

SOFTWARE DECISION FOR  
**KNOWLEDGE MANAGEMENT**



Joint Advanced Student School  
Saint-Petersburg, 2008

Professor: Gavrilova T.A.

*Dudorov D.V., Jin HaiNan*



# Contents

- Introduction
- Basic approaches
- History of KM
- Ways of getting knowledge
- Knowledge Management System
- Ontology
- Our software decision
- Perspectives
- Conclusion



# What is Knowledge?

- Knowledge is neither data nor information, though it is related to both, and the differences between these terms are often a matter of degree.
- Data, information and knowledge are not interchangeable concepts.
- Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms.



# What is Knowledge Management?



The leveraging of collective wisdom to increase responsiveness and innovation.

Knowledge Management is intended to allow organisations to protect and develop their knowledge resource.

Knowledge Management is a management discipline that focuses on enhancing knowledge production, integration and use in organizations.

A cycle of knowledge creation, integration and dissemination.

---

# Objective of KM:

**RIGHT** information

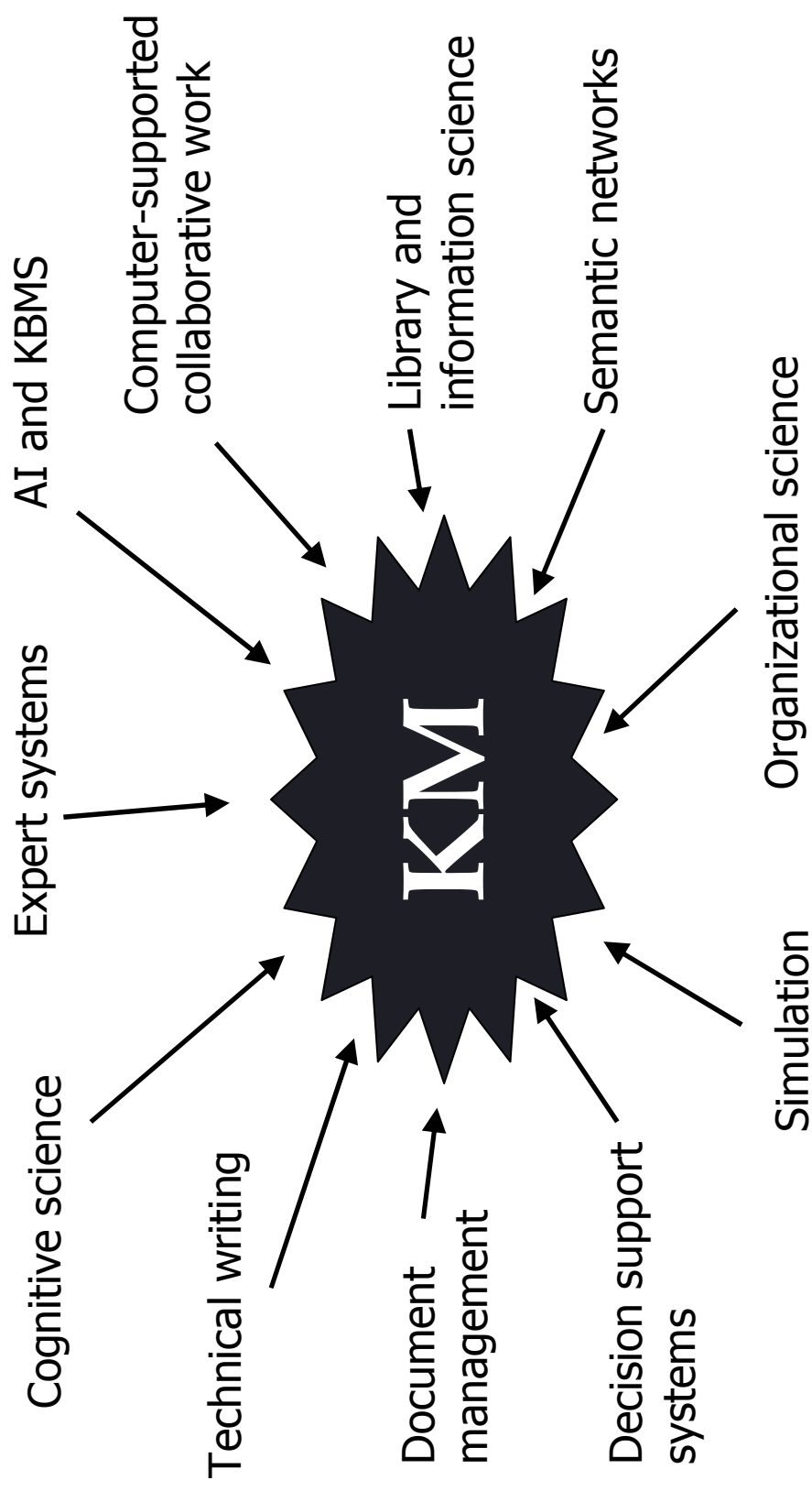
(just in time)

**RIGHT** person

the **MOST**  
**APPROPRIATE** decision

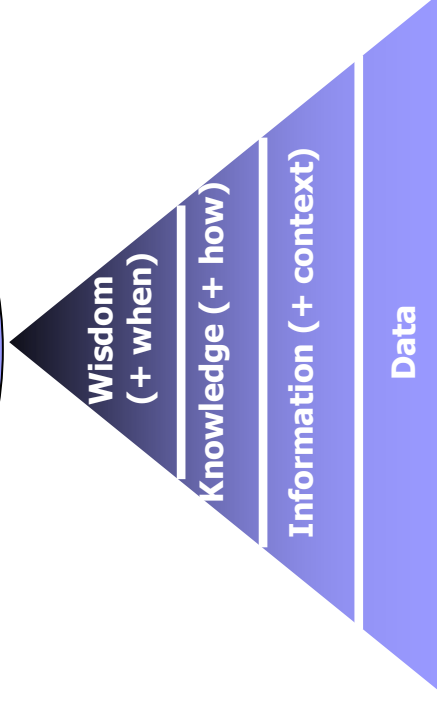


# Disciplines and Technologies:



# KM theory models:

**DIKW model**



**Polanyi's model**



**Explicit knowledge**

what we have codified

**Tacit knowledge**

what is in our heads



# Why do we need KM ?

- Reductions in staffing create a need to replace informal knowledge with formal methods.
- Competitive pressures reduce the size of the work force that holds valuable business knowledge.
- The amount of time available to experience and acquire knowledge has diminished.
- There is a need to manage increasing complexity as small operating companies are trans-national sourcing operations.
- Most of our work is information based.
- Products and services are increasingly complex, endowing them with a significant information component.

