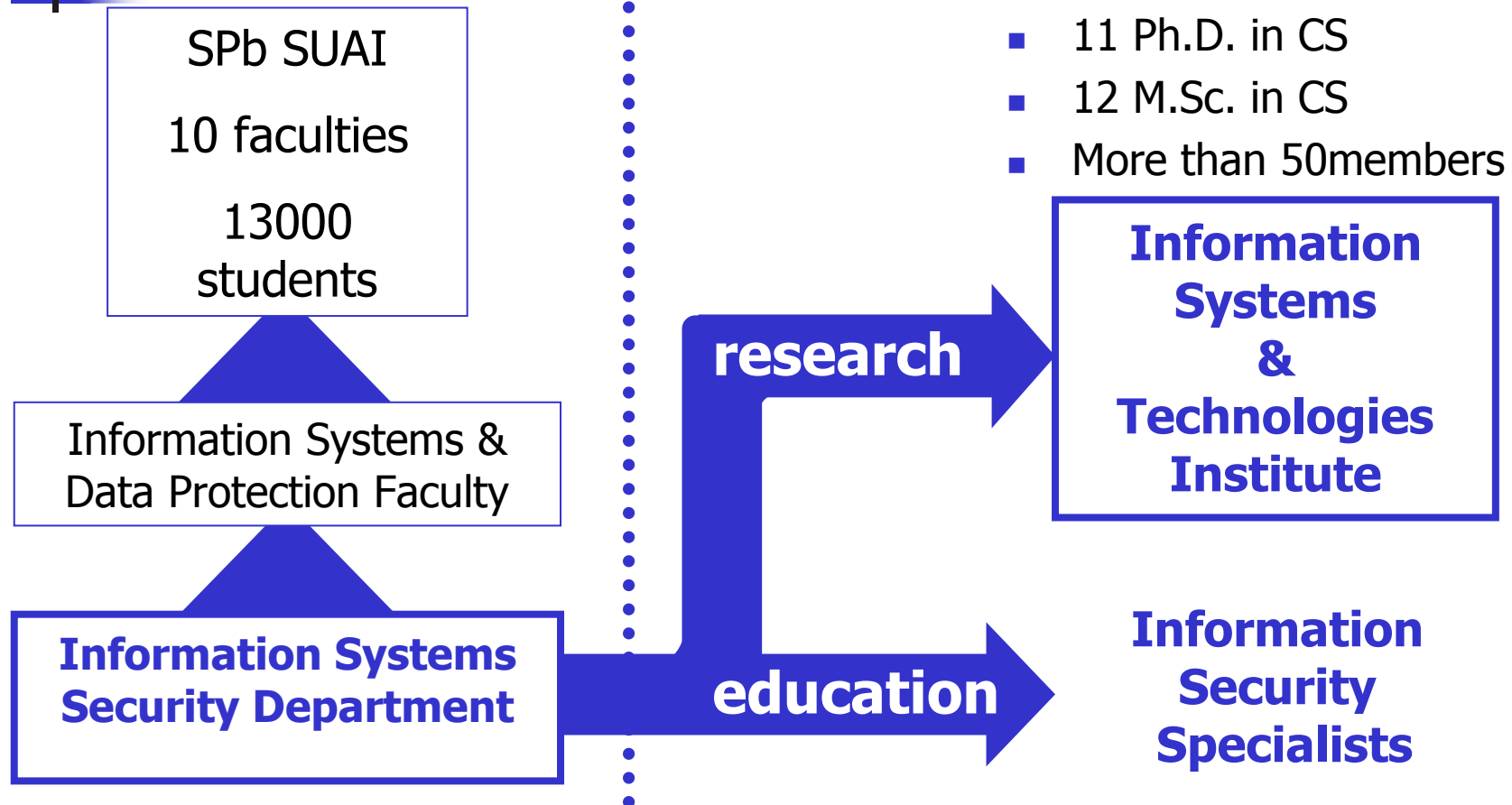


# Saint-Petersburg State University of Aerospace Instrumentation

11.06.2009



# Organizational Structure





# Institute Overview

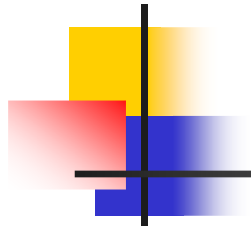
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## Research Groups

- Data communication
- Network security
- Cryptography
- Video transmission
- Software engineering
- Mobile applications

