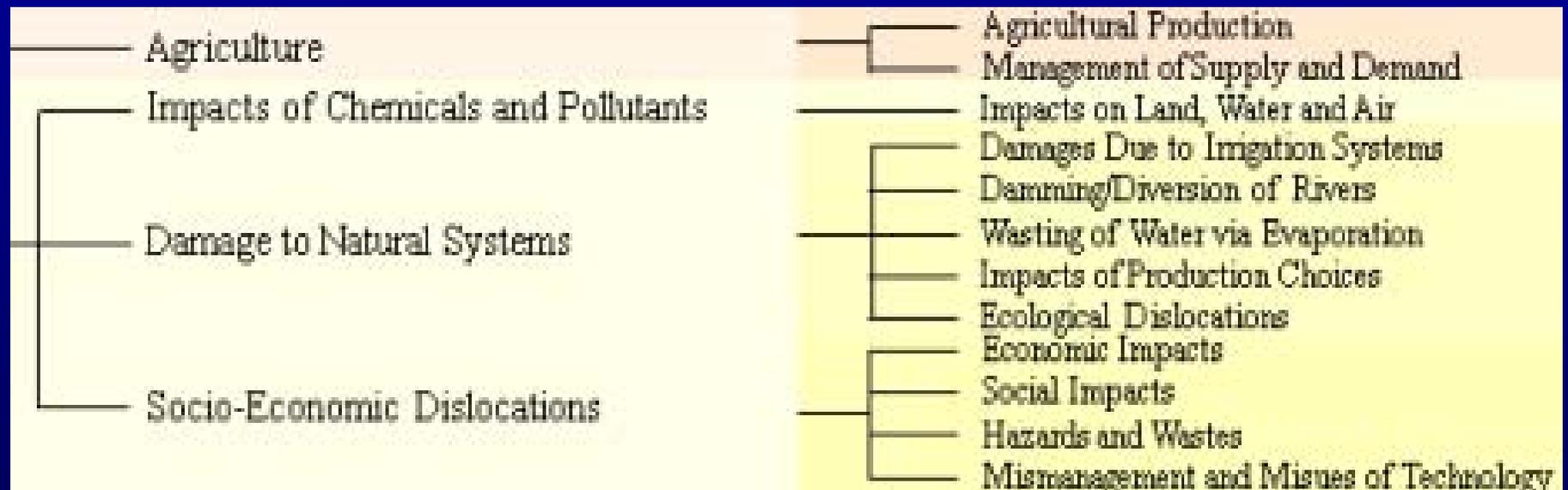
Government Oversight

Improved Socio-Economic Conditions

New Policy Responses

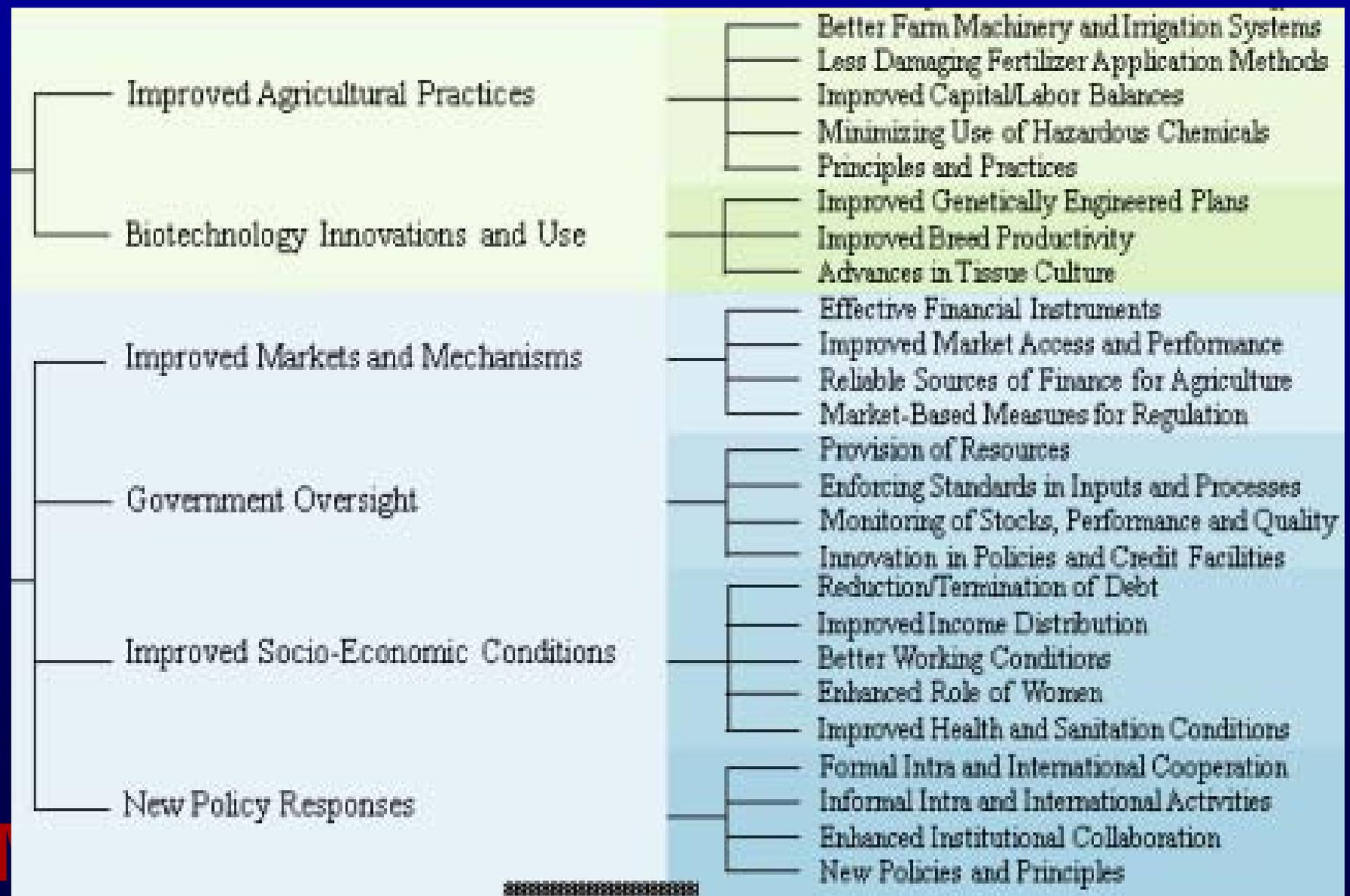


# Agriculture





# Agriculture



**Global System for Sustainable Development**

**Knowledge Meta-Networking for Decision & Strategy**

**MIT**

**What's New**

**Search GSSD**

**Using GSSD**

**GSSD Reports**

**Submit Site**

**Consortium**

**What's New**

Welcome to What's New!

[Director's Message](#)

Periodically, the Director's Message shares new developments and insights gained in the course of our international collaboration. The messages are designed to express our thanks to all of those who are part of this initiative for their valuable contributions to our innovative beginnings and to look forward to the challenging next steps one step at a time.

[News & Notables](#)

Here we note recent events, releases, current initiatives and updates of relevance.

[New from CyberPartnerships](#)

We are pleased to welcome new partnerships and collaborations.

[New On Site](#)

If you are a previous user of the Global System for Sustainable Development, you've noticed that there have been a lot of changes to our site. We are currently upgrading basic functions in a variety of ways to make GSSD easier and more useful. See what's new around the site!

**Search GSSD**

[Click Here to Search the Knowledge Base](#)

The core of the Global System for Sustainable Development (GSSD) is its evolving quality controlled and cross-referenced index to some of the best sources and materials on sustainability found on the Internet. The GSSD search engine and browsers differ from standard Internet search engines in that they reduce barriers to knowledge in six important and distinctive ways:

- Screening:** GSSD locates, reviews, and then catalogs only the most robust materials to be found on all facets of sustainable development. Site submissions to the GSSD knowledge base are professionally screened prior to inclusion and indexing. This saves the user a great deal of time and effort.
- Indexing & Cross Referencing:** Individual entries in the GSSD knowledge base are text indexed and cross-referenced in order to provide quick and efficient search facilities. For a full description of conceptual and operational features click on Using GSSD in the left frame.
- Consistent Conceptual Framework:** The GSSD knowledge base is searchable by fourteen issue areas (pieces), the problem/solution (ings), and many sub-concepts as well as by region of the world, knowledge type, and user-specified combinations. The GSSD knowledge base also has several specialized searches which together mean that GSSD can be used as a personalized "research assistant".
- Abstracting:** An abstract is made for each site reviewed and included in the GSSD knowledge base. Rather than count on a program that lifts the first few lines from a site or targets the home page to use as a guide, the inclusion of abstracts allows the GSSD user to quickly know whether or not the reviewed site contains materials of interest.
- Translation:** The abstracts and all of the referencing information for entries in the GSSD knowledge base will be translated into GSSD's supported languages. This will allow a user's limited translation resources to be directed only to sites already understood to contain desired knowledge. GSSD is currently in the process of adding this functionality which is expected to come on line for Chinese, French, and Arabic in September of 1999.
- Coverage:** Currently the knowledge base consists of over 2,500 abstracted, indexed and cross-referenced sites. These sites are drawn from more than 250 countries worldwide.