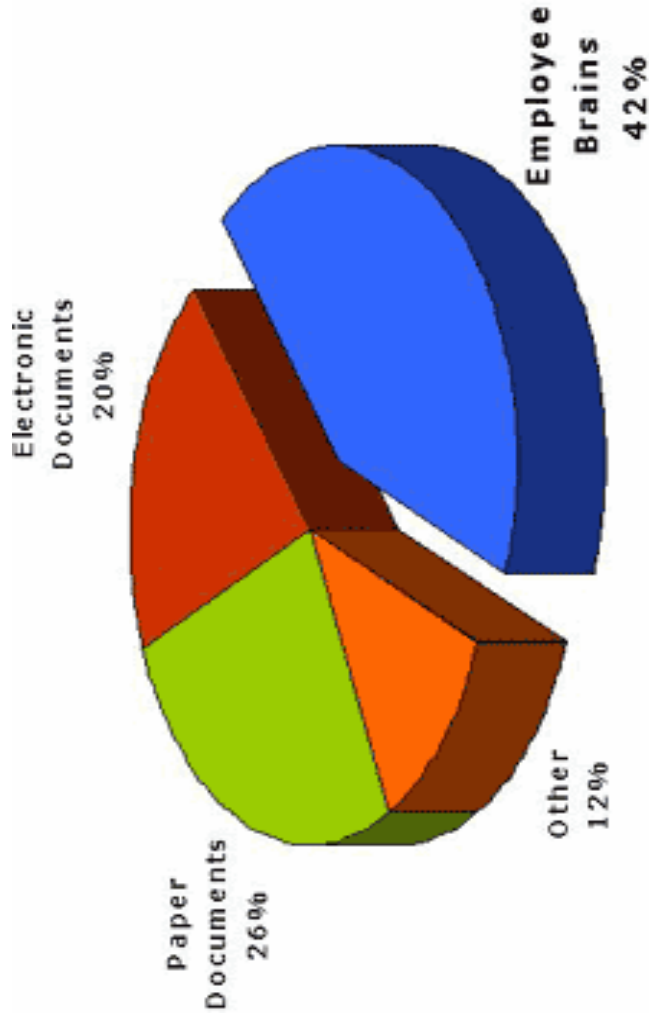




# Real-life example

Company: ORBITAL Software

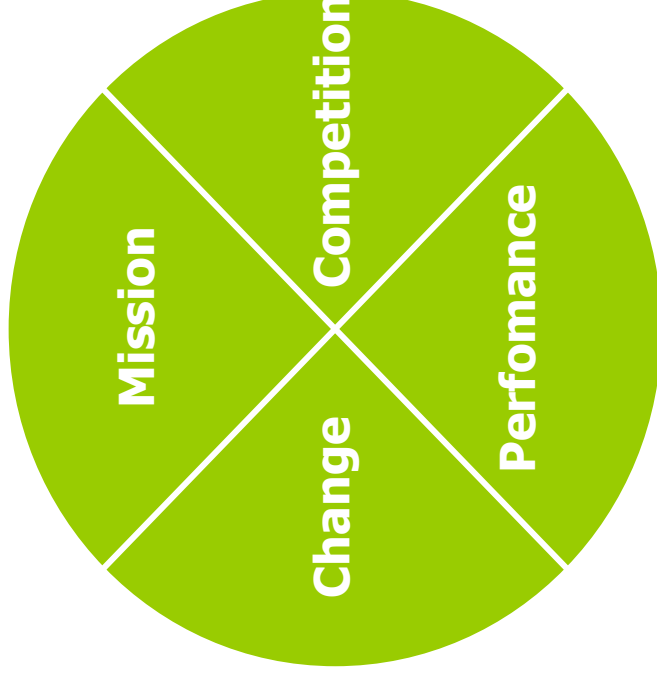
A company's intellectual capital represents its ability to change in the face of adversity. Develop new products. Cut research and develop time. Provide quality customer service. Share knowledge with employees, partners and customers.



# Knowledge management dimensions



What are we trying to accomplish?



How do we cope with change?

How do we gain a competitive edge?

How do we deliver the results?

# History of KM:

## KM as a business

The beginning

The dawn of KM

Future

C. Argyris, C. Bartlett and D. Leonard-Barton of Harvard Business School examined various facets of managing knowledge

P. Senge - "learning organization"

P. Drucker and P. Strassmann - importance of information and explicit knowledge as organizational resources

1995: Leonard-Barton - "Wellsprings of Knowledge - Building and Sustaining Sources of Innovation"

1991: T. Stewart - "Brainpower" (KM was introduced in press)

R. Ackson, D. McCracken - Knowledge Management System (KMS)

1989: The International KM Network (IKMN)

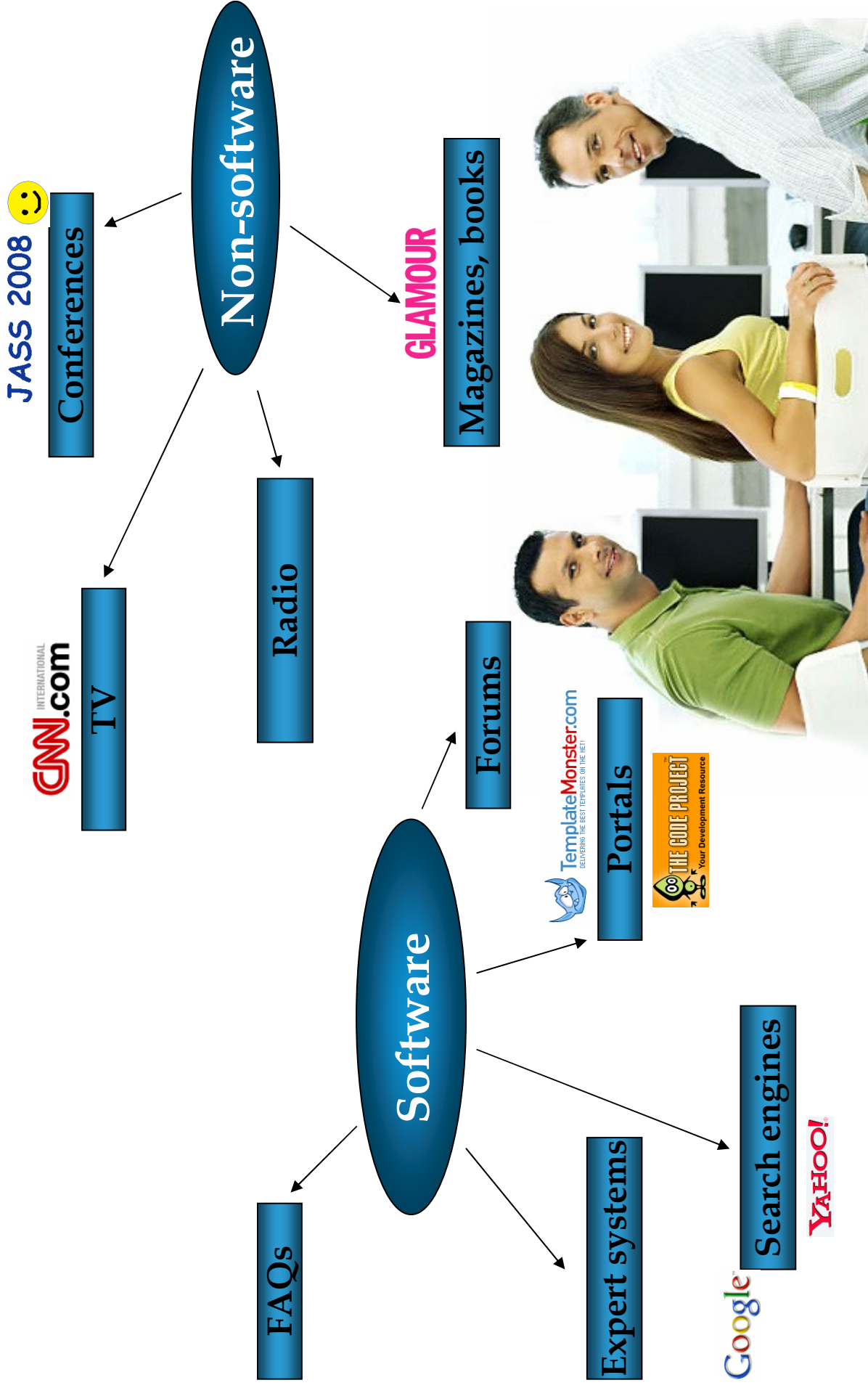
1970s~ :Chaparral Steel company - effective knowledge management strategy

knowledge management entered the lexicon

1970s: E. Rogers (Stanford), T. Allen (MIT) - how knowledge is produced, used, and diffused within organizations



# Ways of getting Knowledge:

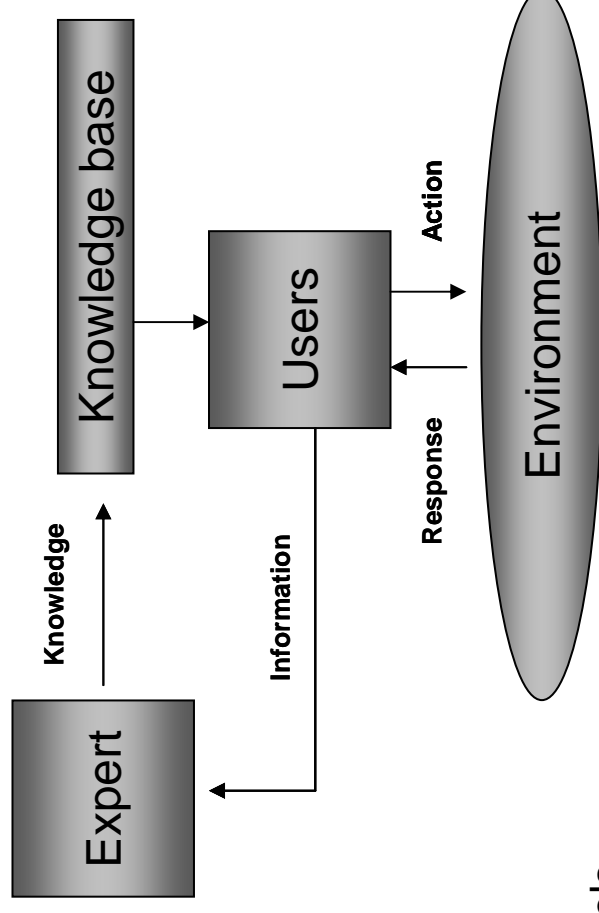


# KM System



**KM System** - refers to a system for managing knowledge in organizations, supporting creation, capture, storage and dissemination of information.

