Institute for Nuclear Research and Nuclear Energy
Bulgarian Academy of Sciences

BEOBAL

BEO Centre of Excellence

BEO Centre of Excellence Research Capacity Improvement for Sustainable Environment and Advanced Integration into ERA

Jordan Stamenov, Boyko Vachev

FP6 Project

BEOBAL prehistory

INRNE astrophysical & environmental research

INRNE complex environmental monitoring

OM2

BEO Moussala

BEO IEC

INRNE – CERN

BEO Centre of Excellence

INRNE – HMO

INRNE – JRC

NUSES

INRNE – JINR

NPI

ITU

IES

IRMM

IRE

INRNE – IAEA

HIMONTONET

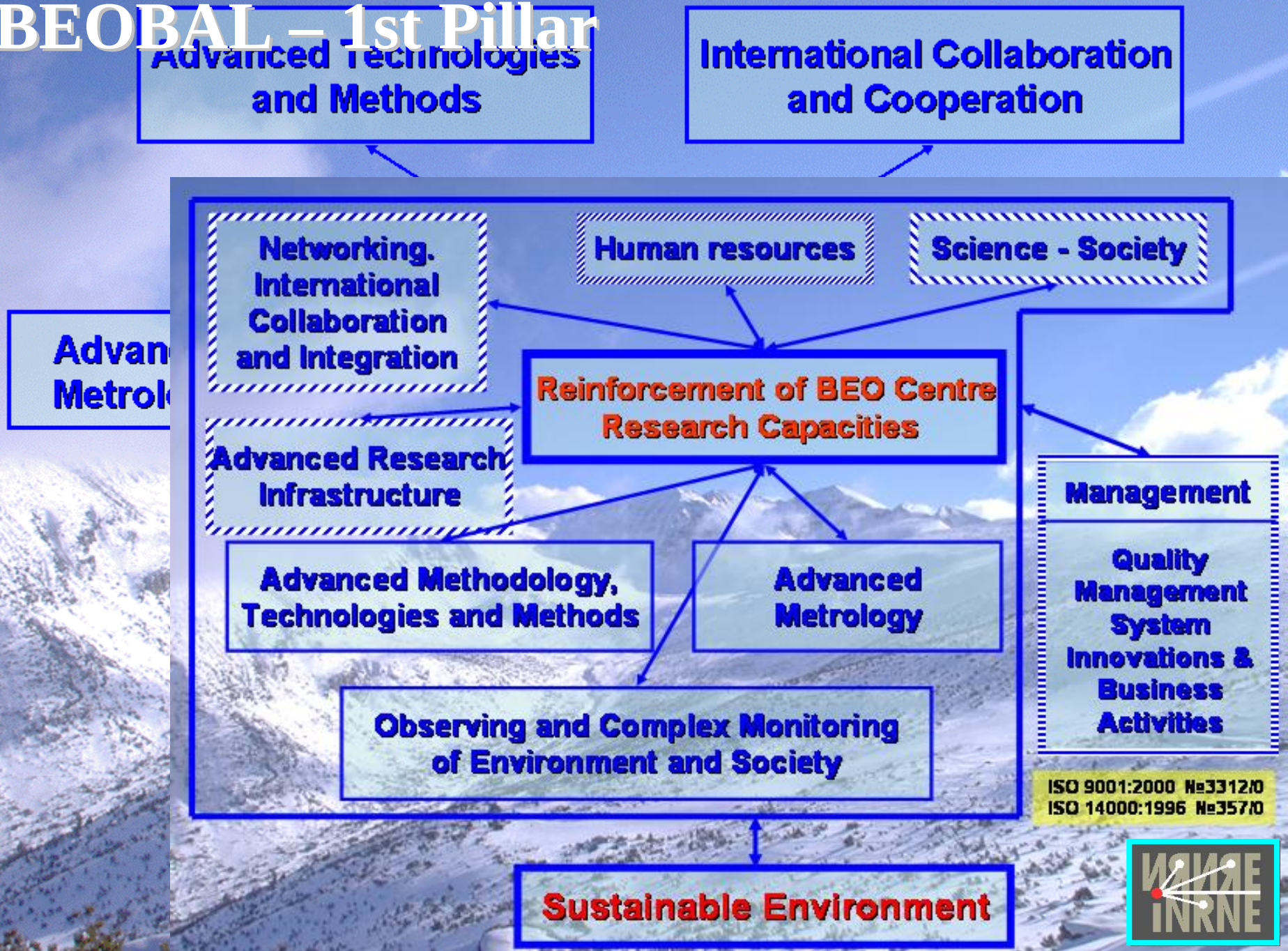
BEOBAL – 3 main conceptual Pillars

1. System approach to
   Nuclear Science, Environment and Society

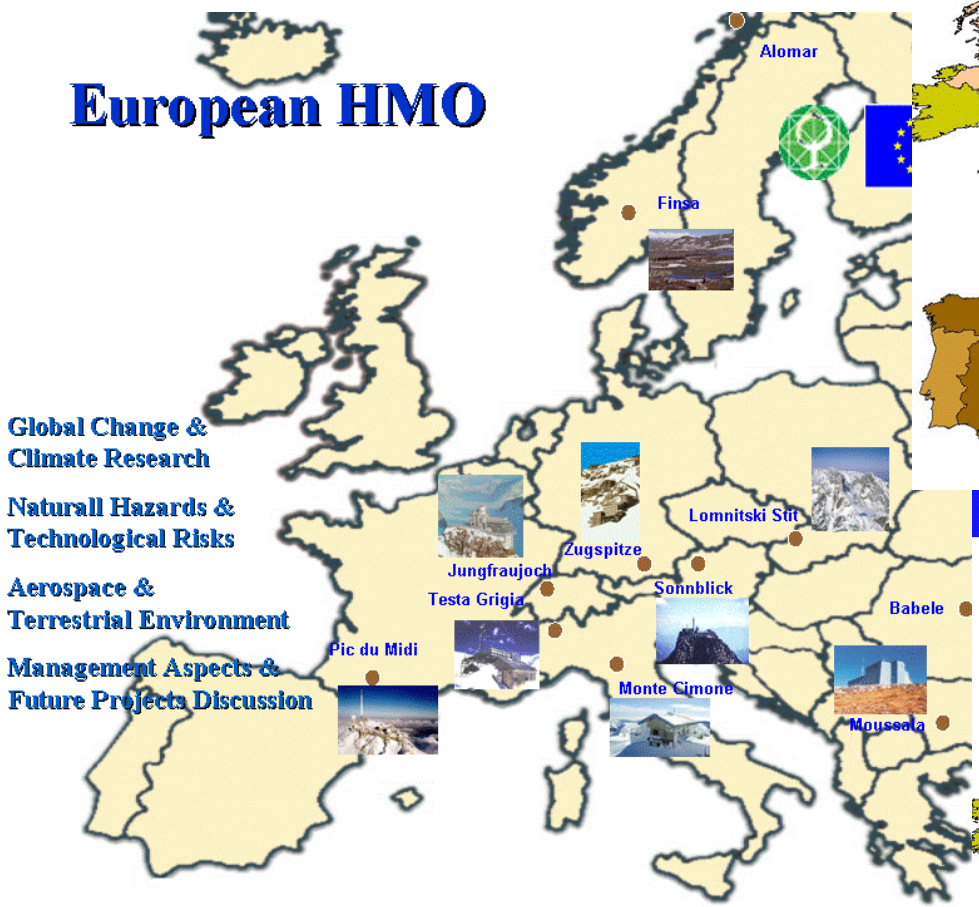
2. Long – Term Development of
   Strategic Cooperation and Integration