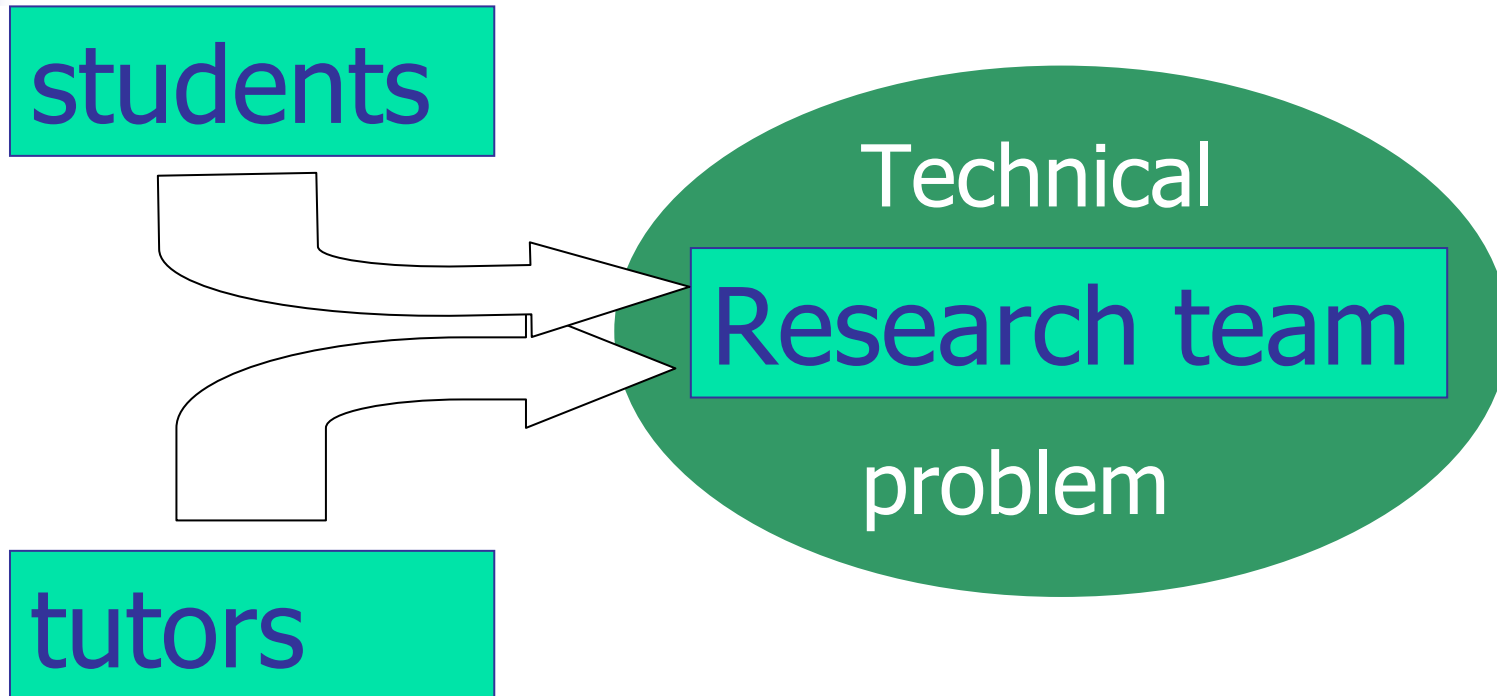
## Research Directions

- MC CDMA
- Multimedia compression
- Code-based cryptography
- Access control method
- Modeling of software applications
- Verification
- Technologies for mobile services development



# Project-based model of education

# Innovations in technical education





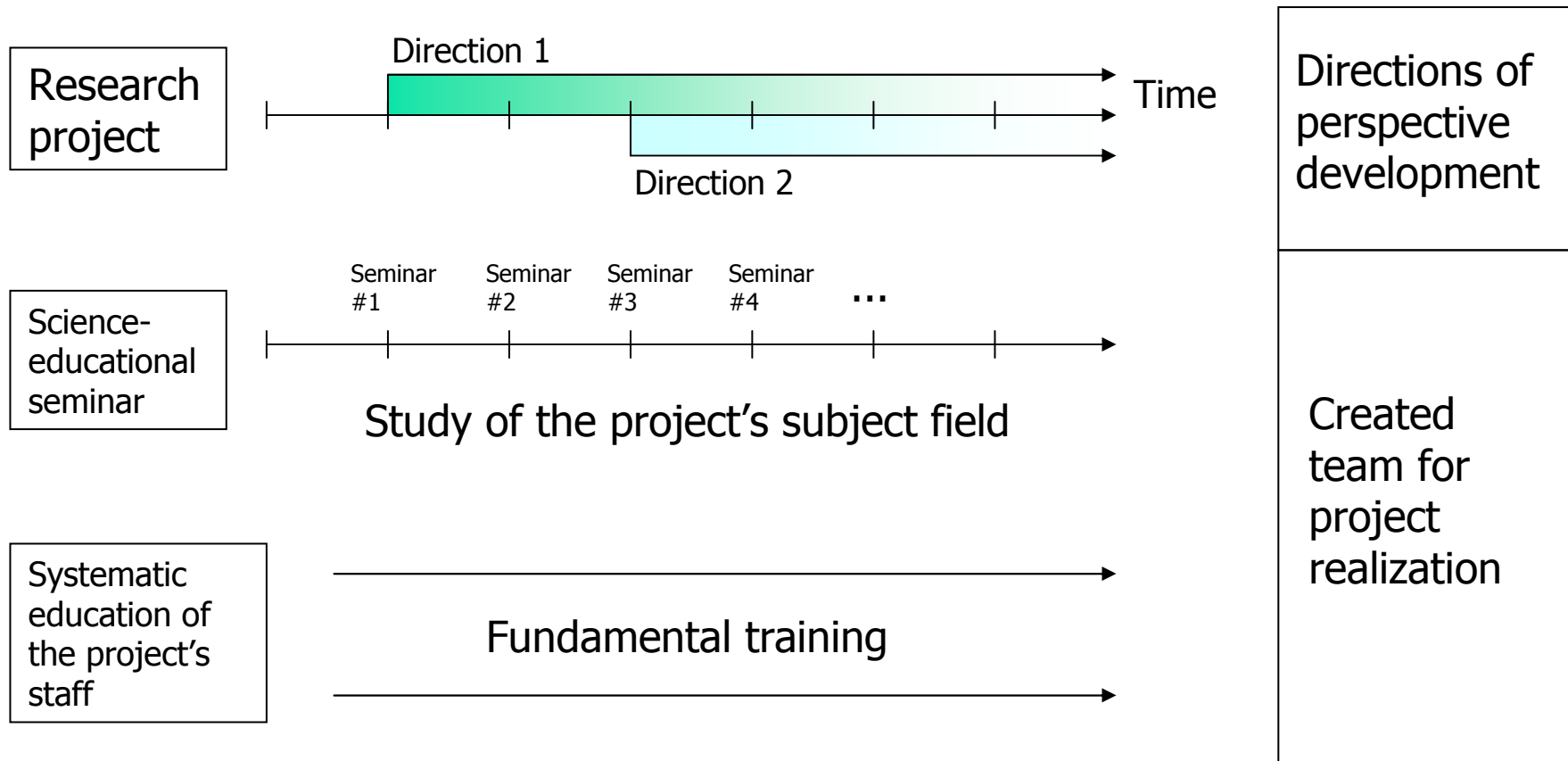
# Main elements of project-based educational model