- Document based
- Ontology based
- Based on AI technologies
- Increasingly social computing tools



# Benefits of KM Systems:



Sharing of valuable organizational information.

Can avoid re-inventing the wheel, reducing redundant work.

May reduce training time for new employees

Retention of Intellectual Property after the employee leaves if such knowledge can be codified.

# Digital students

By age 21, the average college student will have spent:

10,000 hours video games

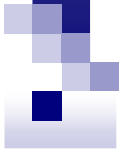
200,000 emails

20,000 hours TV

10,000 hours cell phone

Under 5,000 hours reading (!)





# Campus Web Portals

28% of institutions have web-based campus portals (21% in 2002)  
(2003 National Survey of IT in US Higher Education)

**Harvard University**  
 Home • Admissions & Financial Aid • Employment • Libraries • Museums • Arts  
 President • Administration • Schools • Neighbors & Visitors • Athletics • Alumni • Search

**March 6, 2008**

**Expanding knowledge**  
 Across Harvard University, librarians, researchers, faculty, students, and staff are seeking to edge the boundaries of our existing knowledge about multitudes of scientific questions. The [HarvardScience website](#) seeks to tell many of those stories.

**SCHOOLS OF HARVARD**

- Business
- College
- Continuing Education
- Dental
- Design
- Diversity
- Engineering
- Government
- Graduate School
- Law
- Medical
- Public Health

**A doctor without borders helps kids from around the world**

**Hammonds named dean of Harvard College**

**In Other News**

- The three green 's': Releaser, reuse, recycle
- Kennedy School launches new website
- Yester named visiting scholar at Origins of Life Initiative

Foundations & Corporations  
 Patients  
 Visitors

welcome to Yale University

Home News  
 Yale University and the Government of Peru work on Collaborative Relationship  
 Yale University and the Government of Peru continue to work on the finalization of a collaborative relationship with the Government of Peru. The relationship was initiated by Hiram Bingham and brought to Yale for study.  
[Read more](#)

Directories  
 A-Z Index  
 Calendar  
 Contact Us  
 Quick links

Alumni  
 Parents  
 Undergraduate Applicants  
 Graduate School Applicants

© 2008 The Trustees of Princeton University. Princeton, New Jersey 08544 USA. Operator: (609) 255-3000. Copyright infringement: Web page feedback. Last update: February 4, 2008. Photos: Dennis Applewhite.

PRINCETON UNIVERSITY

WebMail | A to Z | Contact | Site Map | News | Multimedia | Shortcuts

**About Princeton: Overview**

Princeton simultaneously strives to be one of the leading research universities and the most outstanding undergraduate college in the world. As a research university, it seeks to achieve the highest levels of distinction in the discovery and transmission of knowledge and understanding, and in the education of graduate students. At the same time, Princeton is distinctive among research universities in its commitment to undergraduate teaching.

The University provides its students with academic, extracurricular and other resources—in a residential community committed to diversity in its student body, faculty and staff—that help them achieve at the highest scholarly levels and prepare them for positions of leadership and lives of service in many fields of human endeavor.

Through the scholarship and teaching of its faculty, and the many contributions to society of its alumni, Princeton seeks to fulfill its informal motto, "Princeton in the Nation's Service and in the Service of All Nations."

Princeton's Innovative Undergraduate Opportunity  
 Princeton's innovative Undergraduate Opportunity provides the opportunity to work directly with faculty on interdisciplinary research projects.

[Visiting Princeton](#)  
[News Releases](#)





# Relevant Techniques to KM



- Knowledge Engineering
- Data Mining, Information Extraction
  - Ontology
  - XML, XML Schema
- Knowledge and Enterprise Modelling
  - Business Process Modelling
  - Capability, Goal Modelling,
  - User Modelling and Profiling
- Case Based Reasoning
  - Planning
  - Workflow Systems

# Ontology

The New  
Old Conception...



## In **philosophy** of ancient time:

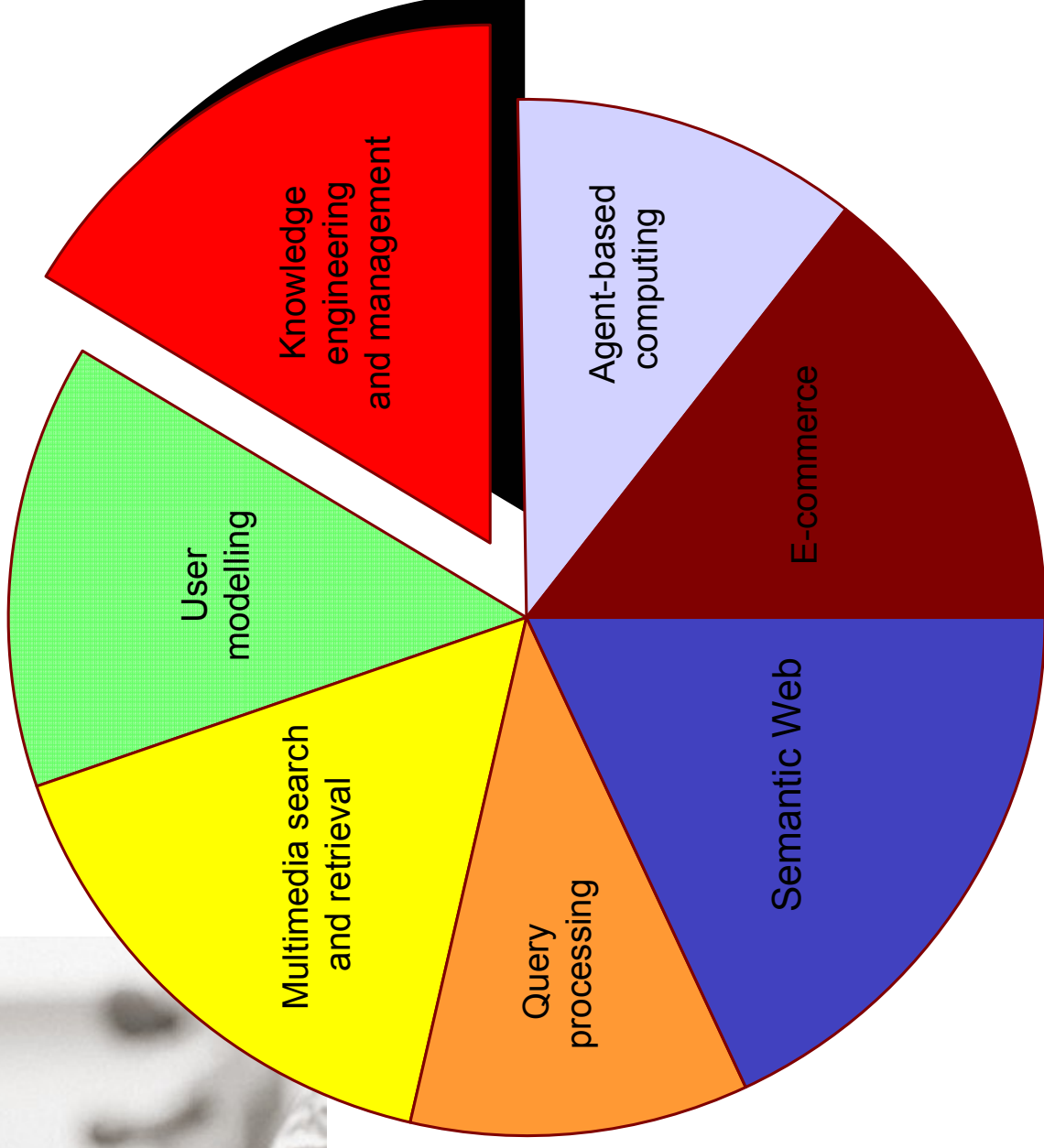
Ontology is the branch of philosophy that studies the nature of **Existence**.