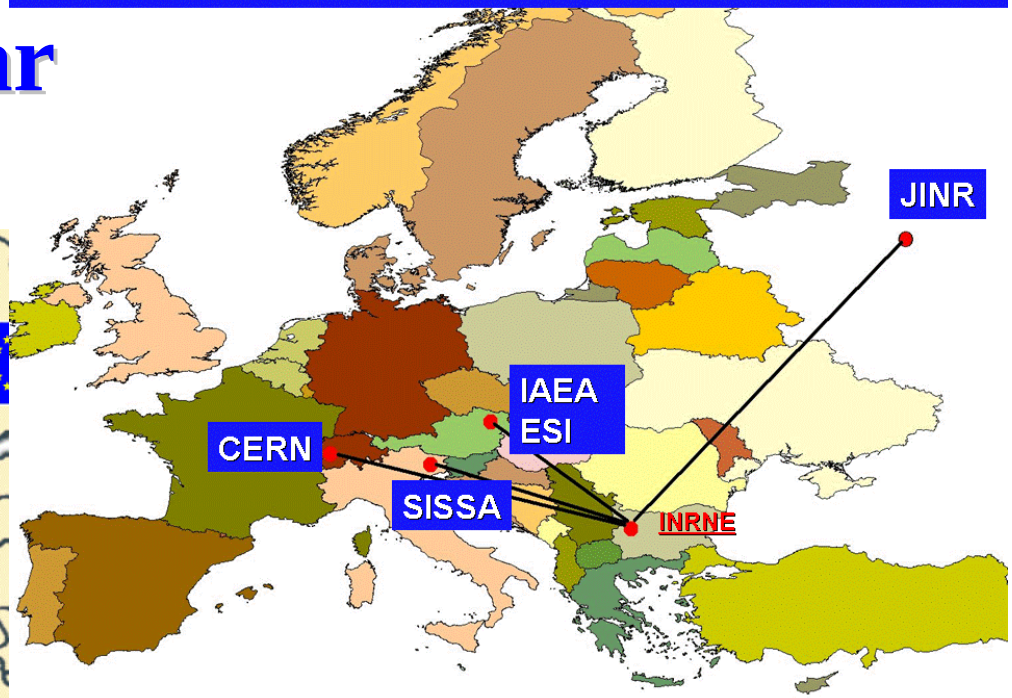
3. Enhancement and Development of
   New Organisational Structures in
   European Context with
   Regional Accent