**Using GSSD**

Welcome to the Global System for Sustainable Development (GSSD), a project of the Global Accord Consortium for Sustainable Development housed at MIT. GSSD consists of an evolving quality controlled and highly cross-referenced index to some of the best resources and materials on sustainability to be found on the Internet organized in an intuitive conceptual framework. Details on relations, design and the theoretical framework used can be found by following the links below, and clicking the Search GSSD button on the left will let you begin to search through our knowledge base.

**Introduction:** Introduction of the Global System for Sustainable Development

**GSSD Functionality:** Describes the basic design and functions of the GSSD knowledge network

**Guide to Core Concepts:** Defines the conceptual framework and strategy employed to organize the kn...

**Sustainability Knowledge Base:** Describes the principal searchable holdings of GSSD, the sustainability knowledge base

**GSSD Meta Networks:** Summarizes the diversity of the contributors to and users of GSSD

**GSSD Showcase:** Presents overview of global context, connectivity, structure and uses

**Represented Institutions:** Associations, institutions, and organizations represented in GSSD's knowledge base

**GSSD Glossary:** Provides definitions for the key terms used in GSSD

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**GSSD Reports**

GSSD supports ongoing reports on scientific developments and/or policy deliberations. These are designed to cover:

[Research](#)

[Proceedings of GSSD Conference](#)

[Science, Technology & Policy](#)

[MIT Press Series](#)

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**Contact GSSD**

**Members of the GSSD Team**

**Director:**  
Harsh Chhabra, Director  
Professor of Political Science, MIT  
Associate Director, Technology & Development Program

**Team Members:**

**Knowledge & Content Development**  
Adrian P. Hord  
Paula S. Dearbon  
Elio Huang  
Amy Thayer

**Technical Management & Development**  
Steven R. L. Millman  
Vigor Hartzelsson  
Faqueen Ge  
Simon Hewatt  
Patma Hebl

**Members of the International GSSD Teams:**

- GSSD MIT
- GSSD French
- GSSD Arabic
- GSSD Spanish
- GSSD Chinese
- Part Contributors to GSSD

**Institutional Contributors:**

**Submit Site**

**ABSTRACT DETAILS**

*If the abstract is data set, please select "Data Set" under Submission Type and fill out the Organizational Information below.*

**Submission Type**  
 Acrobat (PDF)  
 Data Set  
 FTP  
 MetaGDS  
 WWW

**Title**

**URL Arabic**

**URL Chinese**

**URL English**

**URL French**

**URL Spanish**

**URL Other**

**Abstract**

**Country**

**Region(s)**

*Click to select multiple values*

Continental North America  
 Oceania  
 Continental Central America  
 Caribbean Central America

**ORGANIZATIONAL INFORMATION**

**Input By**

Netcape 6

File Edit View Search Go Bookmarks Tasks Help

http://gssd.mit.edu/GSSD/gssden.nsf/submitFrameset?OpenFrameSet Search

Home My Netcape Search Shop Bookmarks Net2Phone Instant Message WebMail Contact Reference People Yes



- What's New
- Using GSSD
- Search GSSD
- GSSD Reports
- Submit Site
- Consortium
- Contact GSSD



U.S. Patent: #6752023

# Submit Site

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**ABSTRACT DETAILS**

(If the entry is a data set, please select "data set" under Submission Type and fill out the Originator Information below)

**Submission Type** ◆

- Acrobat (PDF)
- Data Set
- FTP
- Map/GIS
- WWW

**Submission Language** ◆ To enter an abstract in Arabic or Chinese, please go to the Arabic or Chinese pages  
 English

**Title** ◆

**URL Arabic** ◆

**URL Chinese** ◆

**URL English** ◆

**URL French** ◆

**URL Spanish** ◆

**URL Other** ◆

**Abstract** ◆

**Country** ◆



# Graphical Options

Netscape

File Edit View Go Communicator Help

**Search GSSD**

There are currently four search options available for searching the GSSD knowledge base. The GSSD user may choose to use using our graphical navigators to browse the entire knowledge base by issue area and problem/solution; the industry specific entries by industry type and problem/solution; or our holdings of the [Alliance for Global Sustainability](#). The GSSD user may also employ simple and advanced text based searches over the entire knowledge base. Click on one of the graphics below to continue!