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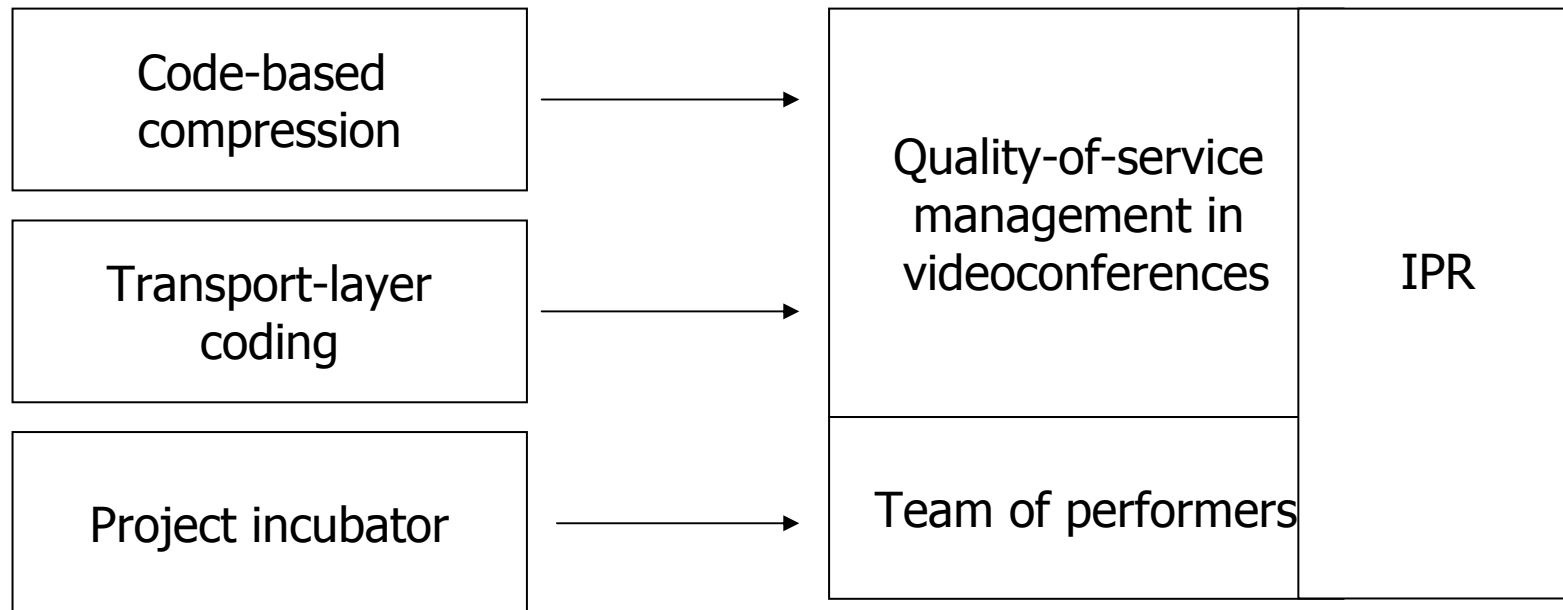
- Main elements
  - Research project in the area of little-studied science intensive technologies
  - Project incubator. The team of performers with different educational level (students and Ph.D. students of different courses)
  - Science-educational seminar on project's research field
  - Systematic educational process of project's staff to obtain fundamental knowledge basis in the project research area
- Estimated results
  - Developing the research directions perspective for business applications
  - Developing of well-balanced research team



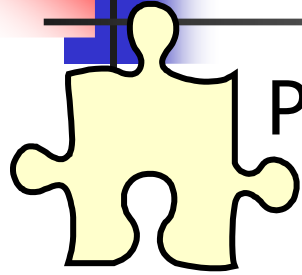
# Functioning scheme



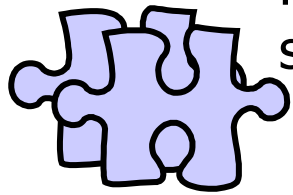
# Project components in the framework of Intel academic program



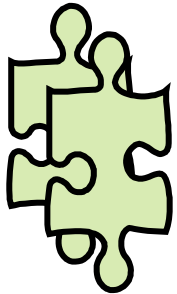
# Project as Team Building



Professor



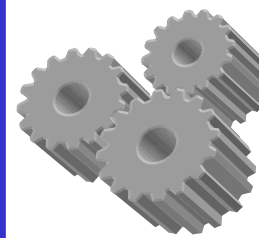
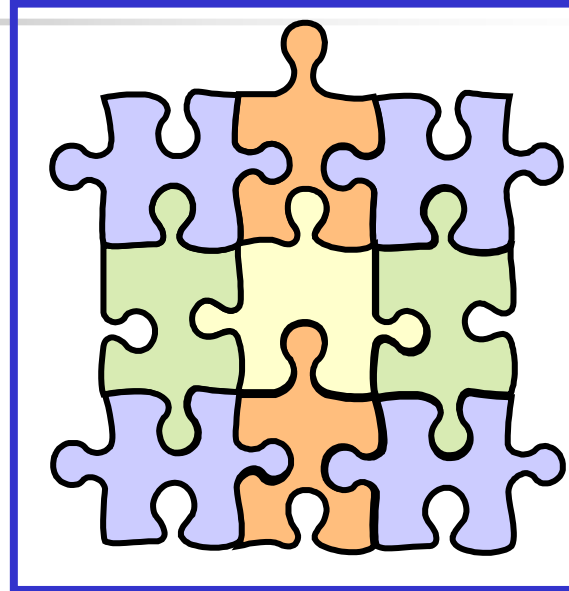
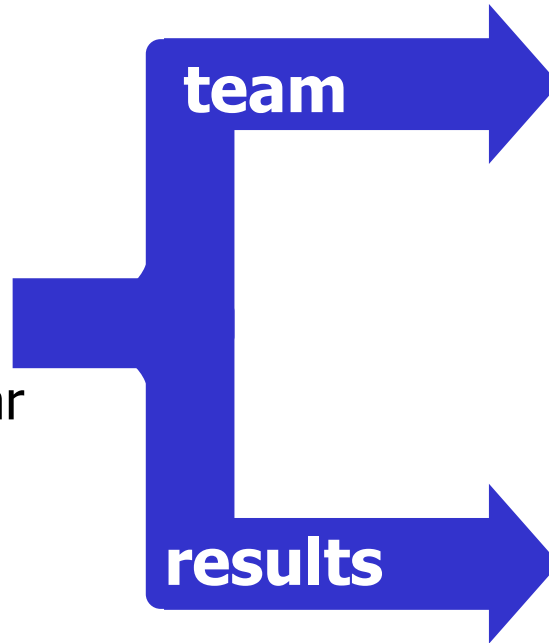
PhD  
students