## Nowadays:

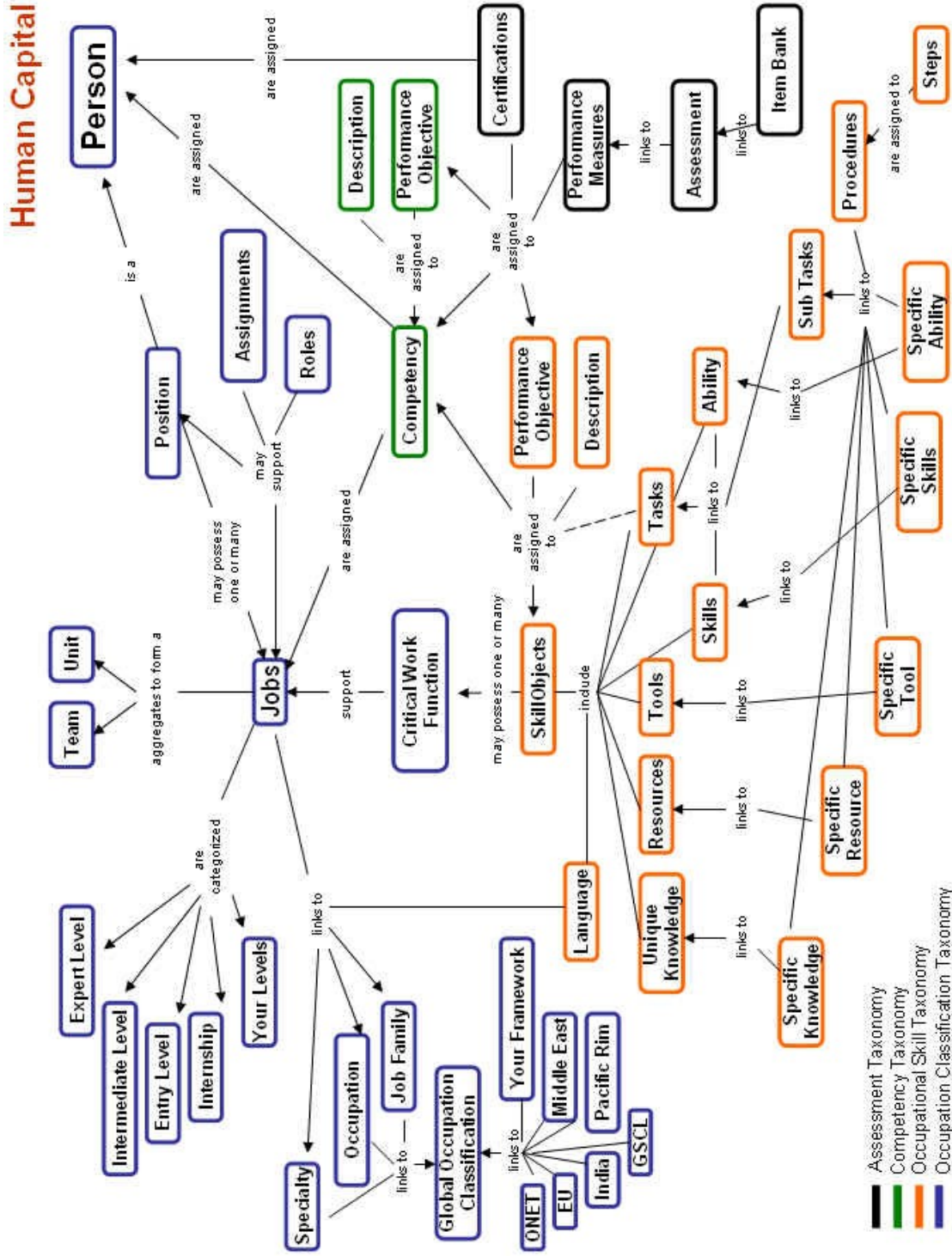
In computer science, ontology defines the basic terms and relations comprising the structured vocabulary of a topic area.

It is an explicit **Specification of a Conceptualisation** or a hierarchically structured set of terms for describing a domain that can be used as a skeletal foundation for a knowledge base”.

# Why do we need Ontology ?



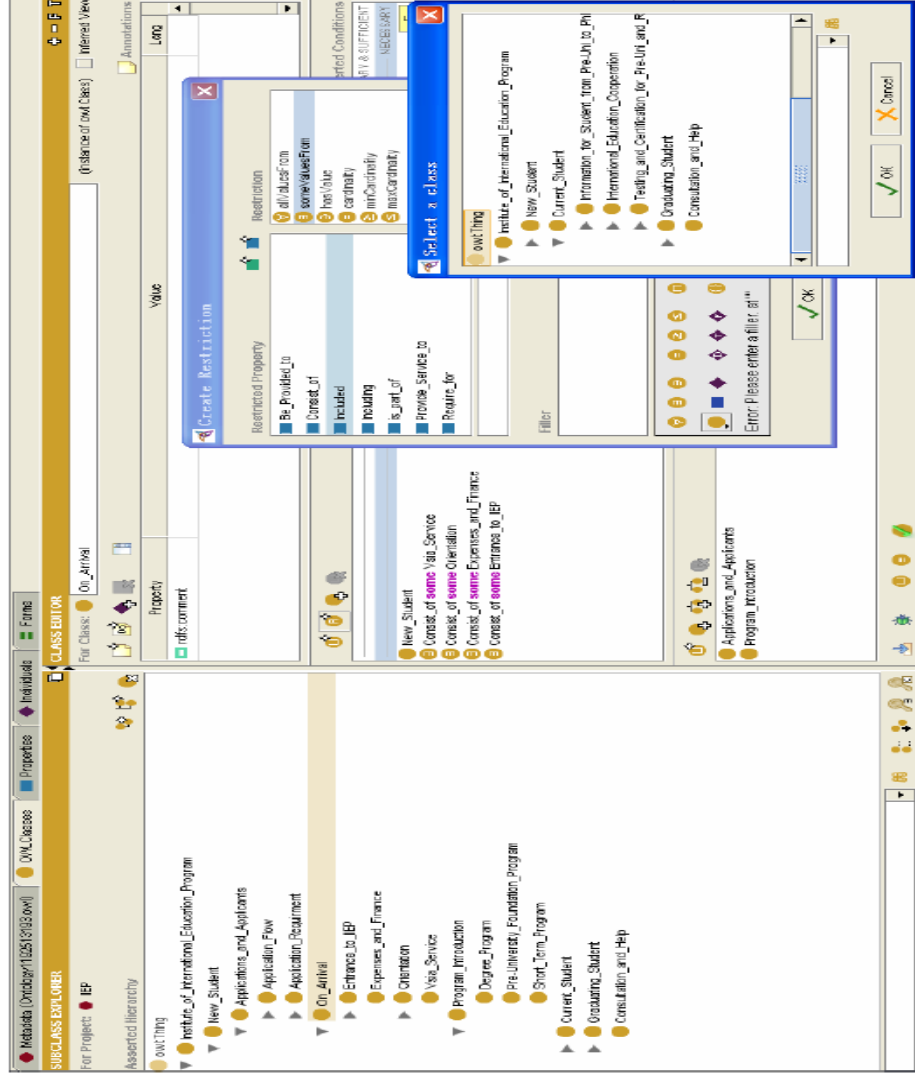
# How to Present Ontology ?