Text Searches	Graphical Browsers		
			

Copyright © 1999 GSSD™

Document: Done

MIT

U.S. Patent: #5752023



# Current e-Networks Mirror Sites



# النظام العالمي للتنمية المستدامة

ما هو الجديد

إبحث في GSSD

إستعمل GSSD

تقارير GSSD

إتصل GSSD

زيادة موقع

الإتحاد

شبكة المعرفة الكبرى للقرار والإستراتيجية



# 全球可持续发展系统

新消息

搜索 GSSD

使用 GSSD

GSSD 报告

与 GSSD 联系

向站点提交

咨询机构

## 决策知识网络



# GSSD in China

China's Agenda21 - Microsoft Internet Explorer

文件(F) 编辑(E) 查看(V) 转到(G) 收藏(A) 帮助(H)

后退 前进 停止 刷新 主页 搜索 收藏 历史 频道 全屏 邮件 字体 打印 编辑

地址 http://www.acca21.edu.cn/ 链接

**中国** 可持续发展  
**CHINA'S AGENDA 21**

文件下载 FTP 站点联结 Other Links 搜索引擎 Search Engine 数据库 Database

最新动态 (2001. 01. 15): 农业、农村、农民

[组织机构](#)  
Institution

[战略研究](#)  
Strategy Research

[地方 21 世纪议程](#)  
Local Agenda 21

[环境无害化技术](#)  
Environmentally Sound Technology

[全球可持续发展系统](#)  
Global Systems for Sustainable Development (GSSD)

[可持续发展信息网](#)  
Sustainable Development Information Networking

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Sustainable Communities

[中国可持续发展研究会](#)  
The Chinese Society for Sustainable Development

[国家创新药物研究](#)  
National New Drug Discovery Project

[中药现代化](#)  
Modernization of Chinese Materia Medica

动态 news  
简介 Introduction  
简讯 Newsletter  
出

Internet 区域

N. Choucri



## **Our Common Challenge**

- **Make Knowledge Widely Available**
- **Organize Masses of Materials**
- **Meet Needs of Diverse Groups**
- **Increase Local Access to Global Knowledge**
- **Increase Global Access to Local Knowledge**



# Knowledge for Transitions to Sustainability

- From 'supply chain' to 'knowledge chain'
- From material production to meeting social needs
- From isolated understanding to increased value due to knowledge deployment
- From knowledge creation to knowledge diffusion through networking practices



# Conclusion

## New Knowledge Frontiers

- Collaborative Knowledge Management
- Multi-lingual Search Functionality
- Mirror Site Locations
- Software Agents for Knowledge
- Multi-Media & Distance e-Learning
- New Venues for e-Governance
- Novel Modes of e-Participation & Voicing
- Other?