fourth-year  
students



third-year  
students



Research  
Framework



Algorithms



Patents &  
Papers

# Finnish-Russian Universities Cooperation in IT





# Eventual results of the project

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- **Most important results**
  - projects & ideas incubator
  - well-prepared teams capable of continuing challenging research and design work independently
  - Visibility of universities and persons
- **Additional results**
  - novel algorithms,
  - signal structures,
  - architectural solutions, etc.

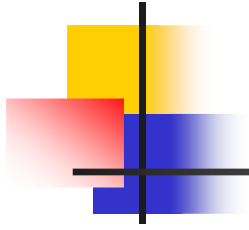


# ICT Academy

## (Open Source Academy)

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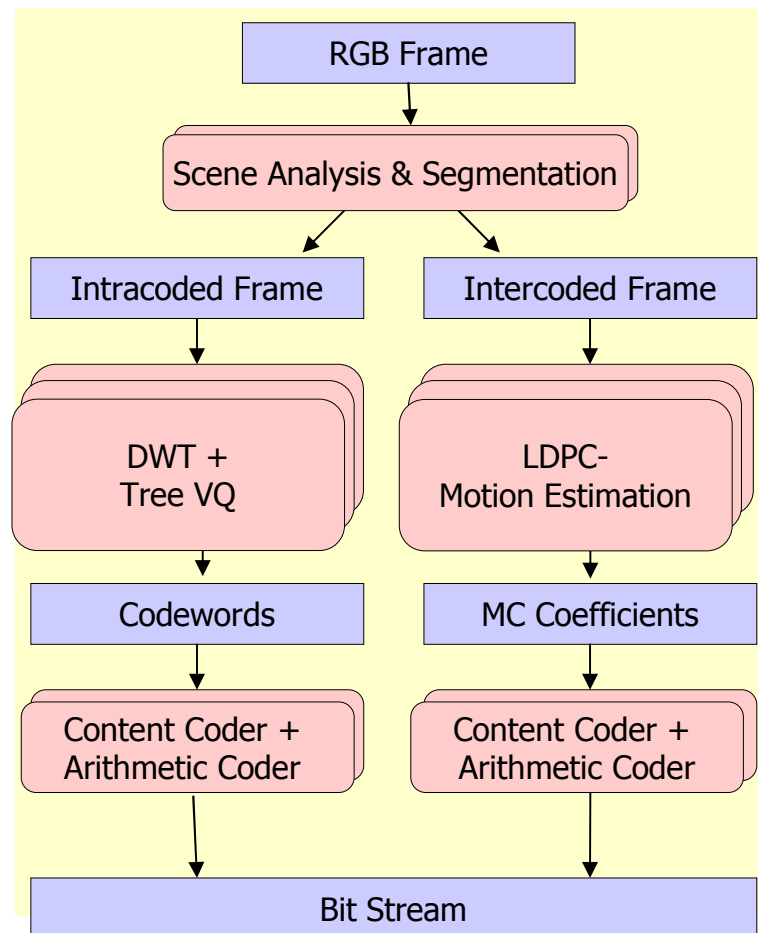
- Goal: development of Academy for training and retraining specialists in the area of infocommunication technologies basing on open hardware-software systems
- Education consists of 4 semesters and 3 blocks of disciplines:
  - Fundamental education in infocommunication technologies development (1st, 2nd semesters)
  - Learning of basic infocommunication technologies using open hardware-software systems (1-3 semesters, wide application of project-based education is supposed)
  - Specialized training and master thesis preparation (4th semester, practice on work place)