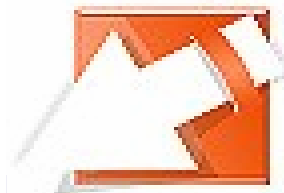


# Ontology Research and Software



- CAKE/VITA (Russia)
- OntoEdit (Germany)
- KAON (Germany)
- Apollo (United Kingdom)
- WebOnto (United Kingdom)
- OilEd (United Kingdom)
- **PROTEGE (United States)**
- Hozo OE -Mizoguchi Tool (Japan)





# Knowledge Portal

Not a search engine for data or information but for Knowledge

Помощь История Войти в систему

Новости 19:35 [все](#) [Санкт-Петербург](#) [Выборы президента - 2008](#)

1. Более 130 человек ранены во время беспорядков в Египте
2. В Грузии скончался шотландский аграрий София Чарлз
3. Туркино в Дубае выиграла Елена Леменьева
4. УрФО, Пермь, Башкирия и Оренбургские закрыты участки
5. Наталья Нурова с супругом были вынуждены вернуться в Калининград

**Яндекс.Картинки**  
найдено больше, показаны лучше

Например, [мишель Фара-Моргана](#)

Везде: [Новости](#) [Маркет](#) [Карты](#) [Службы](#) [Блоги](#) [Картинки](#) [Все службы...](#)

**Яндекс**  
Найдётся всё

Поиск:

Например, [мирис Фара-Моргана](#)

Везде: [Новости](#) [Маркет](#) [Карты](#) [Службы](#) [Блоги](#) [Картинки](#) [Все службы...](#)

Каталог сайтов

- [Развлечения](#)
- [Спорт и отдых](#)
- [Работа и учеба](#)
- [Технологии](#)
- [Бизнес](#)
- [Дом и авто](#)
- [Сайты Санкт-Петербурга](#)

**Маркет**  
[телевизоры](#)

**Мой Круг**

**Игушки**  
[Должник Вова](#)

**Открытки**

**Народ**

**Деньги**  
монетальные платежи

**Сегодня в блогах**

1. [Можно ли есть с банками?](#)
2. [Выборы](#)
3. [Умерла София Чарлз](#)

**Знаете ли вы?**  
дословный язык

**Фотки**

**Санкт-Петербург. 2 марта, воскресенье**  
-1  
ночью -5, завтра -4

**Погода**

**Теплопрогнозы**  
10:40 Две звезды, Первый

**Карты Санкт-Петербурга**  
[Спутниковые снимки](#)  
[Схема метро](#)  
[Адреса и телефоны](#)

**Афиша**  
[Под домашний диван](#) приложение  
[Неделя драма](#)  
[Мы из будущего](#) приложения

**Котировки**  
[USD RUB](#) 01.03 24.0023 -0.1136  
[EUR RUB](#) 01.03 36.5099 +0.1045

United States [ Change ]

Home Solutions Services Products Support & downloads My IBM

Welcome [ BU Sign in ] [ Register ]

HOW IT WORKS

**Nowadays, everything comes with chips**  
→ Find out how they work

Microprocessors do a lot of work these days. Here's how.

What's binary for "Woo-hoo"?

Announcing the most powerful System z jet

Learn about Shop for Get support My IBM links About IBM

**Featured topics**

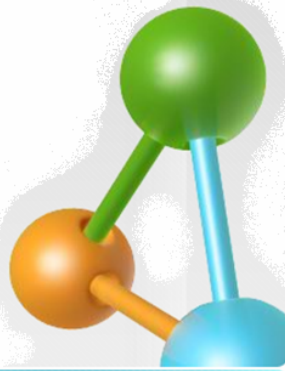
- A real world education for your real world issues
- Drive innovation by providing technology for collaboration
- Business executives
- CIOs
- Developers
- IBM Business Partners
- Small business
- Medium business
- Journalists
- Job seekers

**IBM Press books:**  
Start fast.  
Change faster.  
→ Learn new rules

About IBM Privacy Contact Terms of use Accessibility IBM Feeds

Sandwich: Tell us what you think

# Ontology



# Knowledge Portal



United States [change]

Home Solutions Services Products Support & downloads My IBM

Welcome [EU Sign in] [Register]

Search

IBM

HOW IT WORKS

Nowadays, everything comes with chips

Find out how they work

Microprocessors do a lot of work these days. Here's how.

What's binary for "Voc-100"?

Announcing the most powerful System z yet

Learn about Shop for Get support My IBM links About IBM

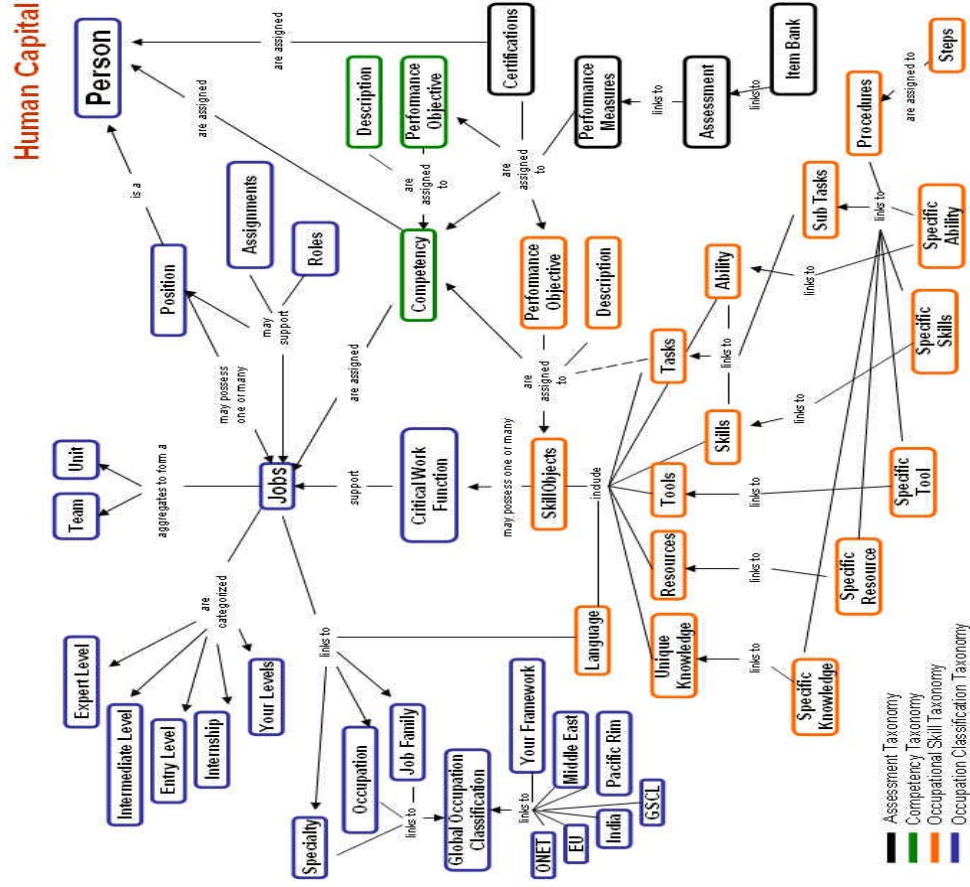
**Featured topics**

- A real world education for your real world issues
  - Industries
  - Government
  - K-12 and higher education technology for collaboration
  - Investors
- Business executives
  - CIOs
  - Developers
  - IBM Business Partners
- Small business
  - Medium business
  - Journalists
  - Job seekers

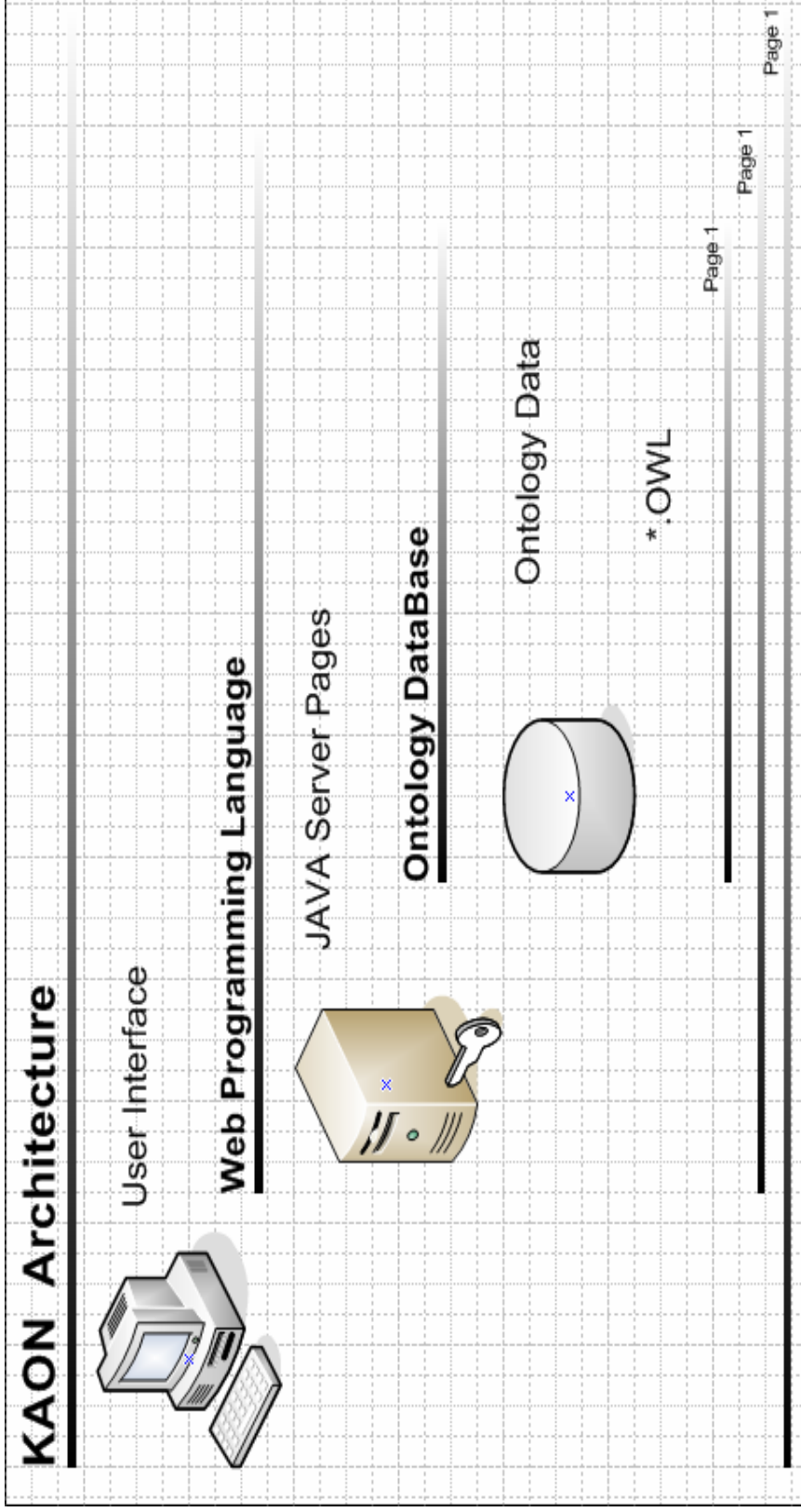
IBM Press books: Start fast. Change faster. Learn new rules.

