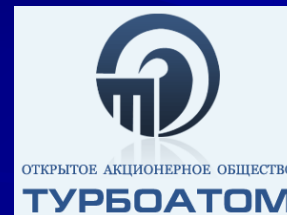


# National Aerospace University “Kharkov Aviation Institute”



## Concept and case studies of implementation of the innovation triangle by cooperation with enterprises of aviation engineering



Ukrainian University Presentation  
Uni4Inno - 2011

# Basic Aims of the Project

To attract new funding for selected research areas

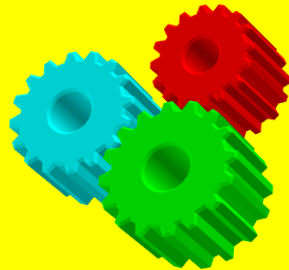


Com. contracts with Ent's

Partic. in gover. RP

Partic. in intern. RP

To provide **needed facilities** and **services** for research groups



Informational support

Law support

Financial / plan. support

Patenting service

To develop the procedures for extensive **promotion of research results**



Direct Sale

IPR Transfer

Spin-off Company

## • Strengths:



- **Recognized research potential** in aircraft, control system engineering etc.
- **Availability of required resources** in the research areas
- **Long-term bilateral contacts with enterprises**
- **Departmental support** for research groups

## • **Weaknesses:**



- **Impossibility for establishing start-ups** owned by public universities or joint companies
- **Lack of special supporting programs** in international patenting services
- **Low availability of national funds** for research purposes

**National Aerospace University  
“Kharkov Aviation Institute”**

# **Technology Transfer Process in National Aerospace University**



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# Innovation office

## Technical department

**3 or 4 experts**  
(2 employed)

**Workweek:** 5 days

**Work time:** 4-8 hours

**Responsibility:**

- Negotiations with Ent's, State and Fund. Org's
- Consulting services
- Preparing of proposals
- Preparing of technical data etc.

## Information department

**2 or 3 experts**  
(1 employed)

**Workweek:** 5 days

**Work time:** 8 hours

**Responsibility:**

- Publications
- Conferences & seminars
- Data-base systems
- Target information for specialist
- Technical advertising etc.

## IP department

**2 experts**  
(1 employed)

**Workweek:** 5 days

**Work time:** 8 hours

**Responsibility:**

- Special consulting services
- Patenting services
- Preparing of contracts
- Author's supervision service etc.

**Tech. specialists of res. struct's**

**Tech. specialists of ent's**

**Internal and ext. databases**

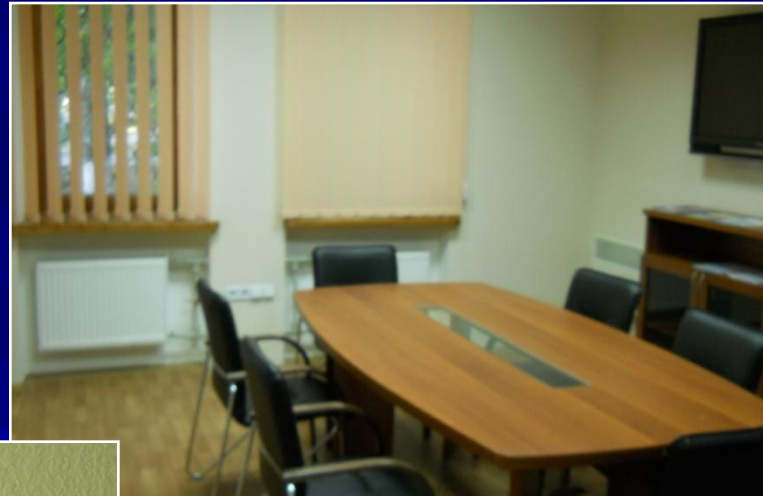
**State and intern. res. org's**

**University patent department**

**University law department**

Information  
department

IP department



# Technical department of IO

## IO Technical department

### Exhibition center

Virtual and real exhibition / demonstrational center for perspective technologies and equipment.  
EC used as the base for technical seminars/ presentations



### IO research laboratories

IO RL used as the base for additional investigations for individual researchers and small research groups



### “Partner laboratories”

IO PL used as the base for investigations for all types of research groups / organizations



Council of  
young  
scientists

Council of  
students'  
research work

Science  
and research  
department

Assistant rector  
in scientific work

**INNOVATION OFFICE**

**Scientific centers**

International study  
and research centre  
CAD/CAM/CAE

Interindustry scientific  
and research centre  
of space energetic  
and engines

Center of Technical  
Physics etc.

**Fundamental  
Research  
Laboratories (FRL)**

FRL of new  
technologies in  
aircraft engines  
production

FRL of  
aerohydrodynamics  
and acoustics etc.

**Departments'  
research  
laboratories**

# Innovation Office Field

## Internal

Students & Postgraduates;

Research groups;

Academicians;