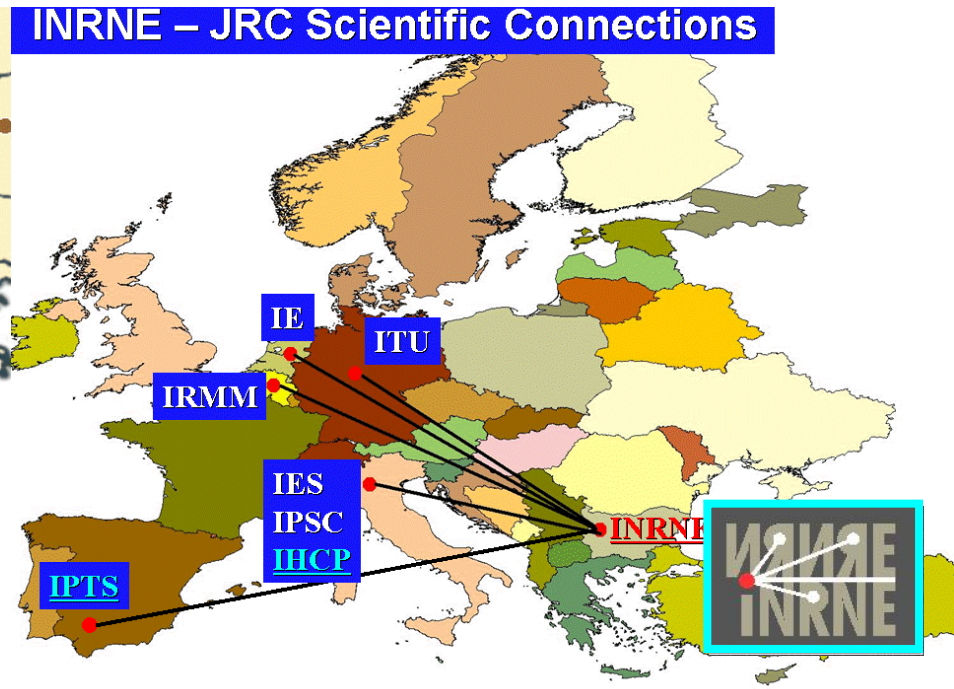
BEOBAL – 1st Pillar



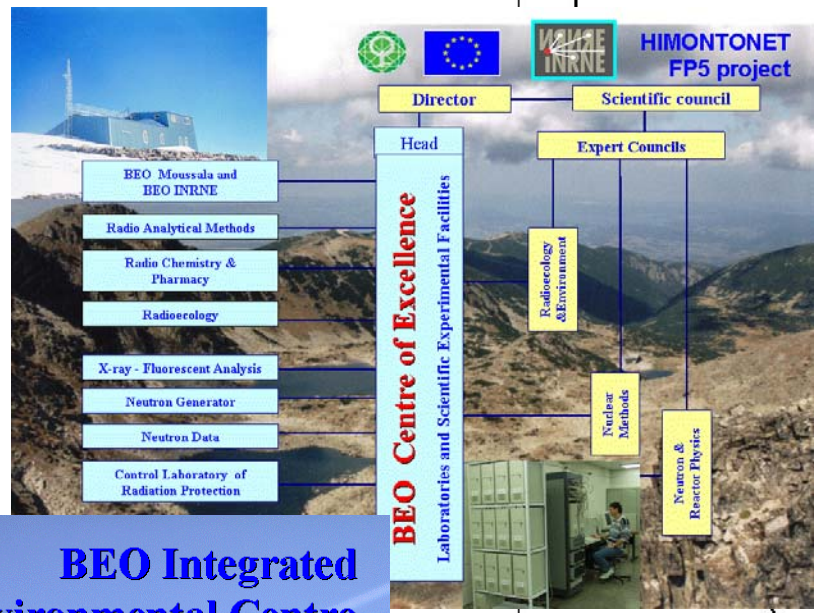
BEOBAL – 2nd Pillar

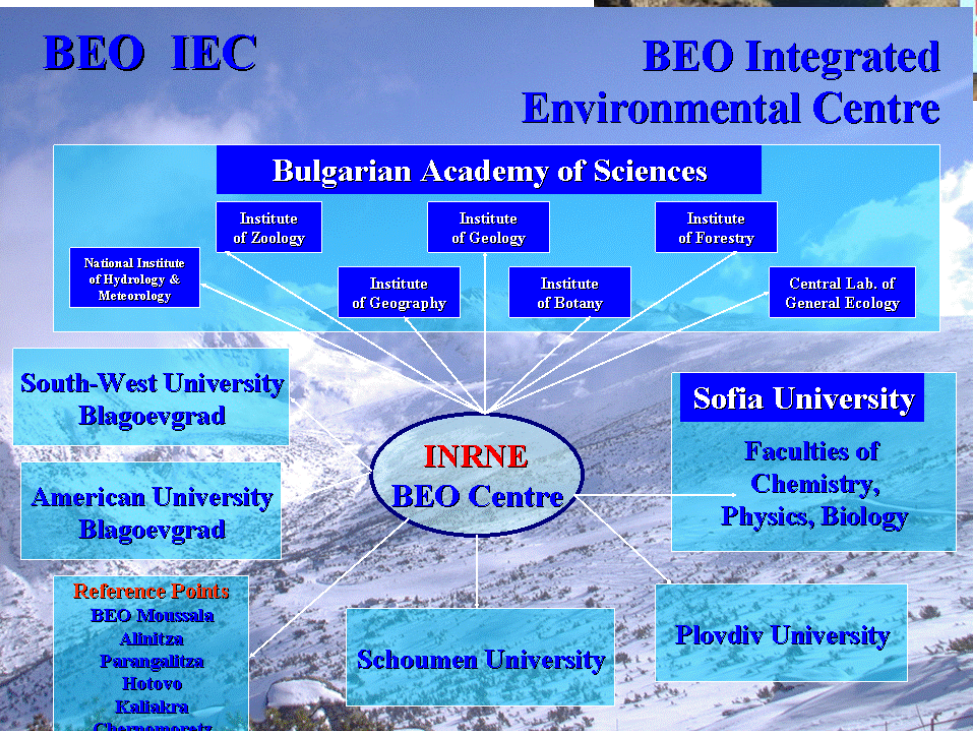