About IBM Privacy Contact Terms of use Accessibility IBM Feeds

Sandbook: Tell us what you think

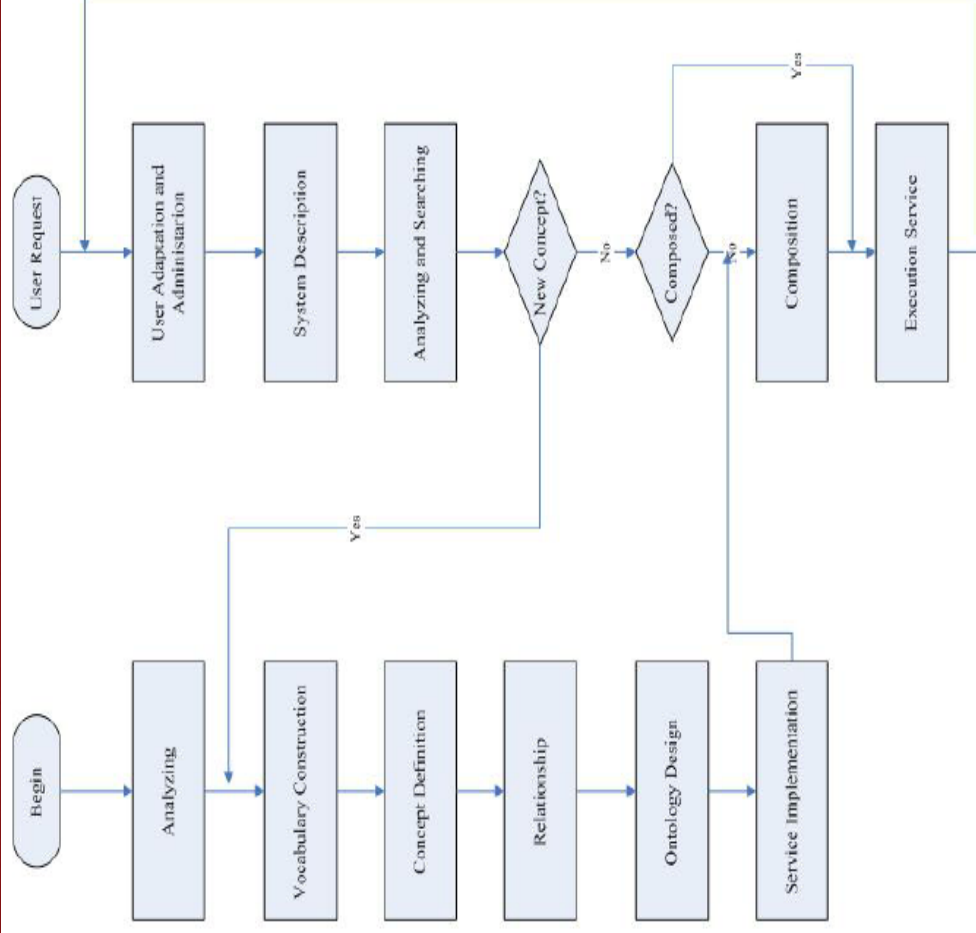


# Ontology-based KP by Using KAON





# THE WORKFLOW of the system

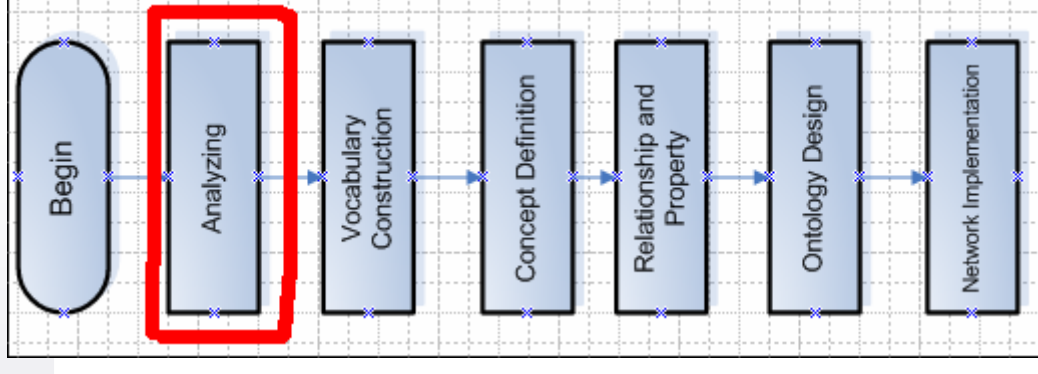
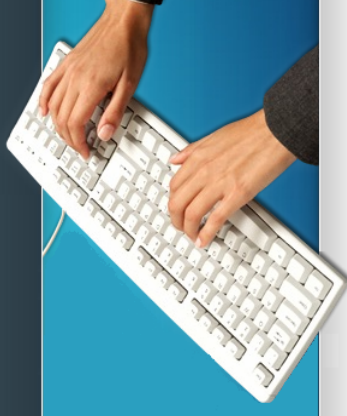


Development

Utilizing

# Developing Process

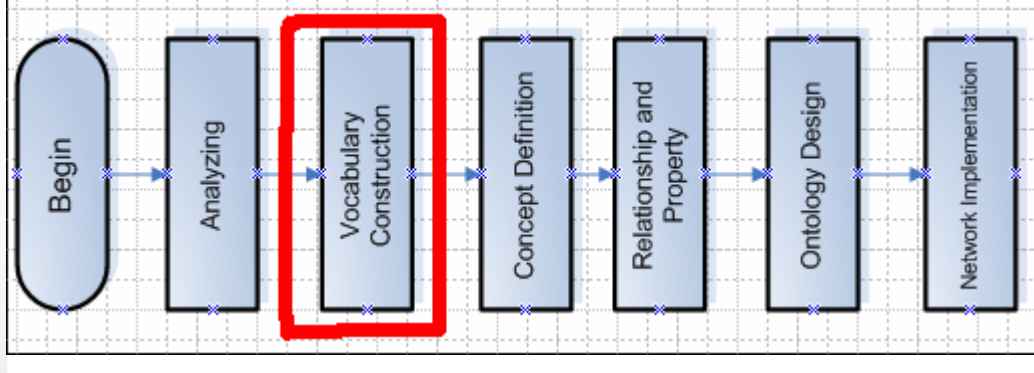
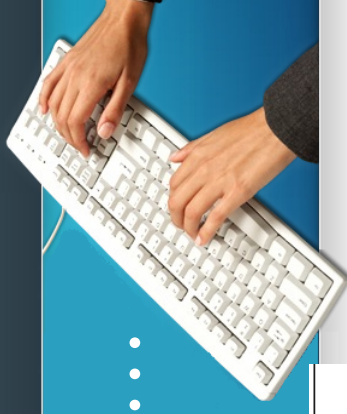
## Analyzing...