S&R Department

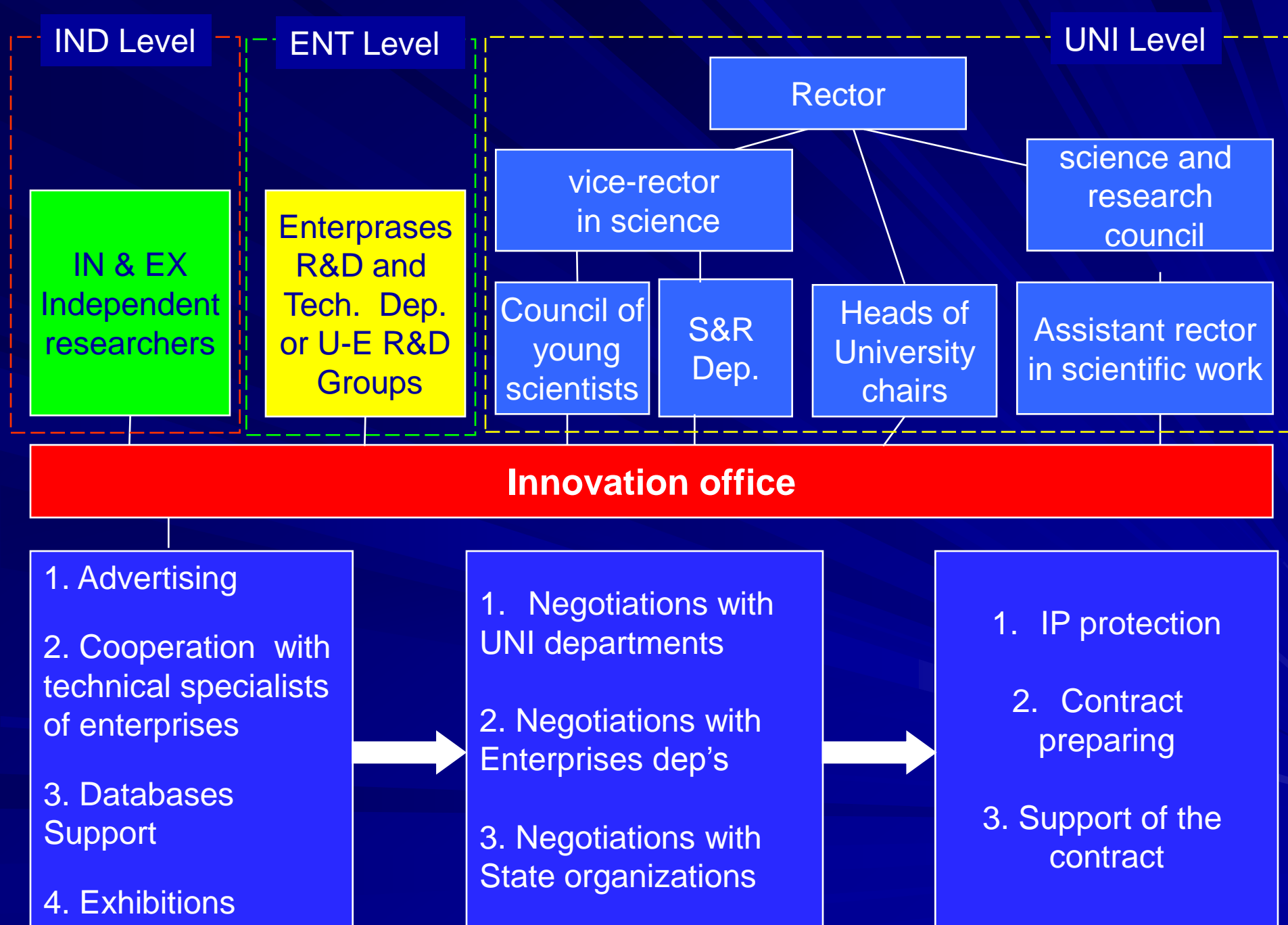
University administration

## External

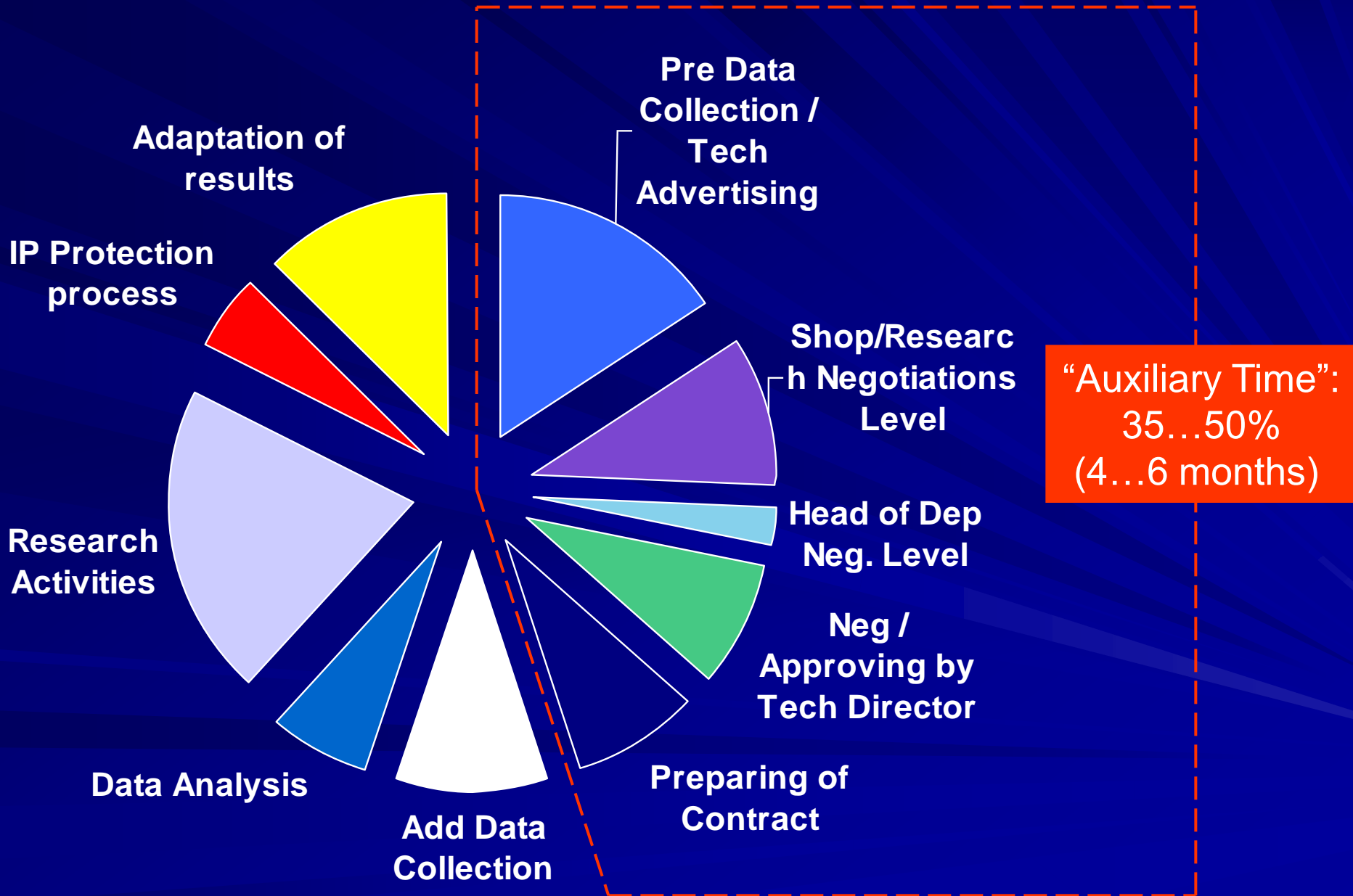
Research partners;