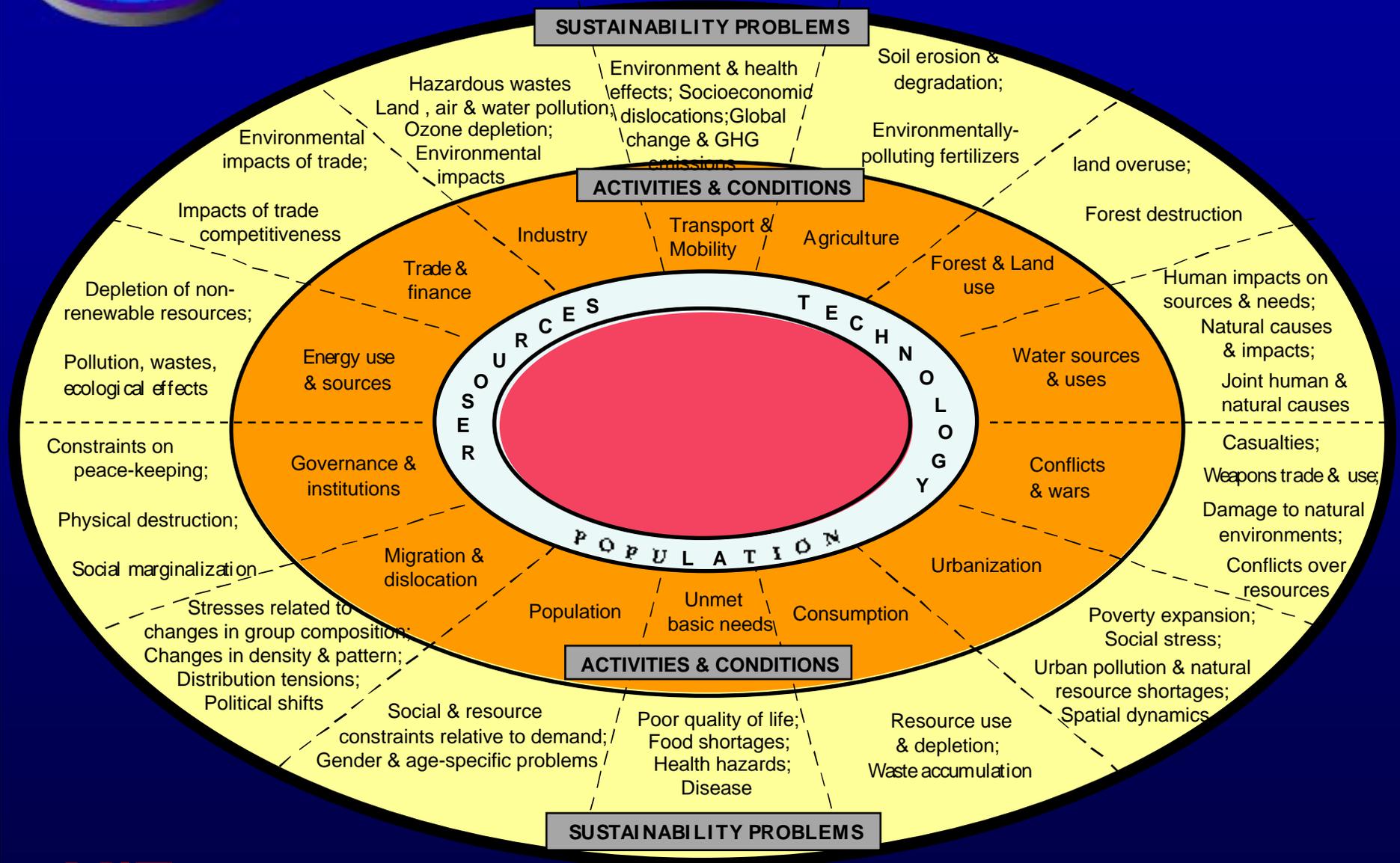


# BACKUPS



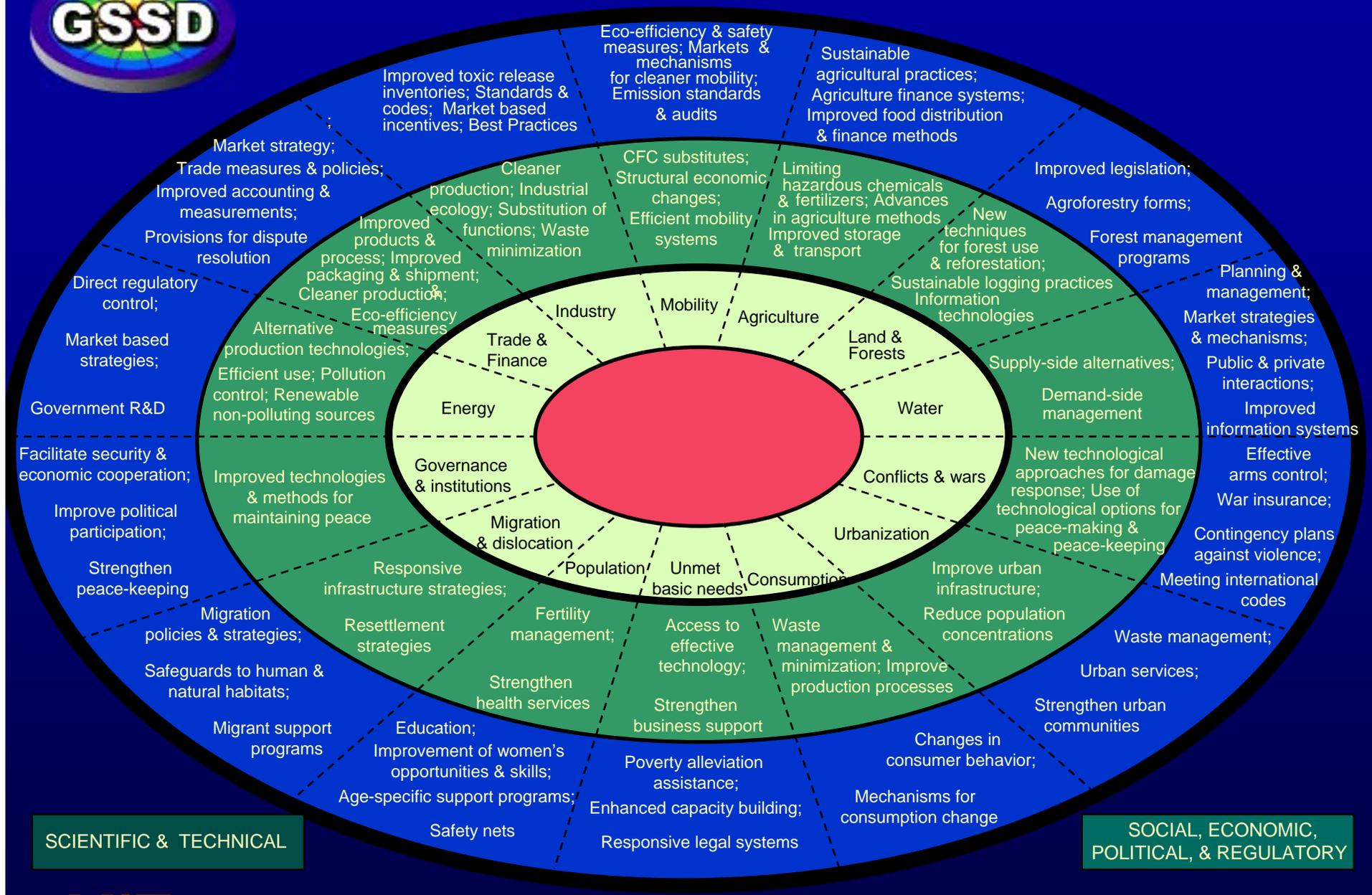
# FRAMES – ‘FILLING the SLOTS’

## From Activities & Conditions to Sustainability Problems





# TYPES of SOLUTION STRATEGIES



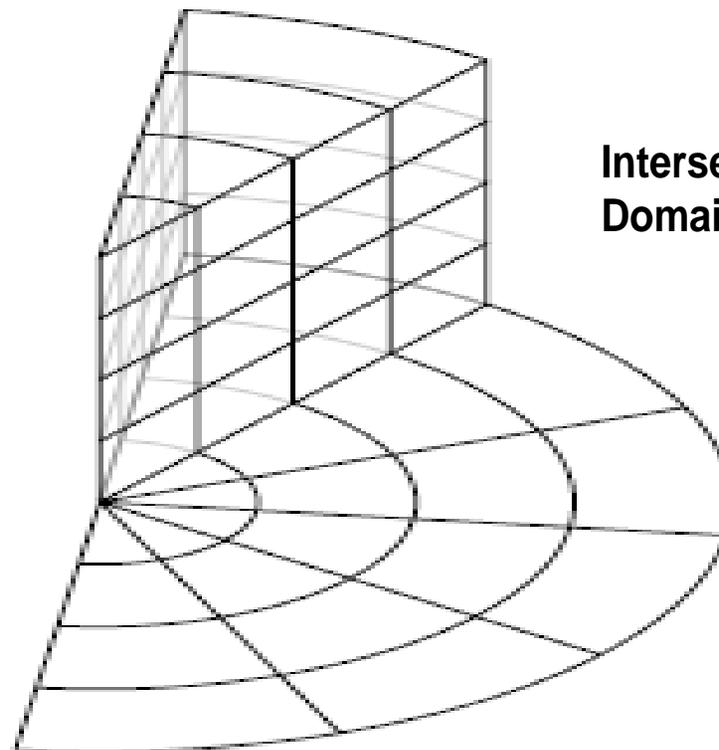


*Organization  
Provision  
Management  
Retrieval*  
*of*  
*Knowledge*



## The Frame System

Domain – The Topics\*



Intersection of  
Domain and Dimension

Dimension – The Issues\*\*

Notes: \* Recall Figure 4.9  
\*\* Recall Figure 4.10