<i>Areas</i>	<i>Staff</i>	<i>Student</i>	<i>Teacher</i>
Study Information	✓	✓	✓
Life Service Information	✓	✓	
Student Information		✓	
Teacher Information			✓
Staff contact Information	✓		
Exam Information		✓	✓
Database Access	✓		
Financial Service	✓		
Update Notifying		✓	✓
Calendaring and Timetable	✓	✓	✓
Passport and Visa Service	✓	✓	

# Developing Process

## Vocabulary construction...

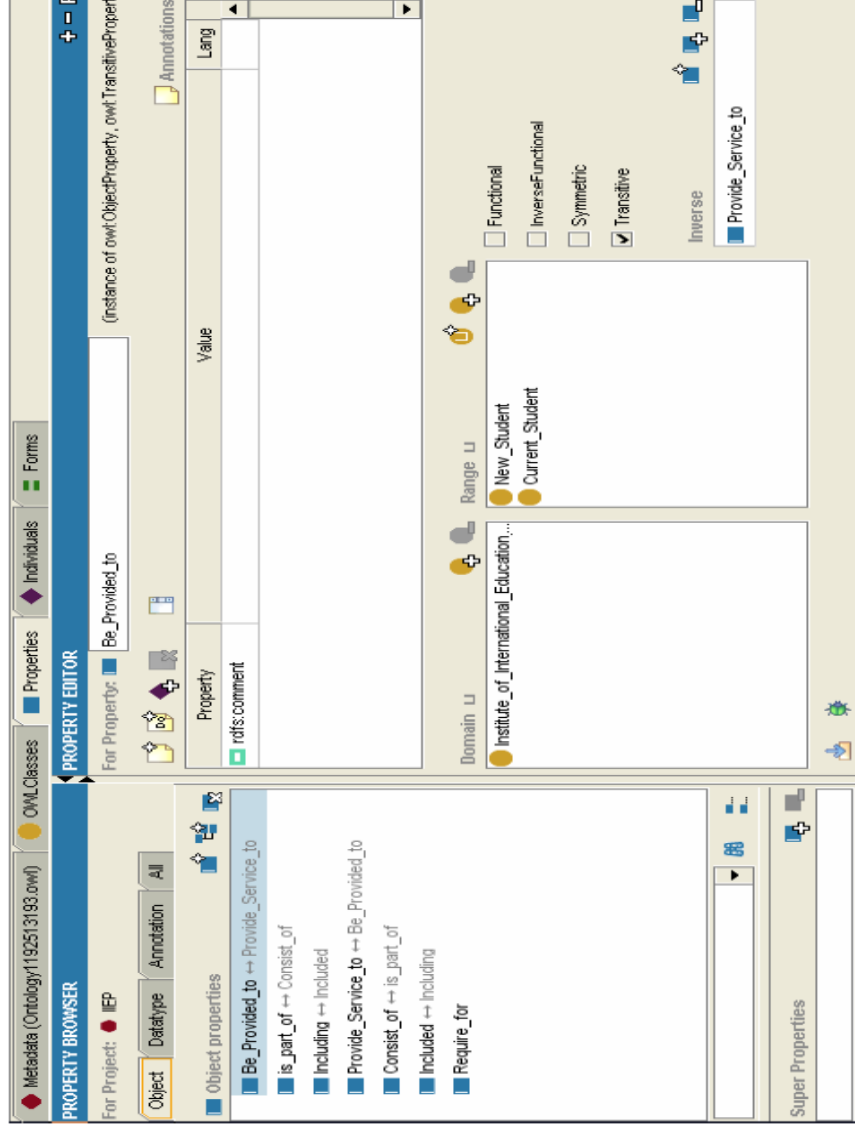
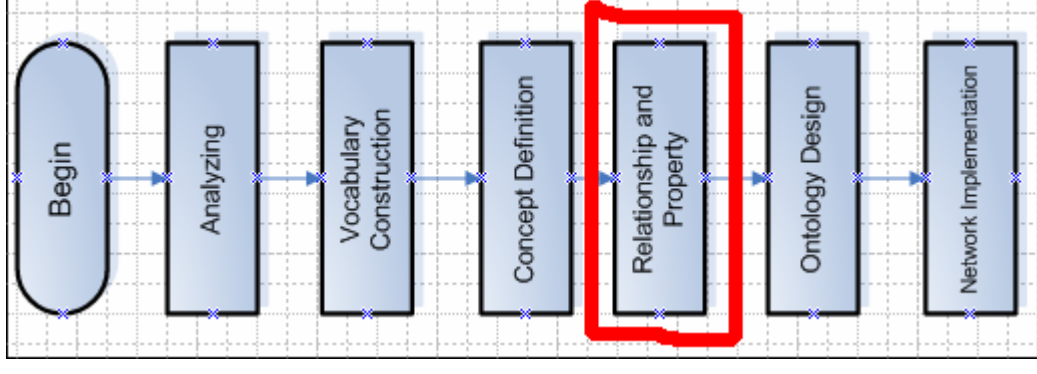
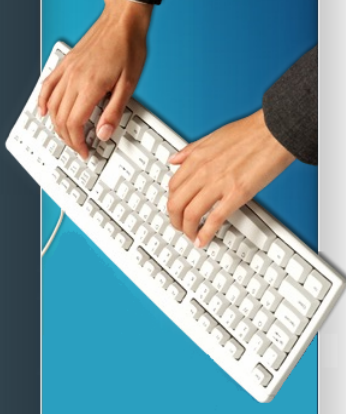


Primary	Secondary	Detail	
New Students	Program Introduction	Degree Program	
	Applications and Applicants	Pre-University	Short Term Program
		Application Flow	Requirement
		Requirement	Timetable
		Timetable	Finance
		Finance	Housing
	On Arrivals		Medical Insurance
			Visa Service
			Orientation
			Infor. Degree Student
Infor. Pre-Uni Student			
Current Students	Information for Student	Infor. Short term Student	
	International Education Cooperation	Exchange Student	
		International Semester	
		Pre-Uni Exam	
	Testing and Certification	Russian Certification	
Graduating Student	Education Certification	Working Flow	
	Important Messages	Messages	