Potential consumers  
of the innovation  
& IP products  
(SMEs, public  
enterprises etc.);

Governmental  
authorities

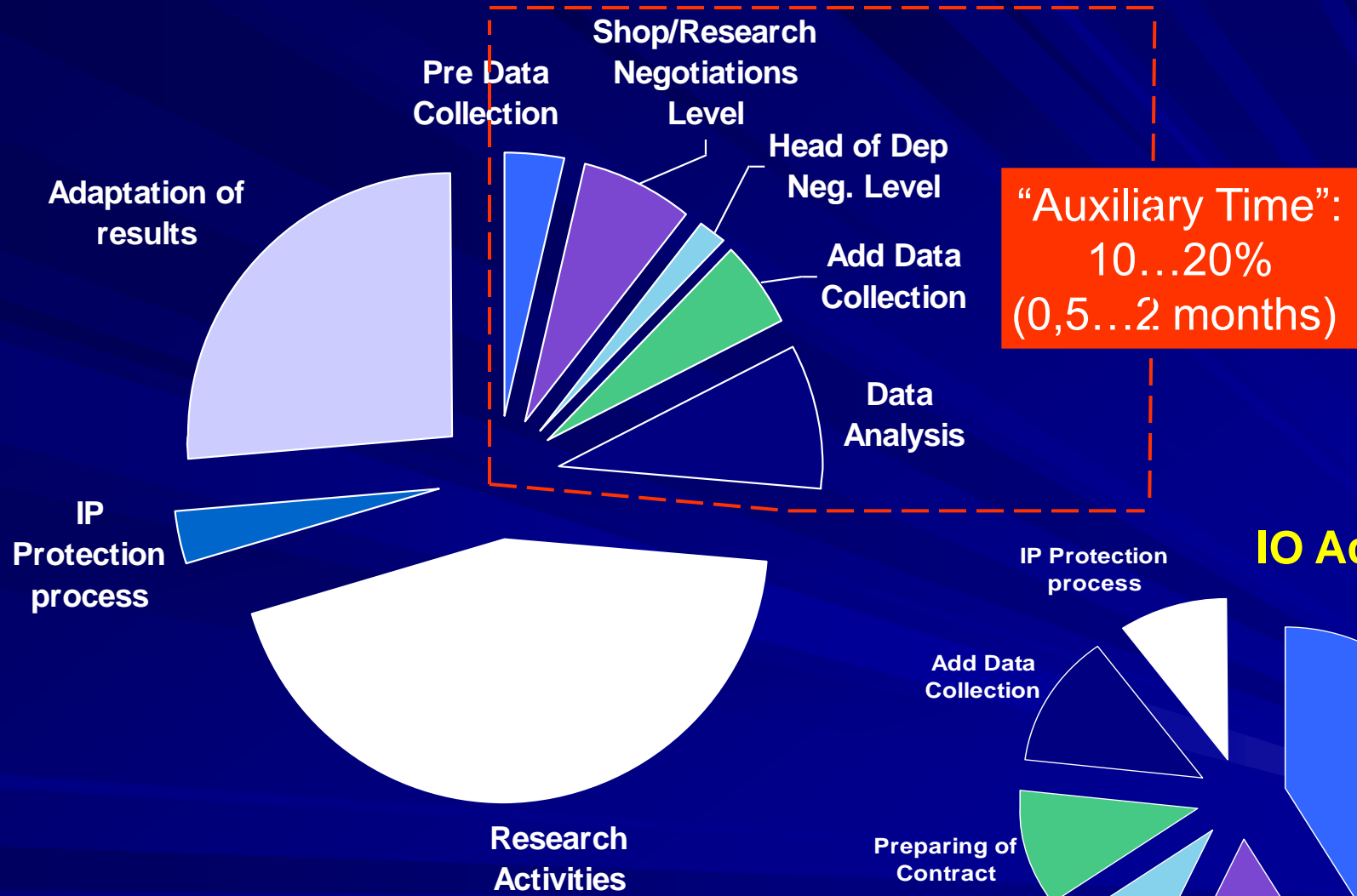


# Individual / Res. Group Activities

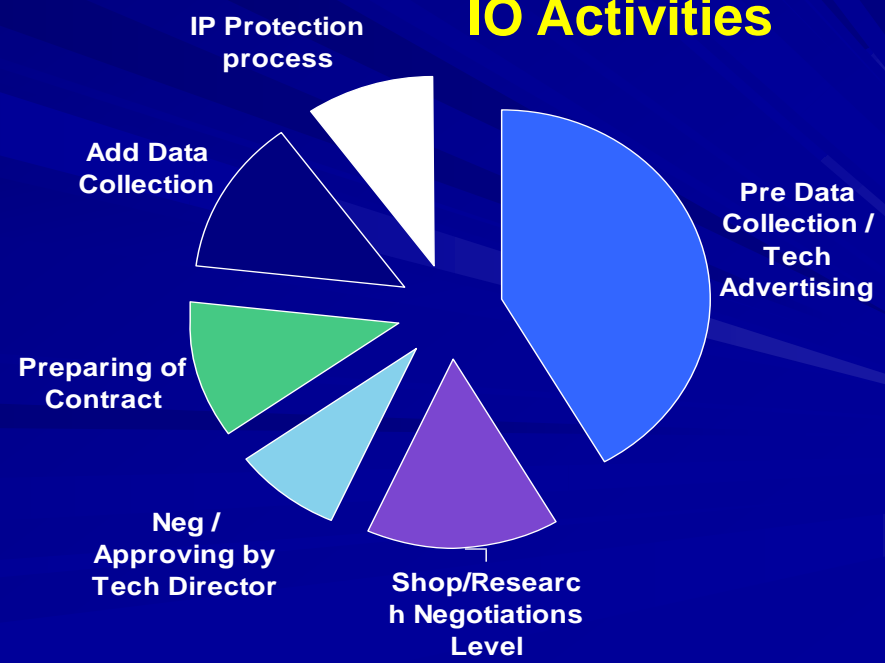


# Individual / Res. Group Activities

**NEW STRATEGY**



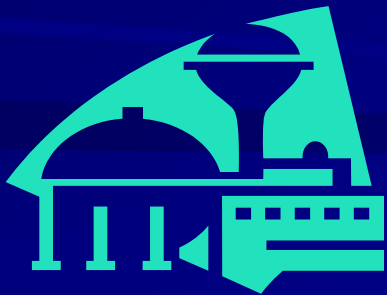
# IO Activities



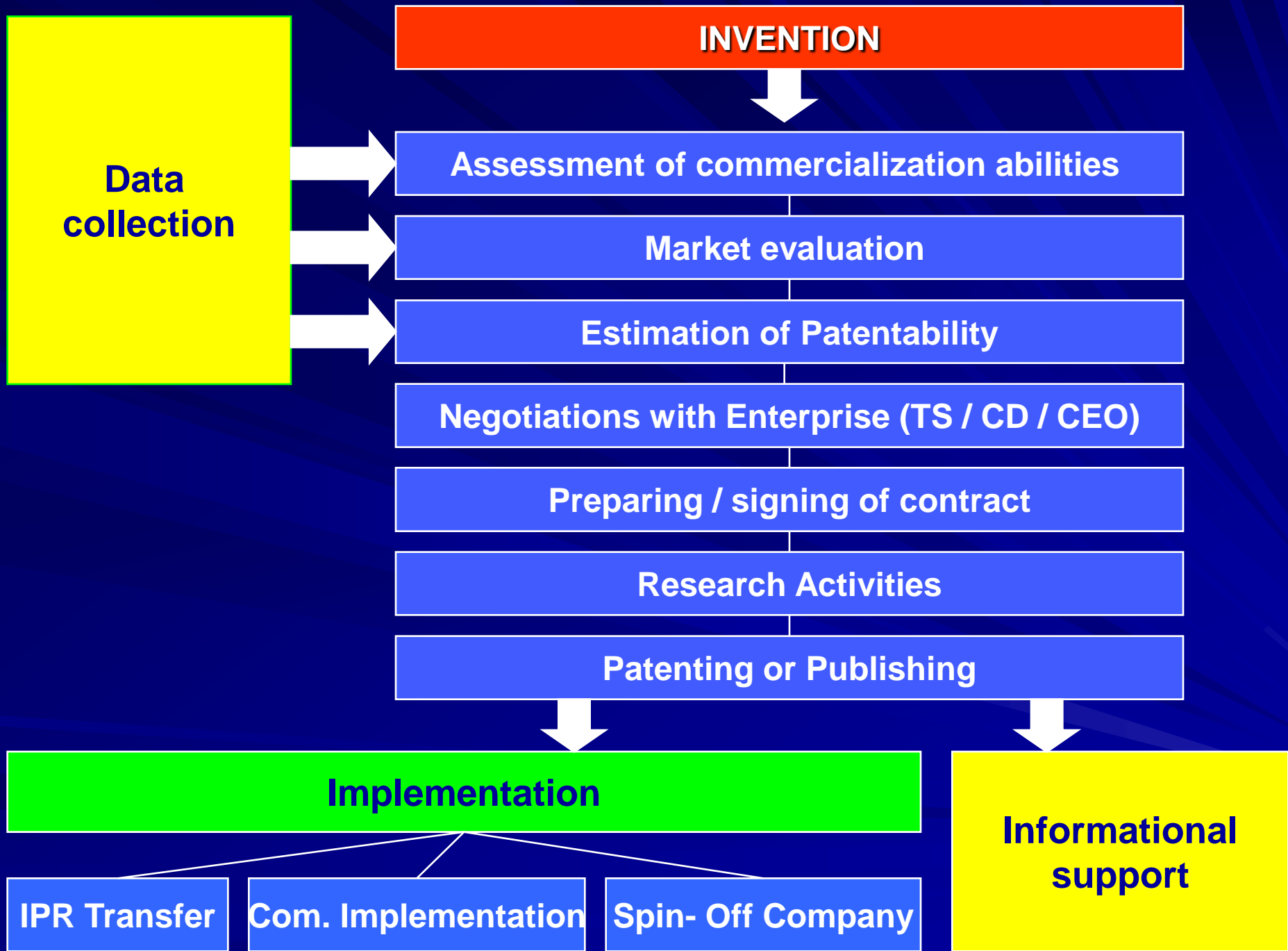
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# Technology Transfer Process

“Step by Step”



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# Ext. data collection

```
graph TD; A([Ext. data collection]) --- B[Publication in journals]; A --- C[Conferences & seminars]; A --- D[Data-base systems]; A --- E[Publication in the resources of non-governmental research organizations]; A --- F[Technical information from technical specialists of private and state companies];
```

Publication in journals

1. UNI level ("ASTT", "RECS" etc.)
2. State level ("Prot. coatings" etc.)
3. Intern. Level (IEEE, Springer etc.)

Conferences & seminars

1. National conf. (University, Ministry)
2. Intern. conf. (AIRTEC, Gas-term. Coatings etc.)

Data-base systems (UNI and Partners Levels)