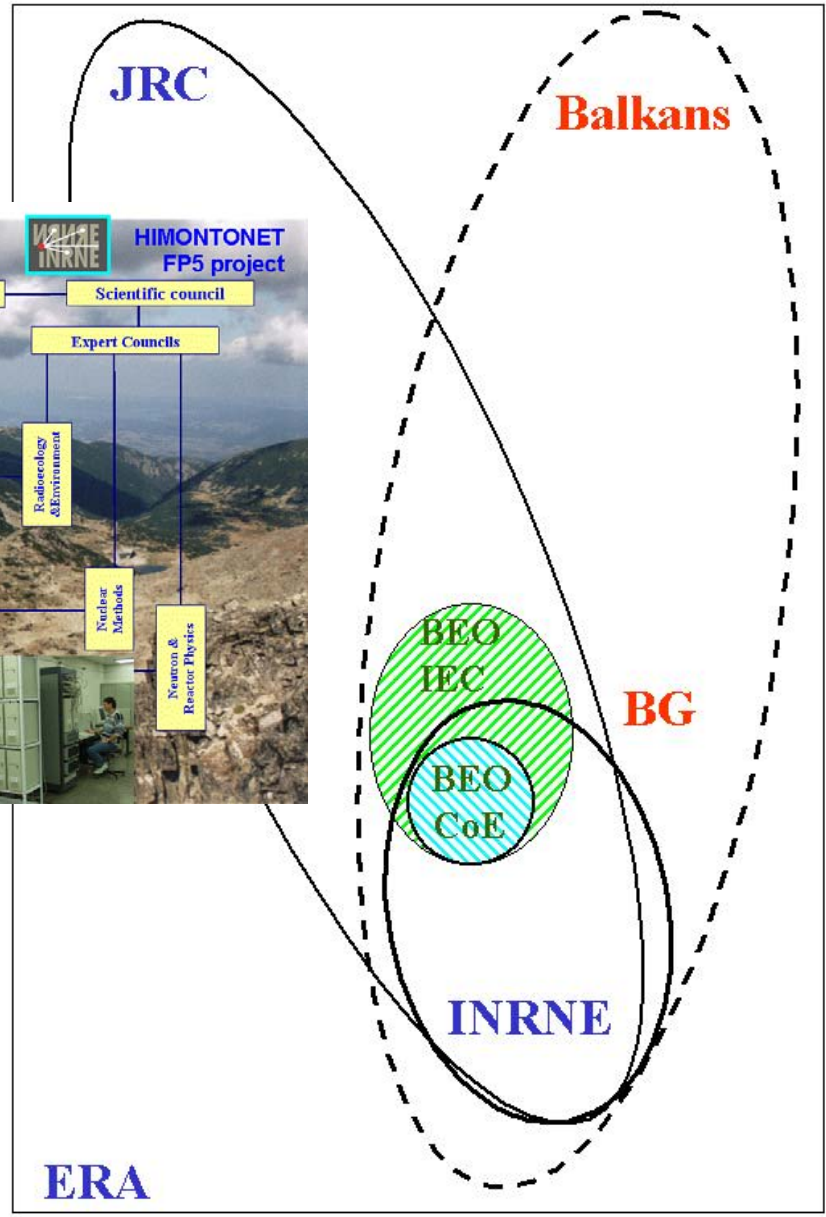




BEOBAL – 3rd Pillar







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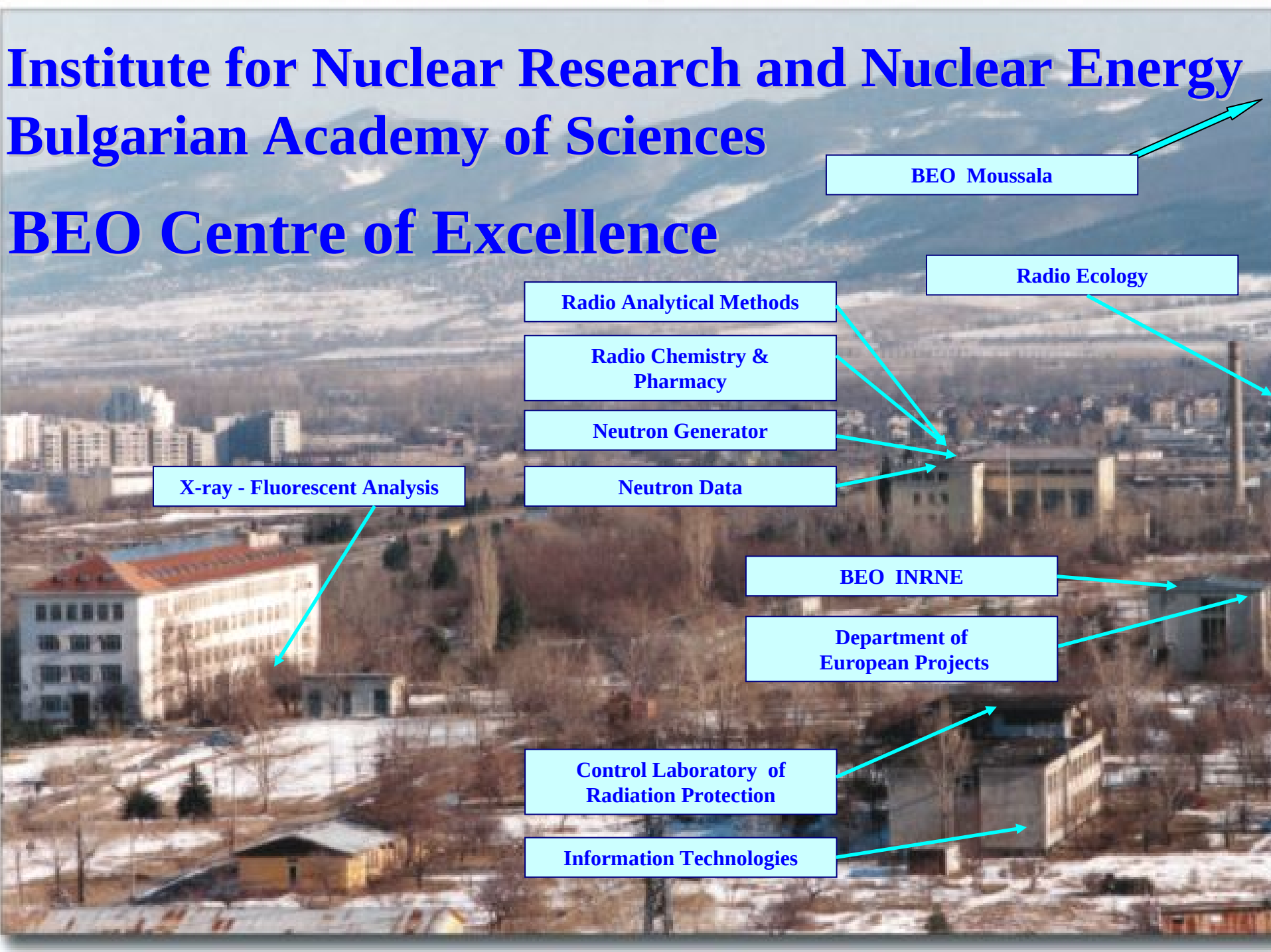
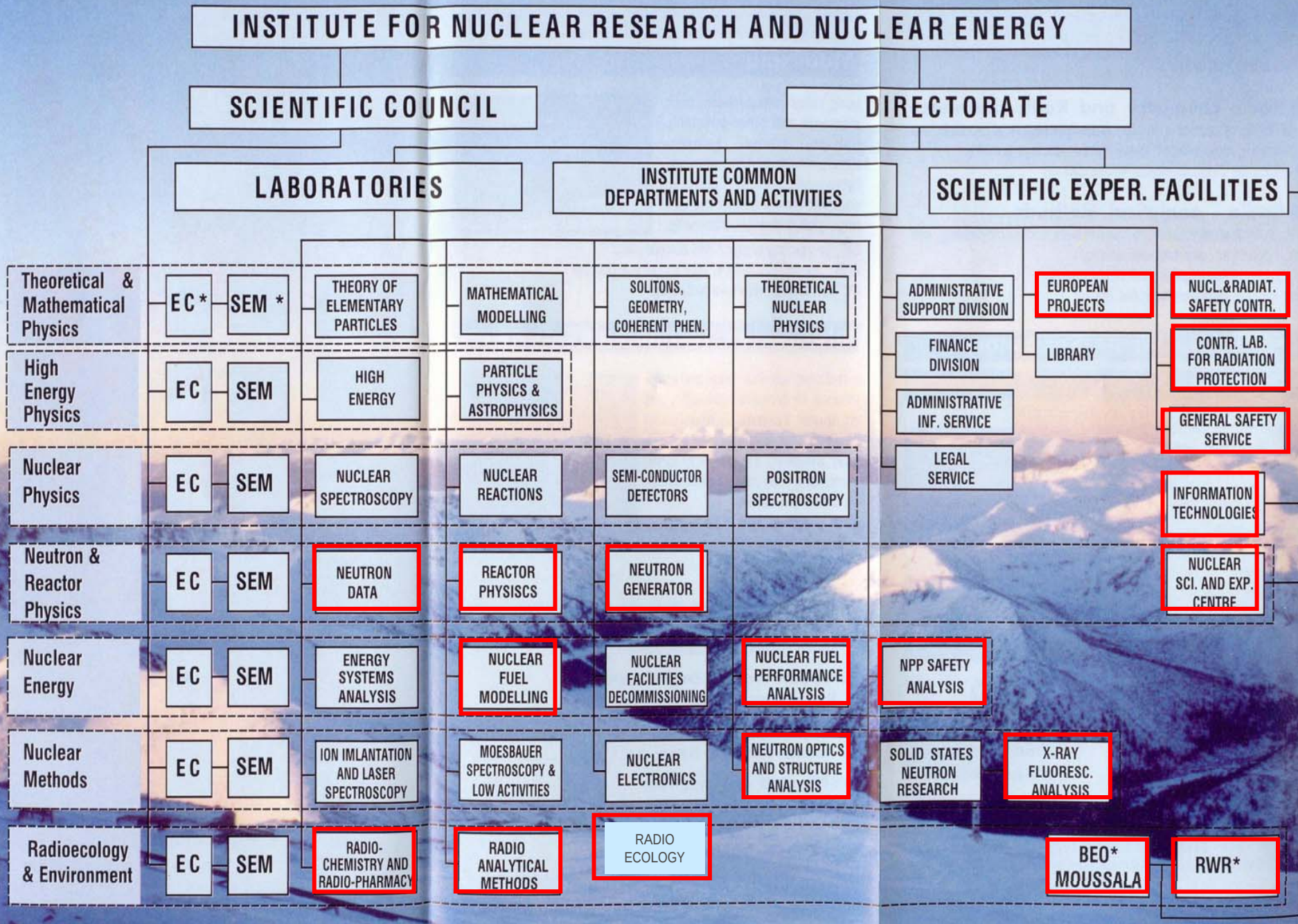