# Q & A

# Video Codec Overview

## Codec Structure

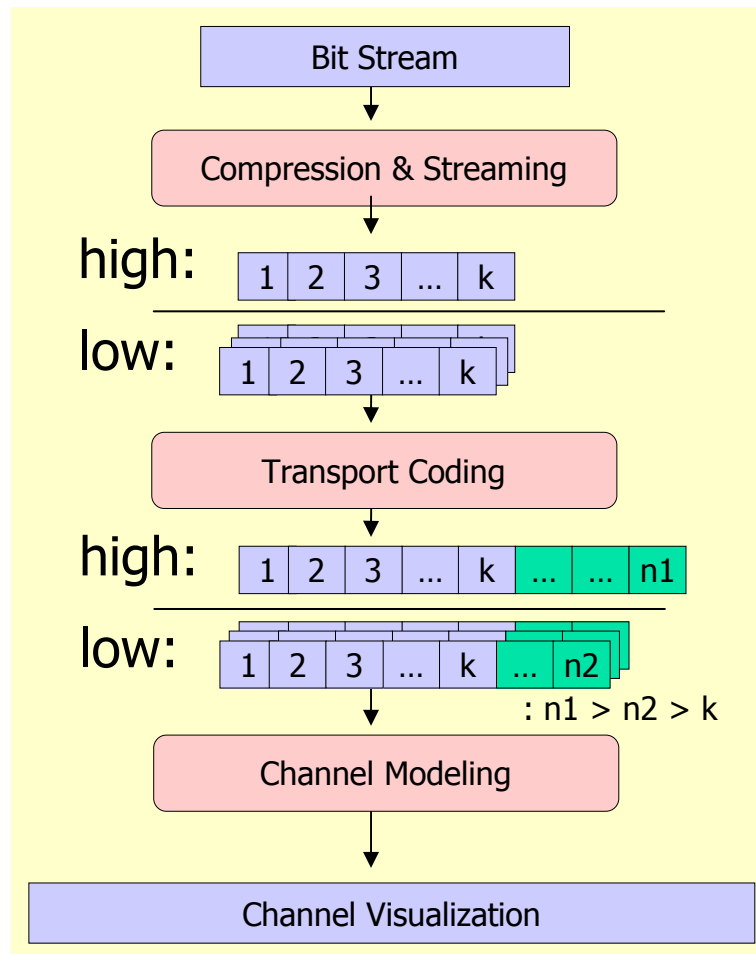


## Research Directions

- Code-based image compression
- Motion compensation
- Zero loss compression
- Motion detection and tracing

# Transport coding model overview

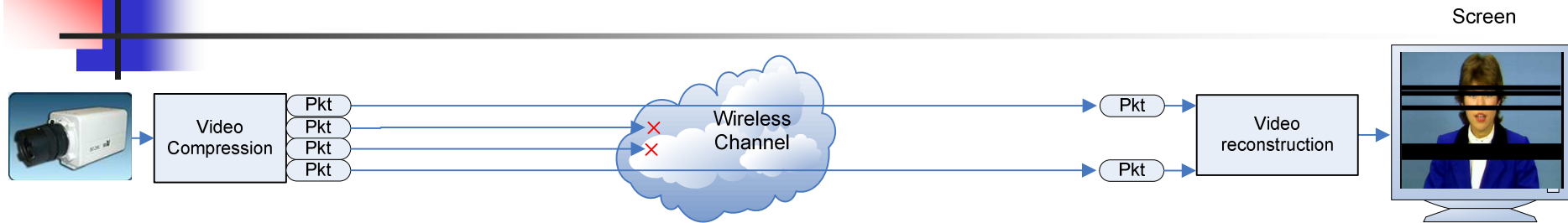
## Transport Coding



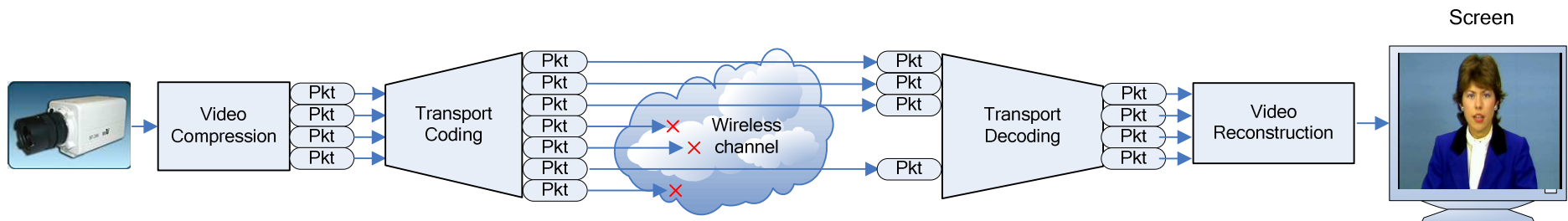
## Research Directions

- Code-based image compression
- Motion compensation
- Zero loss compression
- Motion detection and tracing