Publication in the resources of non-governmental research organizations (NMP, Cordis, CRDF etc.):

Technical information from technical specialists of private and state companies

**Int. data  
collection**

```
graph TD; A([Int. data collection]) --- B[Council of young scientists reports]; A --- C[Council of students' research work]; A --- D[Science and research department info]; A --- E[Assistant rector in scientific work]; A --- F[Technical information from university departments];
```

**Council of  
young  
scientists  
reports**

**Council of  
students'  
research  
work**

**Science  
and  
research  
department  
info**

**Assistant  
rector  
in scientific  
work**

**Technical  
information  
from  
university  
departments**

## Sources of commercialization criteria / market evaluation

Demands from commercial companies

1. Information from Nongovernmental EU-integration organizations
2. Tenders (equipment, Technologies, research)
3. Information from Conferences, seminars
4. Information from Technical specialists

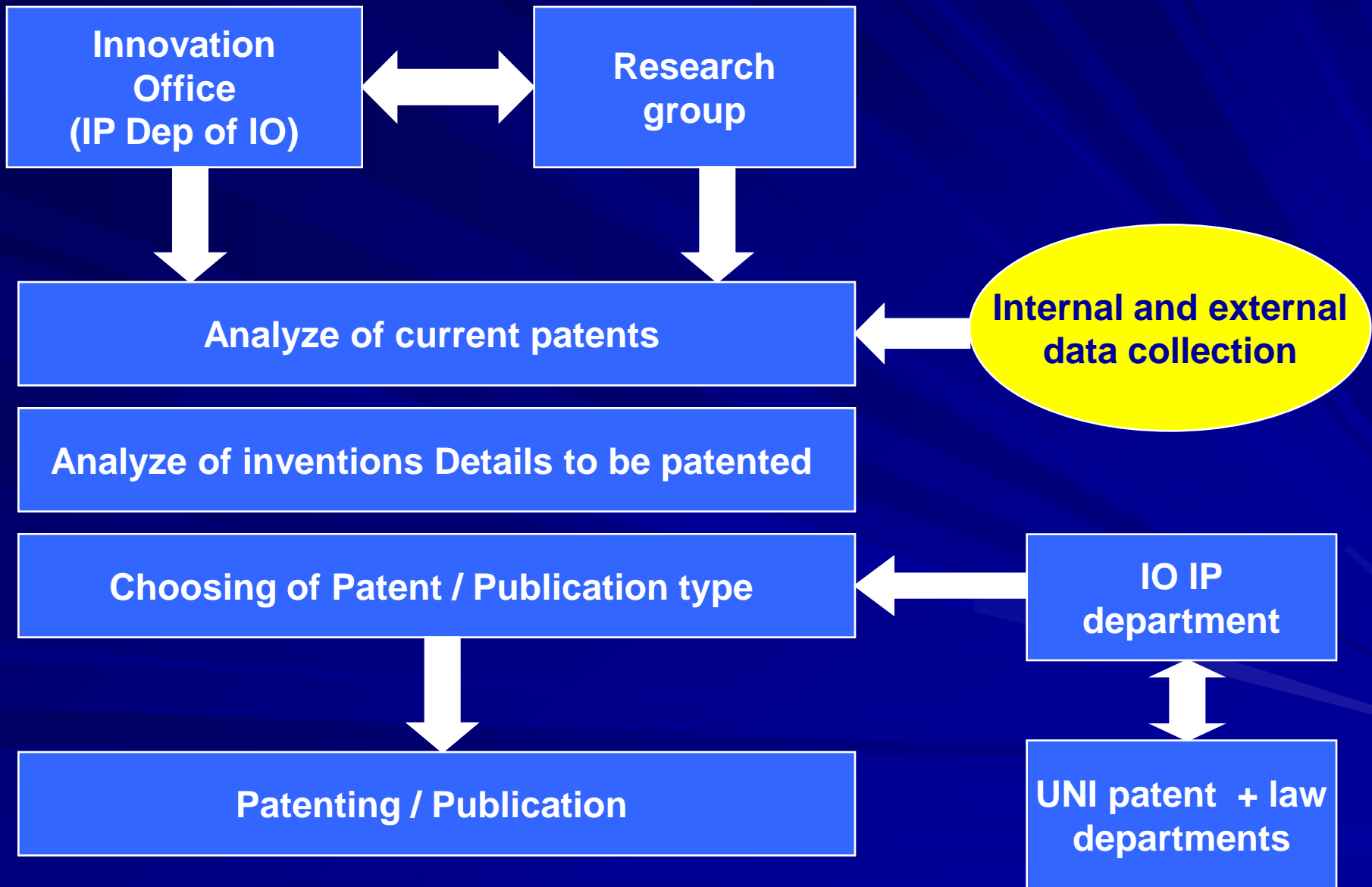
Information about national priorities

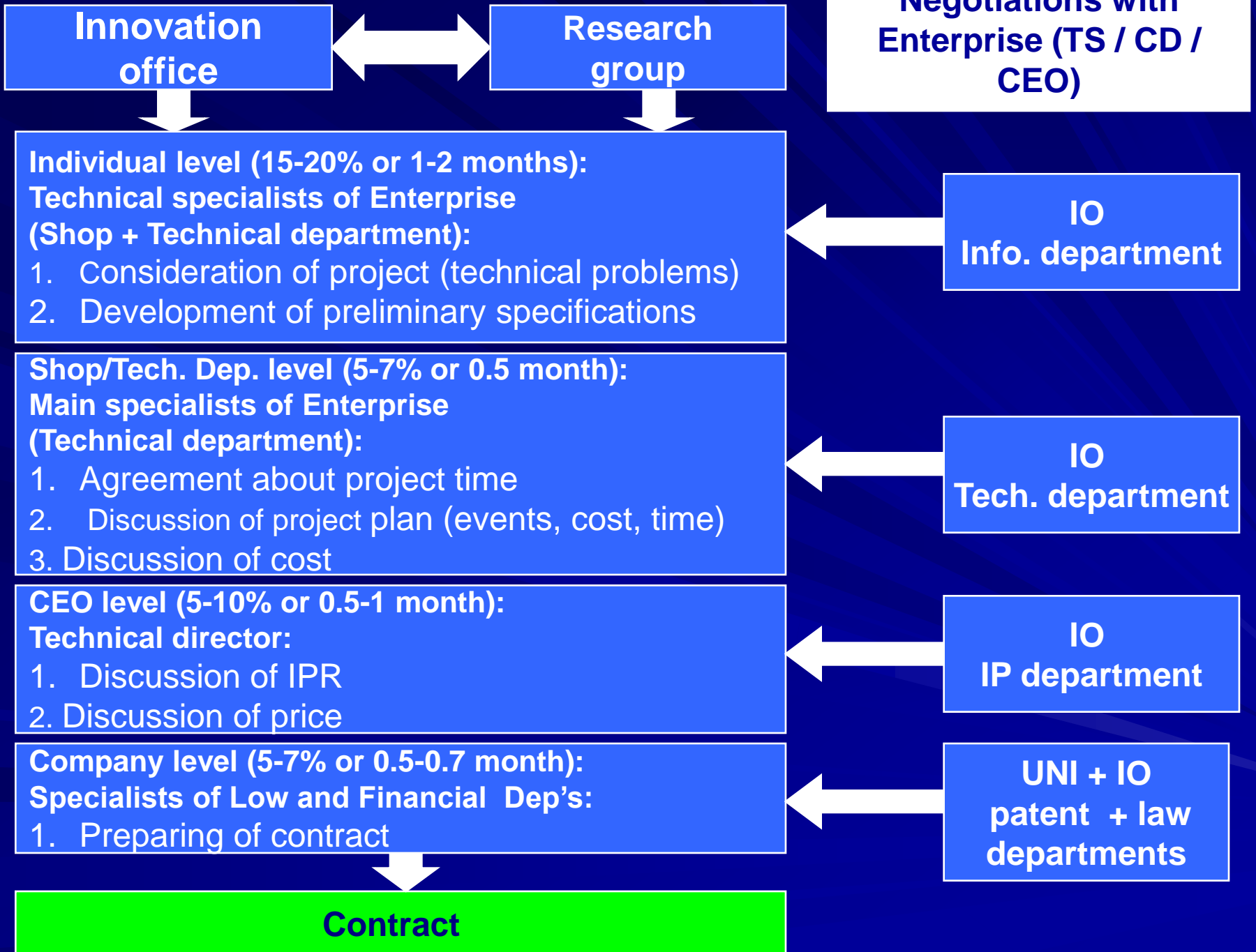
1. State targeted grants (grants for young Scientists etc.)
2. Information about Current state Programs

Information about international priorities

1. Information from resource org's (ERA, NMP, Cordis)