INSTITUTE FOR NUCLEAR RESEARCH AND NUCLEAR ENERGY
SCIENTIFIC COUNCIL
DIRECTORATE
LABORATORIES
INSTITUTE COMMON DEPARTMENTS AND ACTIVITIES
SCIENTIFIC EXPER. FACILITIES
Theoretical & Mathematical Physics
EC*
SEM *
THEORY OF ELEMENTARY PARTICLES
MATHEMATICAL MODELLING
SOLITONS, GEOMETRY, COHERENT PHEN.
THEORETICAL NUCLEAR PHYSICS
High Energy Physics
EC
SEM
HIGH ENERGY
PARTICLE PHYSICS & ASTROPHYSICS
Nuclear Physics
EC
SEM
NUCLEAR SPECTROSCOPY
NUCLEAR REACTIONS
SEMI-CONDUCTOR DETECTORS
POSITRON SPECTROSCOPY
Neutron & Reactor Physics
EC
SEM
NEUTRON DATA
REACTOR PHYSISCS
NEUTRON GENERATOR
Nuclear Energy
EC
SEM
ENERGY SYSTEMS ANALYSIS
NUCLEAR FUEL MODELLING
NUCLEAR FACILITIES DECOMMISSIONING
NUCLEAR FUEL PERFORMANCE ANALYSIS
NPP SAFETY ANALYSIS
Nuclear Methods
EC
SEM
ION IMLANTATION AND LASER SPECTROSCOPY
MOESBAUER SPECTROSCOPY & LOW ACTIVITIES
NUCLEAR ELECTRONICS
NEUTRON OPTICS AND STRUCTURE ANALYSIS
SOLID STATES NEUTRON RESEARCH
X-RAY FLUORESC. ANALYSIS
Radioecology & Environment
EC
SEM
RADIO-CHEMISTRY AND RADIO-PHARMACY
RADIO ANALYTICAL METHODS
RADIO ECOLOGY
ADMINISTRATIVE SUPPORT DIVISION
FINANCE DIVISION
ADMINISTRATIVE INF. SERVICE
LEGAL SERVICE
EUROPEAN PROJECTS
LIBRARY
NUCL.&RADIAT. SAFETY CONTR.
CONTR. LAB. FOR RADIATION PROTECTION
GENERAL SAFETY SERVICE
INFORMATION TECHNOLOGIES
NUCLEAR SCI. AND EXP. CENTRE
BEO* MOUSSALA
RWR*
* EC - Expert Council; SEM - Seminar; BEO - Basic Environmental Observatory; RWR Radioactive Waste Repository

BEOBAL – Objectives

Main Goal

Reinforcement of the BEO Centre of Excellence Research Capacities, and by this way the respective S&T potential of INRNE and Bulgaria for advanced Sustainable Environment studies, devoted to the main Global change and ecosystems observing problems, using sophisticated information technologies and advanced Integration in ERA, in their institutional, national, regional and European aspects

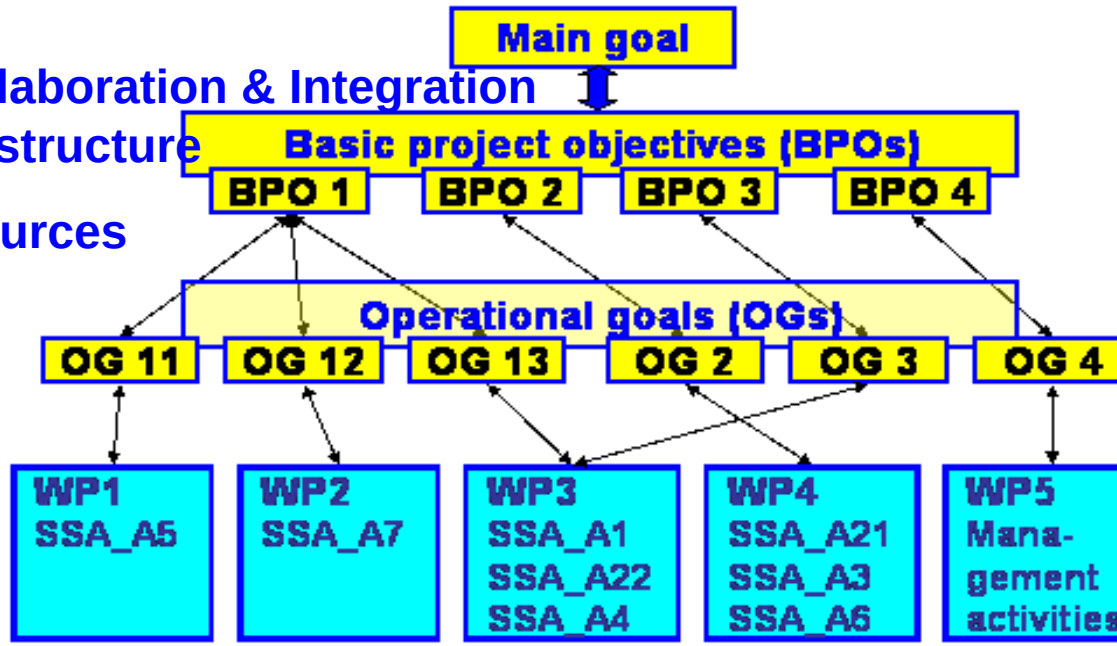
4 basic project objectives

Networking, International Collaboration & Integration and Reinforced Research Infrastructure