# Developing Process

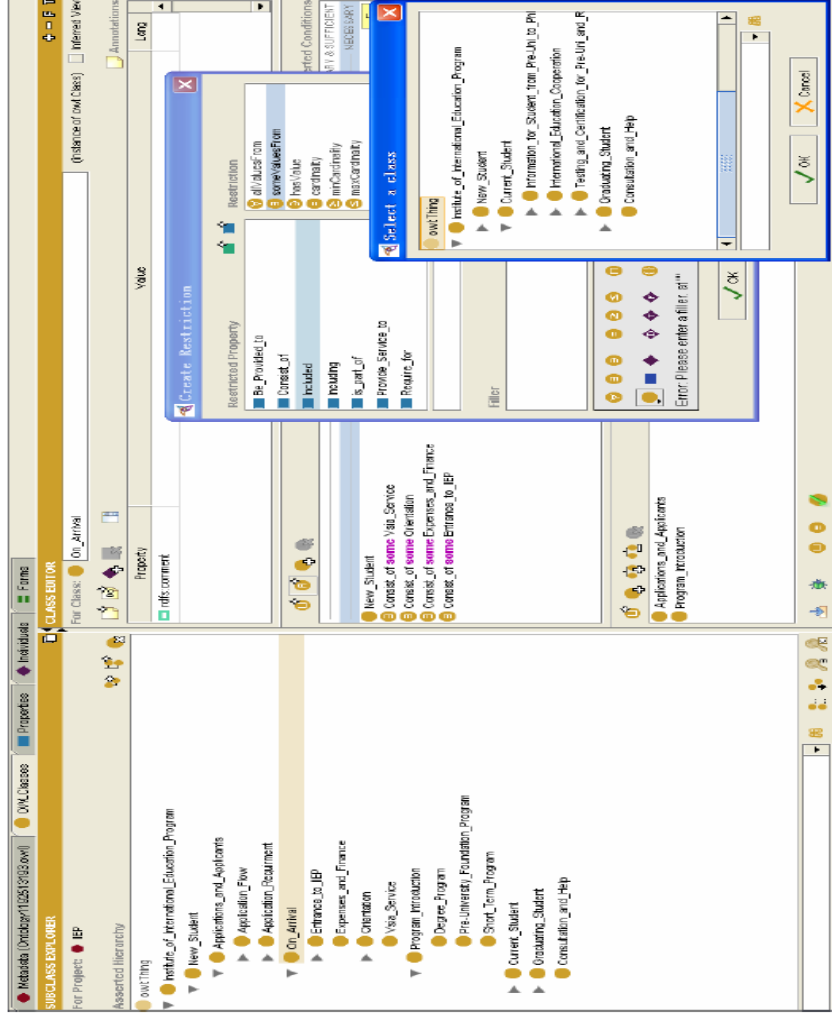
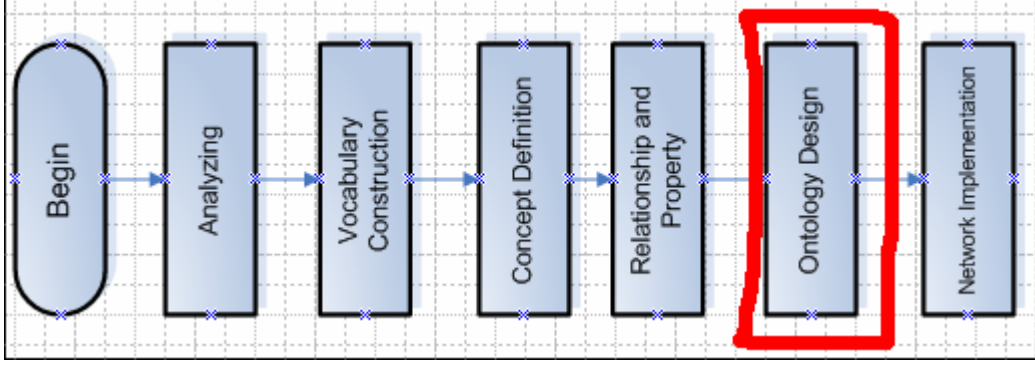
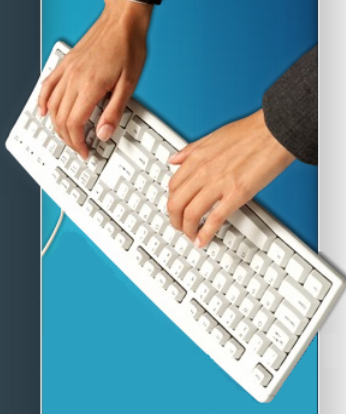
## Relationship and property...



The screenshot displays the OWL Property Editor interface. The main window is titled 'PROPERTY EDITOR' and shows the property 'rdts:comment' with its domain and range. The domain is 'Institute\_of\_International\_Education...' and the range is 'New\_Student' and 'Current\_Student'. The property is set to be 'Transitive'. The 'PROPERTY BROWSER' window shows a list of object properties including 'Be\_Provided\_to', 'is\_part\_of', 'Including', 'Provide\_Service\_to', 'Consist\_of', 'Included', and 'Require\_for'. The 'Be\_Provided\_to' property is selected.

# Developing Process

## Ontology design...





# International Student Services



SPBSTU ISS

Faculty and Staff

BBS

Campus Tours

FAQs

[New Students](#)  
[Current Students](#)  
[Graduating Students](#)

[Quick Link:](#)  
[Programs](#)  
[Admission](#)  
[Housing](#)  
[Medical Insurance](#)  
[finance](#)  
[Visa Service](#)  
[About Us](#)



Санкт-Петербургский

Политехнический институт  
императора Петра Великого  
1829

Государственный  
политехнический университет  
2007



Ontology-based Knowledge Portal

*Saint-Petersburg State Polytechnic University*

Welcome!

[New Students](#)   [About Us](#)  
[Current Students](#)   [Announcements](#)  
[Graduating Students](#)   [Programs](#)

Saint-Petersburg State Polytechnic University, International Student Services  
28, Grahzdansky pr., 195220 St.Petersburg, Russia  
Tel: +7-(812)-534-1001, 534-1214, Fax: +7-(812)-534-1365, 534-1214  
Email: [imop@imop.spbstu.ru](mailto:imop@imop.spbstu.ru)



# International Student Services



SPBSTU

ISS

Faculty and Staff

BBS

Campus Tours

FAQs

New Students  
Current Students  
Graduating Students

Quickly Link:  
Programs  
Admission  
Housing  
Medical Insurance  
Finance  
Visa Service  
About Us



## Institute of International Education Program



Founded in 1996 on the basis of the University's Preparatory Department the Institute of International Educational Programs (the IIEP) is in charge of organizing and coordinating the University's international projects and programs in the field of education. It is housed in the spacious modern building, which is equipped with up-to-date facilities, including lecture halls and study rooms, computer labs, Internet and e-mail access, library, sports and training facilities, a large residents hall and a cafe.

IIEP Mission Statement Institute of International Educational Programs (IIEP) of St.-Petersburg State Polytechnic University was established within University as a comprehensive, academic institution of higher learning.

*The IIEP's mission is to:*

1. Organise and control foreign students education in various long-term and short-term programs of higher education in the framework of University academic programs.
2. Organise and carry out various short-term programs of higher education in foreign languages for foreign students with participation of leading professors of SPbSPU and other St.-Petersburg universities.
3. Encourage intensive Russian language programs.
4. Promote Russian higher education.
5. Widen University academic links.

# International Student Services



SPBSTU ISS

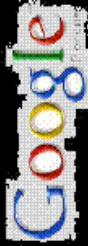
Faculty and Staff

BBS

Campus Tours

FAQs

New Students  
Current Students  
Graduating Students  
Quick Link:  
Programs  
Admission  
Housing  
Medical Insurance  
Finance  
Visa Service  
About Us



## Accommodation

The IIEP students reside on SPbSPU campus where they enjoy a full Russian university experience in an international environment. They live, study, dine and relax with classmates from many different countries and they have the opportunity to share a residence hall room with someone from their own town or from another culture.

IIEP does its best to create comfortable conditions of life for the international students. They, as a rule, live in one of the two hostels. Both of them are located near the SPbSPU studying campus. Private accommodation also can be found.

In a hostel located directly in the building IIEP students live in compartments comprising 2 rooms, a small kitchen, a bathroom and a toilet. In such a compartment 1, 2, or 3 students can reside. Having been paid additionally, a telephone, satellite antenna and refrigerator can be installed. In the building's first storey there located a big dining room, cafeteria, sports gym with trainers.

At a short distance of about 50 m from building IIEP there located another hostel. Students also live in compartments there, comprising 2 dwelling rooms (a big and small ones), a bathroom and toilet. Each hostel's storey contains two kitchens where breakfast or supper (dinner) can be prepared. At student's desire and for an additional payment a telephone can be installed in the compartments.

Saint-Petersburg State Polytechnic University, International Student Services  
28, Grahzdansky pr., 195220 St.Petersburg, Russia

Tel:+7-(812)-534-1001, 534-1214, Fax:+7-(812)-534-1365, 534-1214

Email: [imop@imop.spbstu.ru](mailto:imop@imop.spbstu.ru)

# Perspectives



The current capability of machine intelligence will continue to be a valuable resource for the future.

Technology will clearly become more helpful in dealing with information overload.



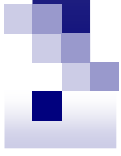
What about employees?

---



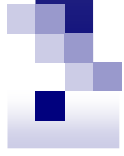
# Conclusion

- **KM** - seeks to understand the way in which knowledge is created, used and shared within organizations.
- 2 models in KM theory: DIKW and Polanyi's.
- Both, positive and negative, perspectives of KM development available.



# Links used

- ABC: An Introduction to Knowledge Management (KM) ([www.cio.com](http://www.cio.com))
- Wikipedia ([www.wikipedia.com](http://www.wikipedia.com))
- Knowledge Praxis ([www.media-access.com](http://www.media-access.com))
- Knowledge Management—Emerging Perspectives ([www.systems-thinking.org](http://www.systems-thinking.org))
- KM past and future-Changing the rules of the game ([www.kmworld.com](http://www.kmworld.com))



**End of slides**

**Thank you for listening!**