2. International conferences
3. International Scientific databases

# Estimation of Patentability





## Research Activities

**Innovation  
office**

**Research  
group**

**Enterprise**

**Step 1**  
**Creation of UNI – ENT research group (0.5 – 1 month)**

**Step 2**  
**Upgrade of equipment, purchase of equipment / materials (1-1.5 months)**

**Step 3**  
**Research activities on the bases  
of UNI-ENT research groups (3 – 24 months)**

# Info Support

Targeted information for technical specialists of companies:  
booklets, tech cards, video files, CD etc.

Data-base systems  
(UNI and Partners Levels):  
[www.khai.edu.ua](http://www.khai.edu.ua), [www.innotech.org.ua](http://www.innotech.org.ua) etc.

Publication in the resources of non-governmental research organizations (NMTT, Cordis, CRDF etc.):  
<http://ec.europa.eu/research/participants/portal/page/myorganisations>  
<http://www.nttn.org.ua/> etc.

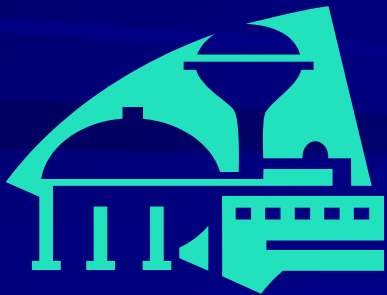
Conferences & seminars  
1. National conf. (University, Ministry)  
2. Intern. conf. (AIRTEC, “Gas-thermal coatings”, “Congress of aviation engine manufacturers” etc.)

Publication in journals  
1. UNI level (“ASTT”, “RECS” etc.)  
2. State level (“Prot. coatings” etc.)  
3. Intern. Level (IEEE, Springer etc.)

National Aerospace University  
“Kharkov Aviation Institute”

# Technology Transfer Process

“Process Alive”