Improvement of Human Resources

Advanced Science – Society Interactions

Advanced Management



BEOBAL – Operational Goals

A. The Networking, International Collaboration & Integration and Reinforced Research Infrastructure contains:

1. ***Diversification, broadening and enhancement of international collaboration and cooperation***
2. **Reinforcement of S&T equipment and systems of BEO CoE directed to *enhancement of the research infrastructure* of European importance**
3. **The *implementation and development of advanced methodology, technology, methods and advanced metrology* in the field of Global change and ecosystems and their regional and European projections and components.**

B. Improvement of Human Resources *includes advanced Human Resources long-term management*

C. Advanced Science – Society Interaction Policy

D. Application and development of advanced Management system

BEOBAL – SSA Tools Kit

SSA_A1: Networking with other research centres in Member States (MS) or ACCs: organising exchange of personnel and of results and joint experiments;

SSA_A2: Visiting fellows (teachers and/or researchers):

SSA_A21: Hosting scientists from abroad for teaching, training

SSA_A22: Hosting scientists from abroad for research activities

SSA_A3: Training in MS or ACCs for Ph.D. students and/or post-doctoral researchers: sending scientists from the centre for short stays, to laboratories abroad, either for specialised training or to carry out a specific research experiment;

SSA_A4: Workshops, conferences: in order to diffuse and to exploit research results;

SSA_A5: Study visits of the researchers from the Centre to other institutions in MS or ACCs in order to prepare cooperative activities and/or joint RTD proposals;

SSA_A6: Hiring of new young researchers to reinforce human potential;

SSA_A7: Upgrading and/or renewal of S&T equipment

BEOBAL – Partners

N	Organization	Country	Role
1	Institute for Nuclear Research and Nuclear Energy, Sofia	Bulgaria	*Executor and Co-ordinator*
2	JRC EC, Joint Research Centre	Belgium	*Cooperative Partner*
3	Institute for Transuranium Elements, ITU, JRC EC, Karlsruhe	Germany	*Scientific Collaborator (SC)*
4	Institute for Environment and Sustainability, IES, JRC EC, Ispra	Italy	*SC*
5	Institute for Reference Materials and Measurements, IRMM, JRC EC, Geel	Belgium	*SC*
6	Mt. Cimone Environmental Research Station, HMO MC	Italy	*SC*
7	Testa Grigia Research Station HMO TG	Italy	*SC*
8	UFS Schneeferner hause, Zugspitze, HMO ZS	Germany	*SC*
9	High Altitude Research Station Jungfraujoch and Gornergrat, HMO JFJ	Switzerland	*SC*
10	Sonnblick Observatorium, HMO SB	Austria	*SC*
11	Nuclear Physics Institute, Czech Academy of Sciences, Prague, NPI	Czech Republic	*SC*
12	National Institute of Nuclear Physics, INFN, Torino sect.	Italy	*SC*
13	Institute of Nuclear Sciences, Ege University, Izmir, INS	Turkey	*SC*
14	ALOMAR Observatory, ALOMAR	Norway	*SC*
15	Meteorological Observatory Hohenpeissenberg, Deutscher Wetterdienst, MOHP-DWD	Germany	*SC*
16	Lomnitský Štit Observatory, LS	Slovakia	*SC*
17	Norwegian Institute for Air Research, Polar Environmental Centre, Tromsø, NILU	Norway	*SC*
18	Institutes and Universities from BEO IEC	Bulgaria	*SC*, Users
19	European organization for nuclear research, CERN	Switzerland	*SC*
20	Vinca Institute for Nuclear Science, Belgrade	Serbia, Serbia and Montenegro	User
21	Centre for Ecotoxicological Research, Podgorica	Montenegro, Serbia and Montenegro	User
22	Institute of Nuclear Physics, Tirana	Albania	User
23	Institute of Physics, Scopie	Former Yugoslavian Republic of Macedonia	User

BEOBAL – Work Packages Description

Networking. *Diversification, broadening and* ***enhancement of international collaboration*** *and cooperation.* **Operational goal A1** (Networking, International Collaboration & Integration and Reinforced Research Infrastructure)

Work package number	**WP1**	**Start date or starting event:**		1			
Activity Type	Activities specific for the Support Action; **SSA_A5**						
Participant id	1						
Person-months per participant:	50						
Objectives ***Networking. Diversification, broadening and enhancement of international collaboration and cooperation*** towards to reach real European integration first of all with big European and world institutions like JRC, CERN, IAEA, WMO, IIASA, UNESCO with accent on correspondent European centers of excellence and especialy improving the level of the regional collaboration. Other objective is facilitating of communication between BEO centre and centers that have similar scientific interest							
Task 1.1. (1,26) Study visits for preparing joint activities and RTD proposals in the field of: **Task M 1.2. (1,30)** ***Review and assessment of project results and progress towards the objectives. Formulation of respective management feedback measures.***							

BEOBAL – Work Packages Structure

Reinforcement of S&T equipment and systems of BEO CoE

Operational goal A2 (Networking, International Collaboration & Integration and Reinforced Research Infrastructure)

Workpackage number	**WP2**	**Start date or starting event:**	1
Activity Type	Activities specific for the Support Action; **SSA_A7**		
Participant id	1		
Person-months per participant:	190		

Objectives Reinforcement of S&T equipment and systems of BEO CoE directed to ***enhancement of the research infrastructure*** of European importance, connected with: global change observing, ecosystems monitoring, technological and natural risks (study, early detection and control) widely using new information technologies and platforms. The improving of systems for ***observing and complex monitoring*** in attempt to realize adequate management towards to reach sustainable environment. ***Improving BEO Moussala to a regional GAW station***, creating and improving by this way South - East European part of this network, joining ERA.