# Transport coding for wireless video transmission

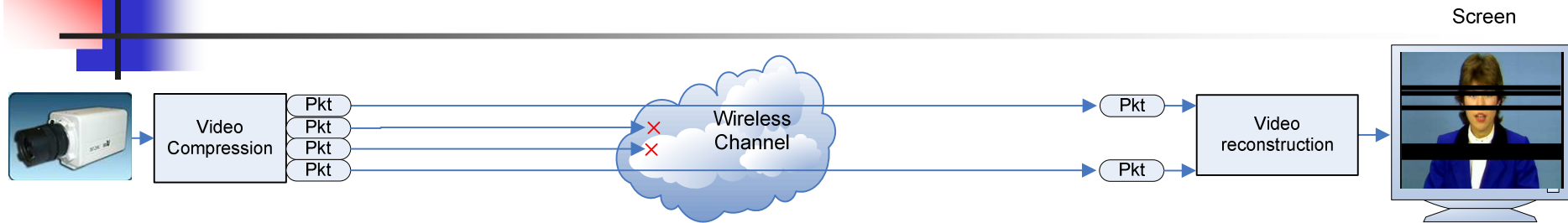


- Standard uncoded transmission – artifacts due to packets loss

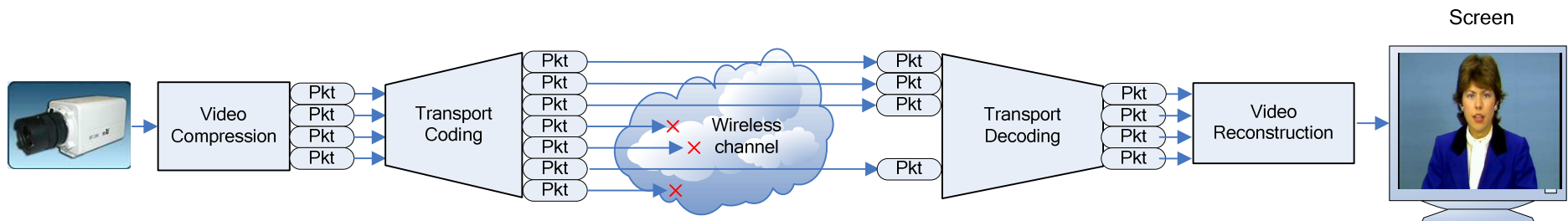


- Transport coding, RS-Code (7,5) – corrects 2 erasures

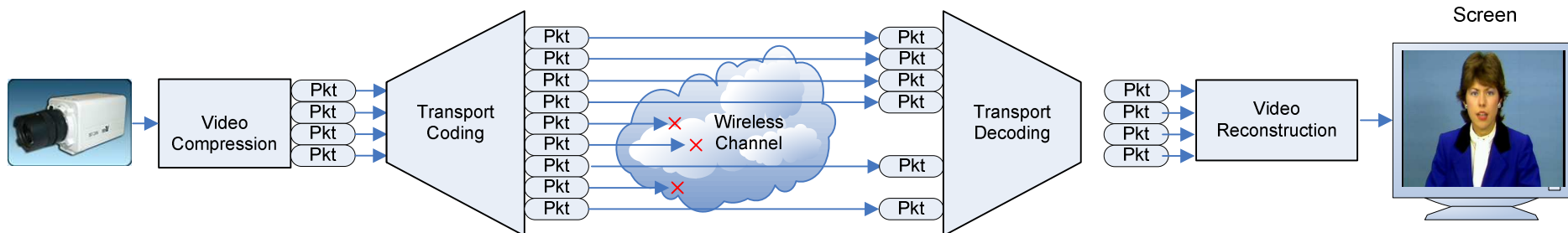
# Transport coding for wireless video transmission



- Standard uncoded transmission – artifacts due to packets loss



- Transport coding, RS-Code (7,5) – corrects 2 erasures



- Transport coding, RS-Code (9,5) – corrects 4 erasures



# Today SUAI is

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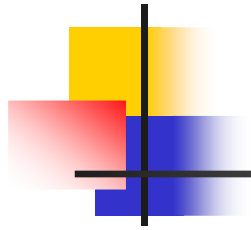
- Ten faculties, 42 chairs, 13 institutes and centers
- 15 000 students from China, India, Sri Lanka, Tunisia, Morocco, Malaysia, Thailand, South America
- 1000 tutors, 900 with scientific degree
- North-West Center of New Information technologies
- UNESCO Chair of Engineering Distance Education



# IT in SUAI

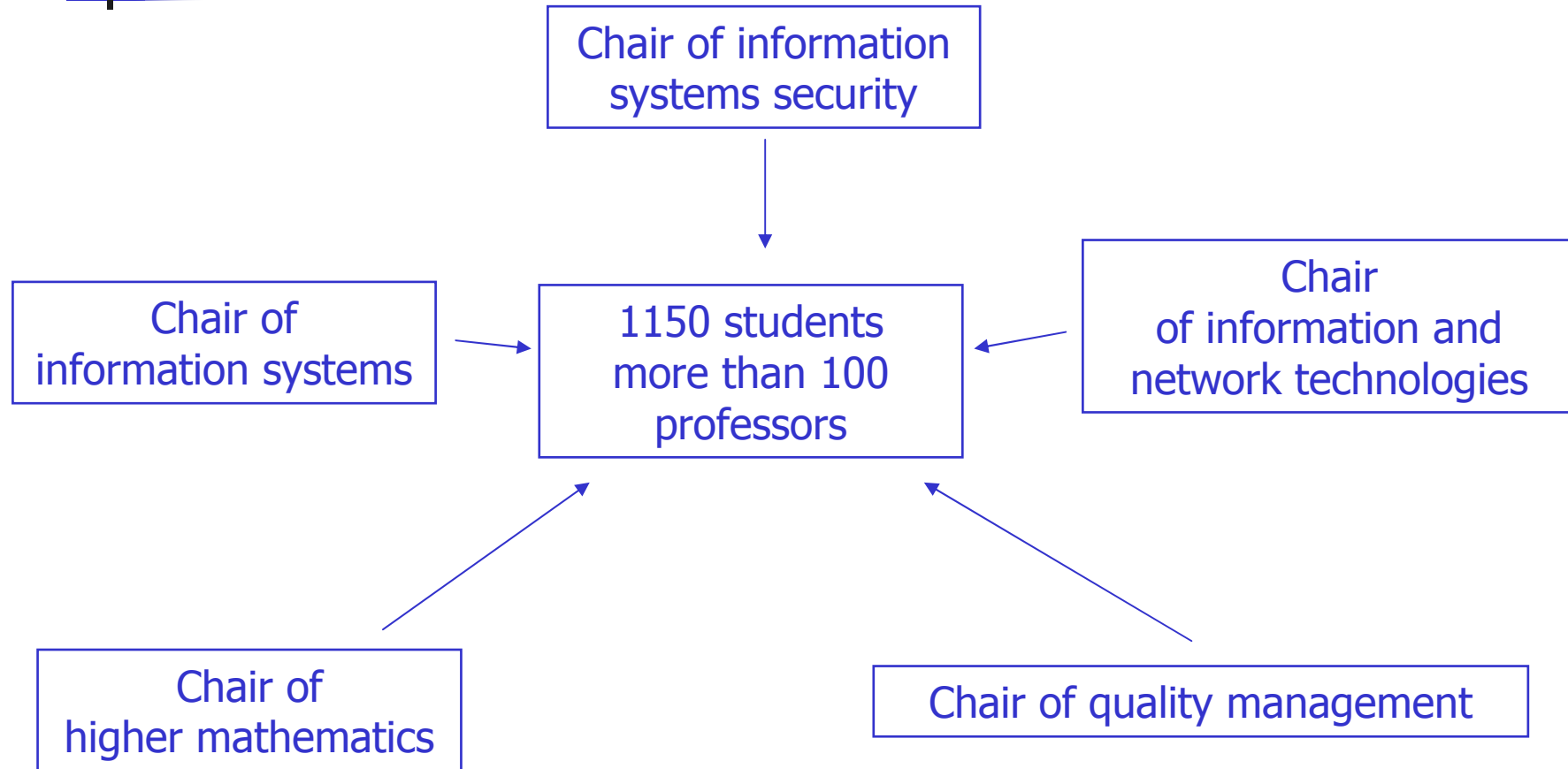
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- Faculties
  - Computer systems and programming
  - Information systems and data protection
- Educational directions (bachelors, masters)
  - Informatics and computer science
  - Software development
  - Information systems
  - Data protection
  - Telecommunications