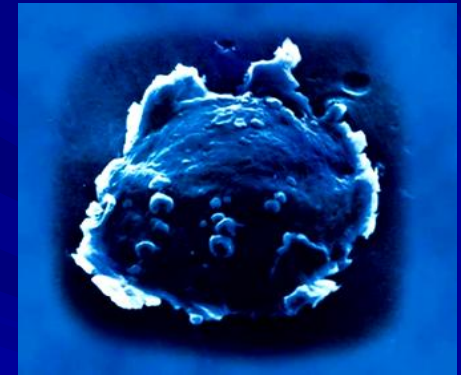


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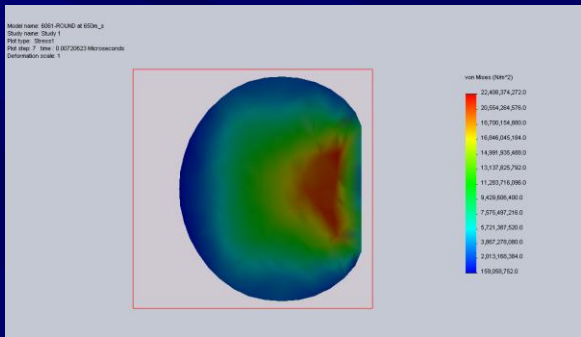
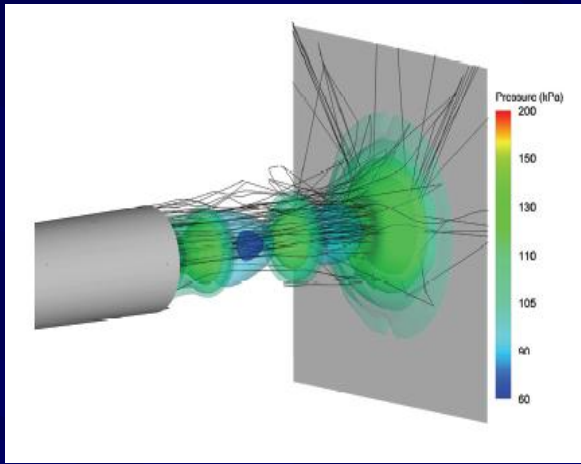
**National Aerospace University  
“Kharkov Aviation Institute”**

# **Technology Transfer Processes**

**TECHNOLOGY AND EQUIPMENT  
FOR COLD SPRAYING (CS) OF  
SPECIAL PROTECTIVE COATINGS.  
TECHNOLOGY FOR PRODUCING OF  
NANOPOWDERS**



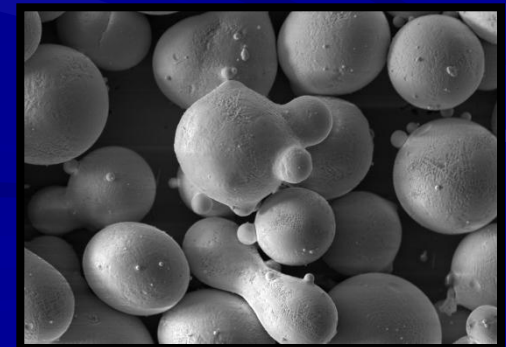
Ukrainian University Presentation  
Uni4Inno - 2011

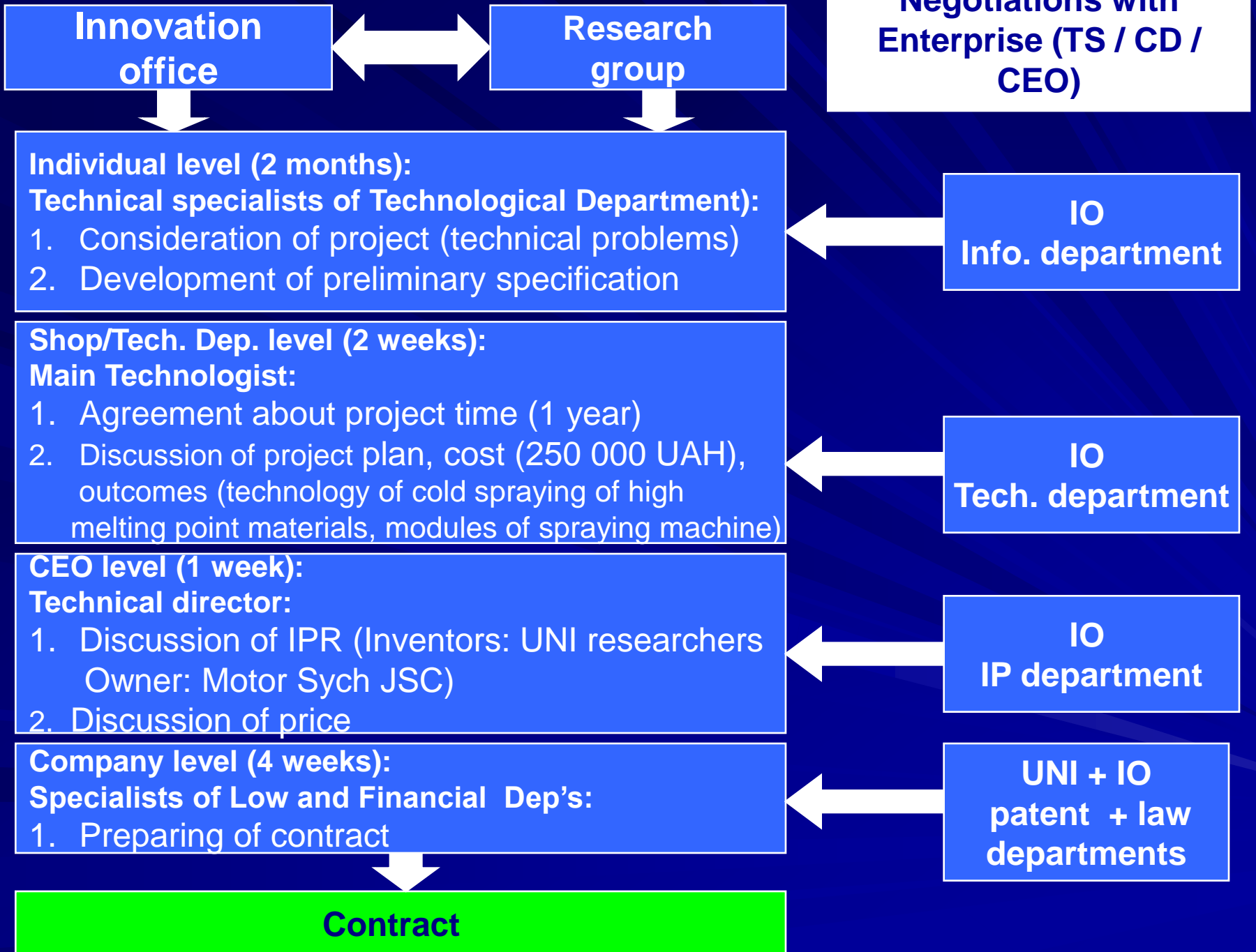


This technology is characterized by the absence of combustion and high temperatures. It is suitable for spray coating from a wide range of materials (pure metals, alloys, plastics and composite materials), nano-powders on any substrate. The new method and equipment allow to obtain coatings of metals (Al, Zn, Cu, Ni, Co, Fe, Ti, V, Sn, etc.), alloys and their mechanical mixtures (with the powders of oxides etc.) on various products made of metals, dielectrics, including ceramics, glass, etc. One of the main features of this method is virtually unlimited coating thickness:

- The thickness of the coating: 10 - 30000 microns.
- The value of adhesion strength: 30 - 80 MPa
- Porosity of the coating: 1 - 10%

This technology is ideal for producing of nanopowders, because there are no processes of heating and oxidation of materials. With this technology nanopowders from any material can be obtained.