Description of work

Task 2.1. (1,15) Upgrading of gas concentration detector systems: *Gas analyzer for SOx (Sulfur oxides); Gas analyzer for NOx (Nitrogen oxides); Gas analyzers for O3 (Ozone); Gas analyzer for CO (Carbon monoxide)*

Task 2.2. (1,15) Installing of aerosol instruments according GAW requirements *PM10 and PM2,5 device for aerosol measurements; Cascade impactor for particle size distribution for range 16 μm – 0.06μm; Integrated nephelometer for determination of integral light-scattering coefficient of aerosol*

Task 2.3. (1,16) Installing of systems for cosmic particles, radioactivity detection and complex environment monitoring *Gamma background detector; Neutron detector; Muon telescope; Rn low level analyzer; α-spectrometer, small portable field devices sets*

All needed for execution of these tasks training and qualification are included in packages WP4 and WP3

Task 2.4. (1,6) Upgrading of computer network of BEO CoE, meteorological observing system and emergency power supply system. Modernization of basic servers, computers and providing tools for flexible control and detection devices and systems; upgrading of the system for uninterruptible emergency power supply.

Task M 2.5. (1,30) ***Review and assessment of project results and progress towards the objectives. Formulation of respective management feedback measures.***

BEOBAL – Work Packages Structure

***Advanced methodology*, technology, methods, metrology, observing and complex monitoring. *Science – society interactions.* Operational goal A3, (Networking, International Collaboration & Integration and Reinforced Research Infrastructure), Operational goal C (Advanced Science – Society Interaction policy)**

Workpackage number	**WP3**	**Start date or starting event:**			1		
Activity Type	Activities specific for the Support Action: **SSA_A1, SSA_A22, SSA_A4**						
Participant id	1						
Person-months per participant:	200						

Objectives: ***Implementation and development of advanced methodology, technology, methods and advanced metrology, observing and complex monitoring*** in the field of Global change and ecosystems and their regional and European projections and components including: impact and mechanisms of greenhouse gas emissions and atmospheric pollutants from all sources on climate, ozone depletion and carbon skins, towards to improve predictions and forecasts; operational forecasting and modeling, global change observing systems; especially environmental radioactivity, monitoring and assessment of technological and natural hazard and risks. ***Advanced metrology development and implementation*** in the field of global change observing, environmental radioactivity and radioecology, radiochemistry and radionuclide analysis, based on the close collaboration with JRC institutes. ***Observing and complex monitoring*** of Global change processes and ecosystems in attempt to realize adequate management towards to reach sustainable environment. ***Advanced Science – Society Interaction policy*** towards to reach not only dissemination of the obtained research results but to succeed in the active communication and dialogue with the public organizations, government and NGOs. ***Improving responses to socio-economic needs of the country.***

Task 3.1. (1,29) Networking with other research centers (exchange of personnel and of results and joint experiments) for execution of joint experiments and exchange of results

Task 3.2. (1,28) Visiting fellows (hosting scientists from abroad for research activities)

Task 3.3. Conference activities

Task 3.4. (2,29) Publication activities

Task 3.5. Other science communication activities

Task M 3.6. (1,30) *Review and assessment of project results and progress towards the objectives. Formulation of respective management feedback measures.*

BEOBAL – Work Packages Structure

Conference Activities

Three levels of conference activities are planned:

3.3.1. (7) ***Methodological and coordination workshop***, Bulgaria, October 2005

3.3.2. *(22)* ***Project conference*** *"Global Changes, Environment and Sustainable Development of the Society",* UFS, Schneefernerhause, Zugspitze, Germany, 2nd half of 2nd year

3.3.3. (27) ***Conference – Informational Days***, *"South – East Europe Environment – Collaboration, Cooperation, Integration in ERA"*, INRNE, BEO CoE, Bulgaria, Sofia, 1st half of 3d year

BEOBAL – Work Packages Structure

Improvement of Human Resources. **Operational goal B (Advanced Human Resources long-term Management)**

Work package number	**WP4**		**Start date or starting event:**		1			
Activity Type	Activities specific for the Support Action: **SSA_A21, SSA_A3, SSA_A6**							
Participant id	1							
Person-months per participant:	194							
Objectives: *Advanced Human Resources long-term management* reaching and preserving European qualification level and creating the best home for young scientist, additionally attracting young scientist from other countries								
Task 4.1. (5,23) Visiting fellows - hosting scientist from aboard for teaching and training activities **Task 4.2. (4,26) Training for Ph.D. students and/or post-doctoral researchers: short stays, in laboratories abroad, for specialized** **Task M 4.4. (1,30) Hiring of young researchers other special measures and activities**								

BEOBAL – Work Packages Structure Training Seminars

***Prof. Klaus Luetzenkirchen,* ITU, JRC** " In situ measurements for complex environmental monitoring using portable equipment", I year;

***Prof. Maria Betti,* ITU, JRC** " Application of radio – analytical methods in environmental studies", II year;

Dr. Leonard Barrie, **WMO,**" Application of advanced methods and techniques for climate and global change studies**",** I year**;**

Dr. Marc De Cort, **IES, JRC** "Systems for monitoring and reporting of environmental radioactivity", I year;

Dr. Uwe Wätjen or Dr. Philip Taylor, **IRMM, IRC,** "Radionuclide analysis and standardization. ISO17025 standard for calibration labs, dealing with uncertainty of measurements ", I year;

Dr. Chris Jones, **CERN, IT*,*** "GRID technologies application in environmental and global change studies", I year;

Dr. Weingarten, **CERN**, **SD,** "Environmental monitoring and complex safety", II year

BEOBAL – Work Packages Structure

Project management - Reinforcement of S&T capacity management. Project implementation plan. Project quality management system.
Operational goal D (application and development of **advanced Management system**)

Work package number	WP5	**Start date or starting event:**		1			
Activity Type	Management activities						
Participant id	1						
Person-months per participant:	72						

Objectives: ***Advanced Management system directed to a sophisticated and pragmatic complex approach to science management -*** from Quality and Environment management ISO certified system and a new, active and aggressive business approach to scientific research and applications, to regional aspects of technology and innovation generation, transfer and implementation and complex use of all available financial instruments.