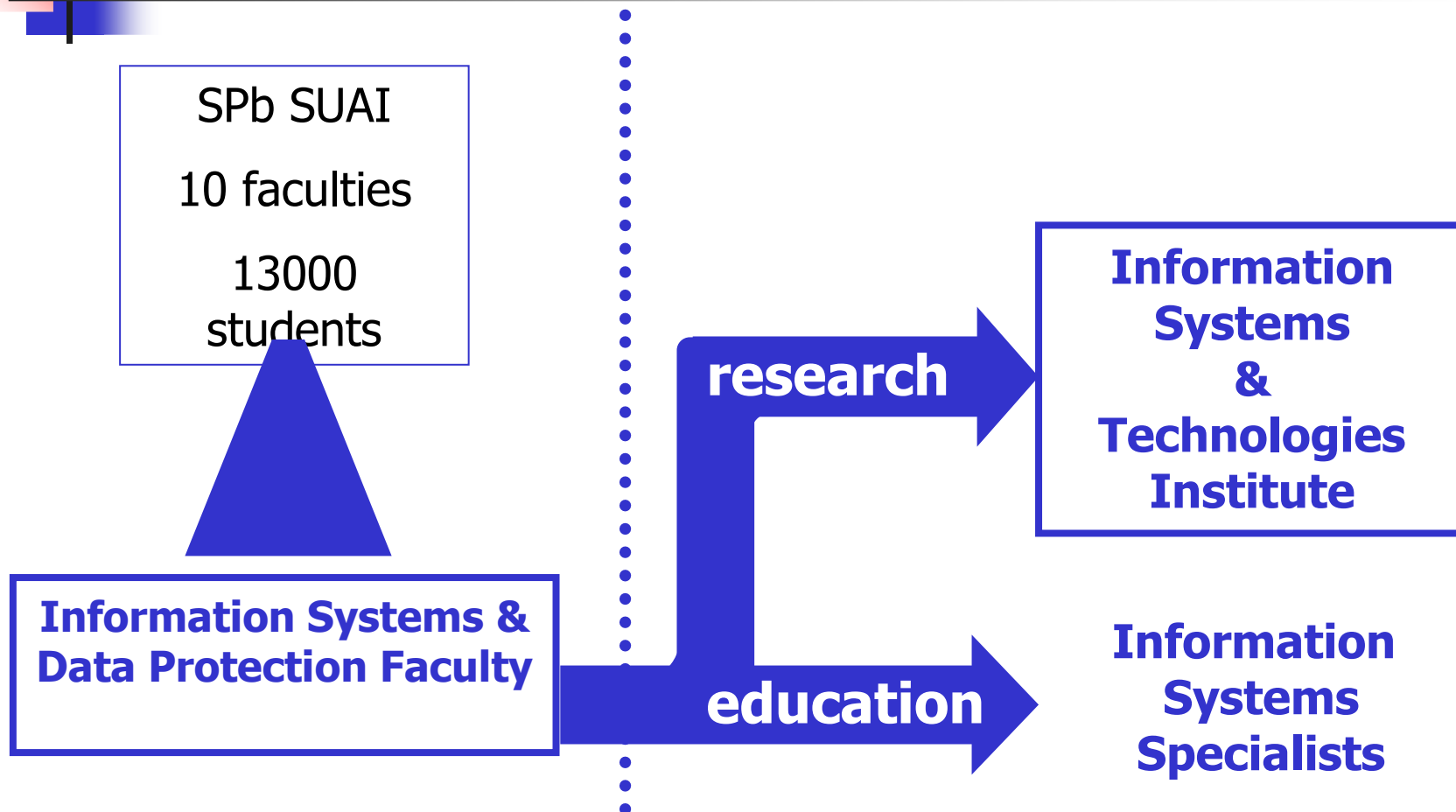


# **Information Systems & Data Protection Faculty**

# Information Systems & Data Protection Faculty



# Organizational Structure





# International Academic Activities

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- France
  - INRIA
  - Bordeaux Technical U.
  - Cachan-Besanson Research Centre
- Germany
  - Ulm U.
  - Stuttgart U.
  - Karlsruhe U.
- Finland
  - \_ Science Park Turku
- Bulgaria
  - Mathematical Institute
- Sweden
  - Lund U.
- The Netherlands
  - Technical U. of Eindhoven
- China
  - Beijing Aerospace U.
- US
  - Riverside U.
  - Indiana State U.
  - Maryland U.