# Institutional support

## Law support

Patent dep.

Law dep.

## Financial aspects

### Market evaluation

Vice-  
rector  
In SR

S&R  
dep.

Technical  
specialists of  
enterprises

Estimation of  
Patentability

Contract  
with  
Enterprises

Automobile engines and cases repair and corrosion protection (cases – up to 12000 units per year, welding – up to 15000 welded assy's), Gas-turbine engines repair and life incr. (Blades – up to 150000 units per year, Shafts – up to 1000 units per year etc.), Metal structures corrosion protection (up to 60 000 sq.m. per year) etc.

- Research Activities Planning (Plan for 2 years research)
- Financial Planning (budget – 250 000 UAH)
- Implementation activities planning

**Basic Outcomes For “Motor Sych” JSC + 2 Patents**

**Business plan for Spin-off**

# Results

```
graph TD; Results[Results] --> Equipment[Updated lab equipment]; Results --> Proposal[Proposal for spin-off company est.]; Equipment --> Pilot[Establishing of pilot "Partner Laboratory"]; Equipment --> Dev[Developed technique and equipment]; Equipment --> Software[Special software]; Proposal --> SOC[Status of SOC: Ltd.]; Proposal --> Owners[Owners: Motor Sych JSC: 60%]; Proposal --> UNI[UNI: 25%]; Proposal --> Researchers[Researchers: 15%];
```

## Updated lab equipment

Cost: 14% of total contract sum

Establishing of pilot  
“Partner Laboratory”

Developed  
technique and  
equipment

Special software

## Proposal for spin-off company est.

Status of SOC: Ltd.

Owners:

Motor Sych JSC: 60%

UNI: 25%

Researchers: 15%

# INFO Supporting

Publication in journals  
1. UNI level (“ASTT”, “RECS”)  
2. State level (“Prot. coatings”)  
3. Intern. Level (IEEE, Springer etc.)

Publication in the resources of non-governmental research organizations (Cordis CRDF)

## Data-base systems and Partner's resources



The screenshot displays the CIET website interface. At the top, there is a navigation menu with links for 'ГЛАВНАЯ', 'О НАС', 'ХОТЛАЙН', and 'КОНТАКТЫ'. Below this, there are sections for 'NEWS', 'USEFUL LINKS', and 'ИНЖЕНЕРИИ'. The 'USEFUL LINKS' section includes links to 'PPT VIDEOS', 'ENIGM', 'CORPORATIONS', 'PROJECTS', and 'TEMP'. The 'ИНЖЕНЕРИИ' section features a large image of a turbine engine component and text describing 'CAD services' and 'CAE services'. The 'CAE services' section includes a 3D simulation of a turbine engine and text describing the development of software for simulation and optimization.

## Targeted information for technical specialists of companies



The screenshot shows a technical document titled 'TECHNOLOGY AND EQUIPMENT FOR COLD SPRAYING (CS) OF... SPECIAL PROTECTIVE COATINGS'. The document is from the 'NATIONAL AEROSPACE UNIVERSITY NAMED AFTER N.Y. ZHUKOVSKY "KHARKOV AVIATION INSTITUTE"'. The text describes the technology, its characteristics, and its applications. It mentions that the technology is characterized by the absence of combustion and high temperatures, making it suitable for spray coating from a wide range of materials (pure metals, alloys, plastics and composite materials), nano-powders on any substrate. The text also lists the thickness of the coating (10 - 30000 microns), the value of adhesion strength (30 - 30 MPa), and the porosity of the coating (1 - 10%). The document includes several images of coated parts and a diagram of the cold spraying process. The text concludes that this technology is ideal for producing nanocoatings because there are no processes of heating and oxidation of materials. With this technology, nanocoatings from any material can be obtained. The document also lists the research areas: Design of new, high effective supersonic nozzle configurations; Simulation of gas flow in nozzles and channels using special software; Simulation of shock interaction of particles with the substrate; Design and conduct experiments in cold spraying of wide range of materials (coating on parts of aircraft engines, ceramic, etc.) with online registration of the main parameters (process parameters, operating parameters of the system coating-substrate, etc.); Development of technology for producing nanocoatings from nano-to-machine materials. The document is from the Department of Technology of aviation engine manufacturing, Cherkassy str. 17, Kharkov, 61070, Ukraine. Phone: +380677690536, +380577074204, E-mail: inv-project@yandex.ru.

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# **NEW STRATEGIES**



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# “Partner Laboratory” strategy

Enterprise

## “Partner Laboratory”

**Base unit:** technical department (e.g. – testing laboratory of “Central enterprise laboratory” or laboratory of technological department or laboratory of metallurgical dep. etc.)

**Owner:** Enterprise

**Constituent instrument:** bilateral contract

### Benefits:

1. Additional UNI-ENT research laboratory with minimum investment (upgrade of equipment, purchasing of additional equipment and materials etc.)
2. The cost of experiments for external UNI projects = 15...30% of market price (or free)
3. Ent. can involve UNI specialists and students for current projects
4. The cost of experiments and investigations with UNI specialists = 50...60% of market price

Technical department of IO

Research group

# “Partner Laboratory” system