Description of work:
Task 5.1 (1,30) Overall project management. Project management bodies meetings. Reporting to EC and communication with FP6
Task 5.2 (1,30) Project progress measurement and management feedback. Project quality management. Review and assessment of project results and progress towards the objectives. Formulation of respective management feedback measures

BEOBAL – Milstones List

MS. no.	Milestone name	WP no.	MS Date (proj. month)
1. M1.1.	Preparation of cooperative activities	1	26
2. M1.2.	Preparation of joint projects	1	26
3. M1.3.	Definition of joint work program with JRC	1	9
4. M1.4.	Preparation of bilateral cooperation with HMO based on work contacts with European HMO's existing since the previous EU project HIMONTONET.	1	11
5. M1.5.	Preparation of joint cooperative agreement. The M1.5 is devoted to the preparation of cooperative activities, in the most of the cases they have to be based on joint projects with thematic correlated with the main fields of BEOBAL proposal. Special attention will be paid to the development of joint work programme with JRC.	1	15
6. M2.1	Installation of muon telescope.	2	5
7. M2.2.	Installation of neutron detector, surface about 5 square meters. M2.2, M2.10. Represent the two stages of the installation.	2	10
8. M2.3.	Replacement of gamma background detector for low dose rates	2	7
9. M2.12.	Feed back of gas concentration detector systems	2	25
10. M2.13.	Feed back of aerosol instruments.	2	26
11. M.3.2	Visiting fellows from MS which are leading experts from JRC or European HMO's towards to support the improvement of the staff qualification level and the final implementation and feed back of the additional new devices and detector systems.	3	28
12.M.3.3	Conference events. Project exploitation and dissemination described in the WP	3	4,22,27
13. M 4.1.	Training courses realization is devoted to improve the research level and capacities of BEO CoE staff.	4	23
14. M 4.2.	Short stays for special training towards to improve the qualification level and capacities of BEO CoE staff.	4	26
15. M 4.3.	Execution of hiring young researchers supporting action is one of the most important supporting actions of BEOBAL project.	4	30

BEOBAL – Deliverables List 1

Del. no.	Deliverable name	WP no.	Lead participant -ant	Estimated per.-months	Nature	Dissemination level	Delivery date (proj. month)
1. D1.1.	Realisation of 21 scientific visits in partners institutes	1	1	2	R	PU	26
2. D1.2.	Preparation of cooperative activities	1	1	15	R	PU	26
3. D1.3.	Preparation of at joint RTD proposals	1	1	25	R	RE	26
4. D1.4.	Deepening of international collaboration, networking and integration.	1	1	6	R	RE	15
5. D1.5.	Joint activities with Balkan institutions	1	1	1	R	PU	11
D1.6.	*Assessment of project progress*	1	1	1	R	PP	monthly
6. D2.1.	Installing gas concentration detector systems.	2	1	57	D	PU	9
7. D2.2.	Installing aerosol instruments.	2	1	50	D	PU	15
8. D2.3.	Installing devices for cosmic particles and radioactivity detection	2	1	74	D	PU	13
9. D2.4.	Upgrading of computer network of BEO CoE,	2	1	5	R	PU	6
10. D2.5.	*Assessment of project progress*	2	1	4	R	PP	monthly

BEOBAL – Deliverables List 2

Del. no.	Deliverable name	WP no.	Lead participant-ant	Estimated per.-months	Nature	Dissemination level	Delivery date (proj. month)
12. D3.2.	Networking: Exchange of personnel (15 person months with 9 institutes)	3	1	58	R	PU	29
13. D3.3	Visiting fellows (hosting scientists from abroad for research activities) – 17 visits from 11 institutes	3	1	52	R	PU	28
14. D3.4	Publications	3	1	20	O	PU	27
15. D3.5	Project web site	3	1	5	D	PU	2
16. D3.6	TV and radio activities	3	1	4	D	PU	27
17. D3.7	Publications in popular journal and newspapers	3	1	4	D	PU	27
18. D3.8	Public activities – public lectures and expositions	3	1	6	D	PU	27
19. D3.9	Report on raising public participation and awareness		1	3	R	PU	30
D3.10.	*Assessment of project progress*	3	1	3	R	PP	monthly
20. D4.1	Visiting fellows – 7 courses from 4 institutes	4	1	60	R	PU	23
21. D4.2.	Specialised for Ph.D. students and/or post-doctors – 12 short stays in 6 institutes	4	1	59	R	PU	26
22 D4.3	Supporting hiring 6 - new young researchers	4	1	72 3	R	PU	30
D4.4.	*Assessment of project progress*	4	1		R	PP	monthly
23. D5.1.	*Assessment of project progress and quality management*	5	1	72	R	PP	monthly
			TOTAL	706			

BEOBAL – Management

Executive Board

Steering Committee

Executive Board

Project Coordinator	Prof. Jordan Stamenov
Project Manager and sub Coordinator	Dr. Boyko Vachev
Chief Accountant of INRNE	Mr. Petio Petkov

WP1 Responsible	WP2 Responsible	WP3 Responsible	WP4 Responsible	WP5 Responsible
Prof. J.Stamenov	Prof. J.Stamenov	Dr. A.Damyanova	Prof. N.Janeva	Dr. B.Vachev
Prof. J.Stamenov T.1.1	Mr. P.Ivanov T2.1,2	Dr.A.Damyanova T3.1	Prof.J.Stamenov T4.1	Dr.B.Vachev T5.1
Prof. J.Stamenov, Dr. B.Vachev T.1.2	Dr. I.Kirov T2.3	Prof. J.Stamenov T3.2	Dr. I.Penev T4.2	Prof. J.Stamenov, Dr. B.Vachev T5.2
	Mr. I.Kalapov T2.4	Dr. B.Vachev T3.3, 4, 5	Prof. N.Janeva T4.3	
	Prof. J.Stamenov, Dr. B.Vachev T.2.5	Dr. A.Damyanova, Dr. B.Vachev T3.6	Prof. N.Janeva, Dr.B.Vachev T4.4	

BEO Moussala 1999

Cosmic ray station Moussala 1959 - 1983

Historical dates

1932 - Inauguration of Meteorological Station on peak Moussala.

1959 – Opening of Cosmic Ray Station on peak Moussala.

1983 - Destroy of Cosmic Ray Station (fired).

1993 - Start of Bulgarian-French project OM2 for monitoring and management of high mountain ecosystems.

1999 – Inauguration of Basic Environmental Observatory (BEO) – Moussala.

2002 - Creation of BEO Centre of Excellence

2002-2003 – HIMONTONET and NUSES FP5 projects

2005 – BEOBAL FP6 project