# International Industrial Activities

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- US

- Intel
- Seagate
- Cadence

- Finland

- Nokia
- Nokia-Siemens

- South Korea

- Samsung
- Keri Institute
- Daewoo

- Germany

- Siemens



# Cooperation of St Petersburg State University of Aerospace Instrumentation, Finland Universities and NOKIA

Finnish-Russian Universities Cooperation in IT  
FRUCT Project



# Participation in the program

## University membership

### Full members

St. Petersburg State University of Airspace Instrumentation

{<http://suai.ru>}

University of Turku /TUCS {<http://www.tucs.fi>}

University of Oulu {<http://www.cwc.oulu.fi/>}

Helsinki University of Technology

{<http://www.tkk.fi/English/>}

St. Petersburg State Electro technical University

{<http://www.eltech.ru/english/index.htm>}

St. Petersburg State Polytechnic University

{<http://www.unilib.neva.ru/>}

## Industrial membership

### Co-founder and key contributor

Nokia {<http://www.nokia.com>}

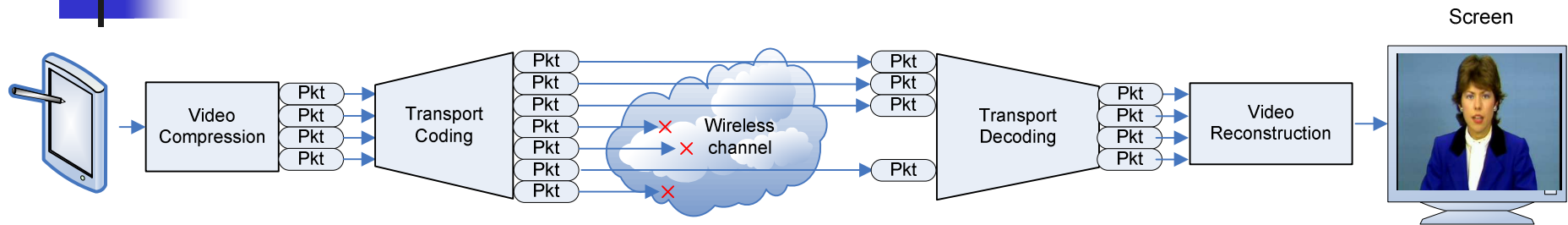
### Observers

EVTEK University of Applied Sciences (Espoo, Finland) {<http://www.evtek.fi/en/>}

St.-Petersburg Bonch-Bruевич State University of Telecommunications

{<http://www.sut.ru/about.en.html>}

# Applications

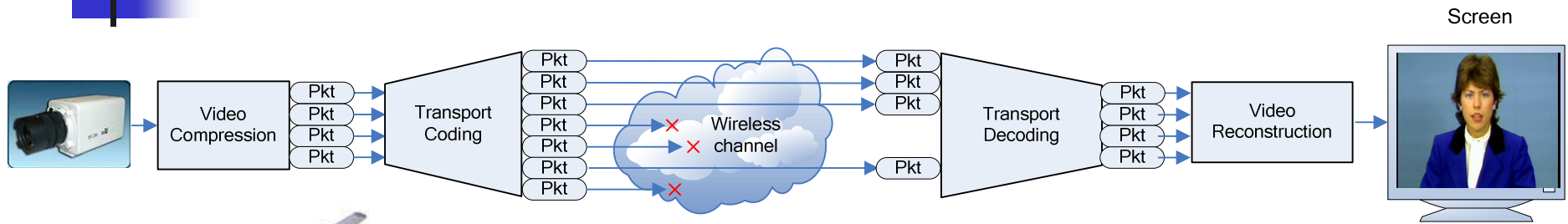


Cable Replacement &  
Residence Communications

WiFi  
WiMAX  
UWB  
60 GHZ  
...

Plasma Panel or  
Multimedia Projector

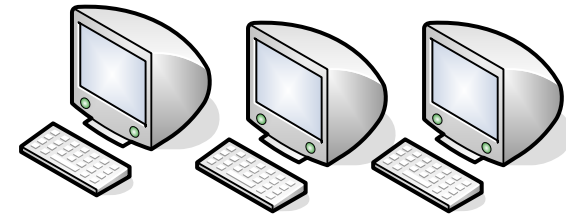
# Applications



Remote monitoring  
and control

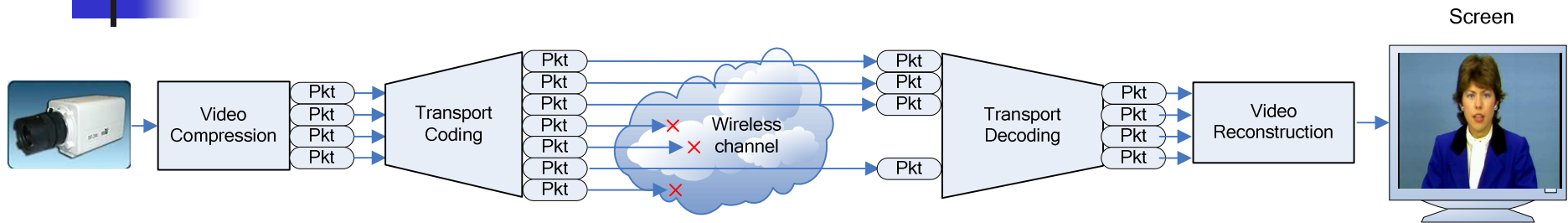
WiFi  
WiMAX  
UWB  
60 GHz

...



Remote Terminals

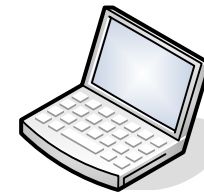
# Applications



Wireless Cameras  
in Security systems

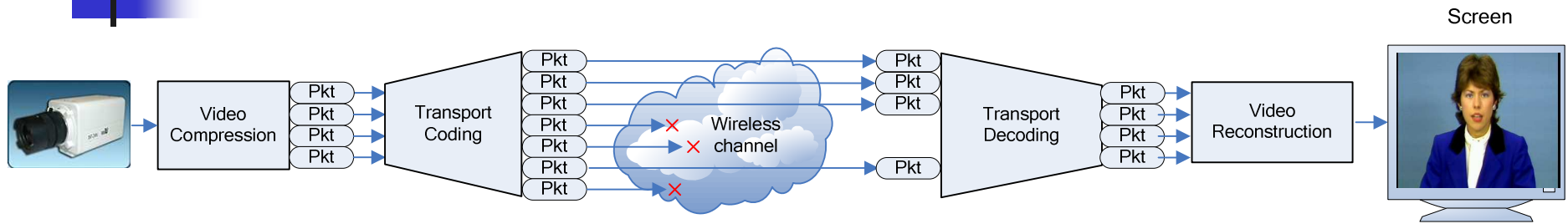
WiFi  
WiMAX  
UWB  
60 GHZ

...



Laptop

# Applications



Mobile Television

WiFi  
WiMAX  
UWB  
60 GHZ

...



Cell phones



# CBC: Project Scope

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- Adding CBC to OpenSSL
- Enabling OpenSSL-based software
  - Apache HTTP server
  - Clients and stress-testing tools
- Benchmarking
  - Simulating e-commerce traffic
- Further software development
  - Cryptography Service Provider (Win32)