

***Training course
20 July – 31 July 2015***

Summer School in Berlin Institute of Technology

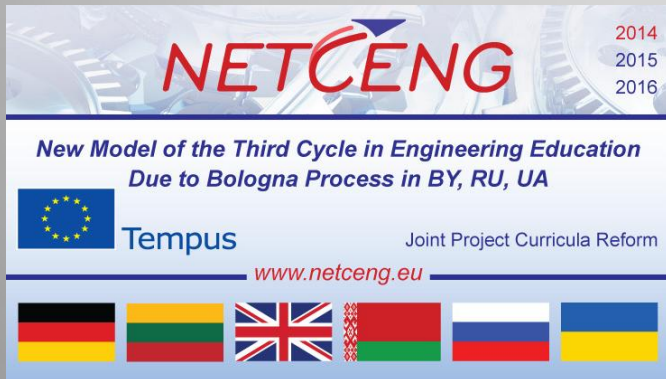
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Doctor of science, professor*

Berlin Institute of Technology – National Aviation University

Summer School - 2015

The Objective of the project NETCENG - new Model of Doctoral Program in Engineering due to actual trends of Bologna process

<http://netceng.eu/index.php>



Berlin Institute of Technology

The main aim of the Summer School is using new Model of Doctoral Program in Engineering to for improve the staff programs according to the needs of industry and experience exchange between universities of Belarus, Ukraine, Russia

Summer school program - 2015

| | |
|-------------------------|---|
| 19.07.2015 | Arrival of participants |
| 20.07.2015 | Registration of the Space School participants/Opening of summer school Presentation about Berlin Institute of Technology |
| 20.07.2015 | Bus guided tour through Berlin |
| 21.07.2015 - 23.07.2015 | Lectures Prof. Dr.-Ing. Klaus Briess Space remote sensing mission |
| 24.07.2015 | Study visit to VW Wolfsburg |
| 25 – 26. 07.2015 | Excursions to Potsdam and other towns |
| 27.07.2015 | Lectures Prof. Dr.-Ing. Michael Orloff the basics of TRIZ + MTRIZ |
| 28.07.2015 | Practical training Prof. Dr.-Ing. M. Orloff on (M)TRIZ. |
| 28.07.2015 | Dr. Arnold Shterenhaz about implementation of the basic principles of the Bologna process in higher education |
| 29.07.2015 | Lectures Dr. G.Parodi about Principles and Applications of Geographic Information Systems (GIS) |
| 30.07.2015 | Lecture Prof. Dr.-Ing. V.Homchenko of robotic systems. Coordination meeting, presentations of participants of the project |
| 31.07.2015 | Presentations E.Eyengorn «Soft Skills for Engineers» and I.Zamoschanskiy «Philosophy for graduate students». Delivery of certificates to participants. |
| 01.08.2015 | Departure of participants |

Part 1

We are introduced.....



Report of
Dipl.-Ing. Dmitry
Ostroverkhov about
Berlin Institute of
Technology

Opening of summer school



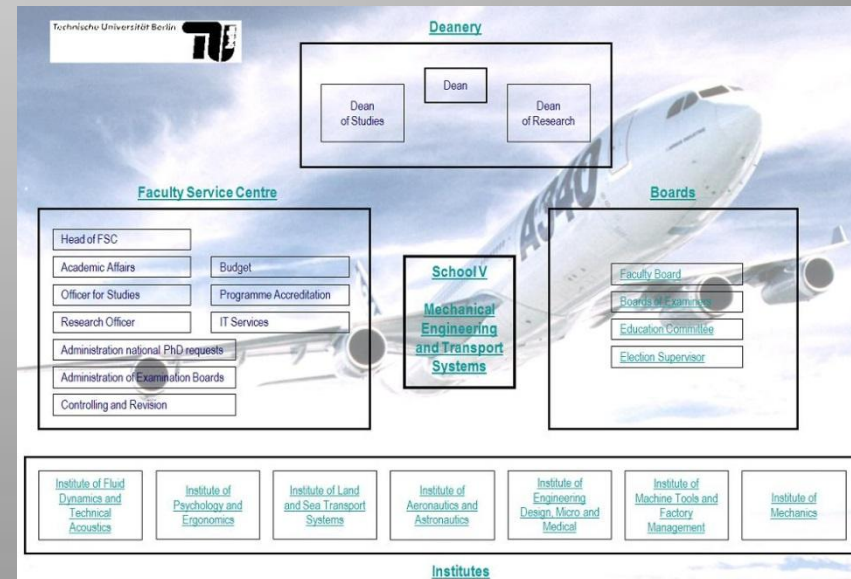
Report of
Dr. Arnold Sterenharz about NETCENG-program in
Institute of Technology



Short information about Berlin Institute of Technology

- 32,752 students, including 6,165 students from other countries
 - 326 professors
 - 16 junior professors
 - 2,641 research associates
 - 7 faculties
 1. Humanities
 2. Mathematics and Natural Sciences
 3. Process Sciences
 4. Electrical Engineering and Computer Science
 5. Mechanical Engineering and Transport Systems
 6. Planning - Building - Environment
 7. Economics and Management
- El Gouna (in Egypt)

<http://www.tu-berlin.de/>



Bus guided tour through Berlin



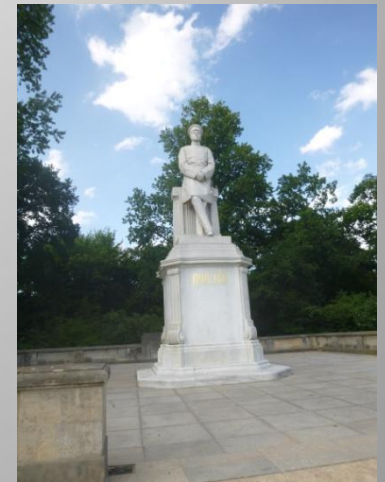
Excursions to Berlin



*Reichstag, Berlin Wall,
the Holocaust memorial*



“Greats” in Berlin



Excursions to Shpree



First impressions



Space School participants



Excursions to Institute of Aeronautics and Astronautics



*Faculty V
of Mechanical
Engineering and
Transport Systems*



On the roof of Institute of Aeronautics and Astronautics



Study visit to VW Wolfsburg

The main purpose of the factory is the assembly of Volkswagen's automobiles. We visited the car assembly plant



Part 2

We are studying.....

Lecture of Klaus Briess. 1 day

ELEMENTS OF A SATELLITE MISSION

1. Definition of the terms satellite and satellite bus and classifications of satellites
2. Elements of an Earth observation satellite mission
3. Segments of an Earth observation satellite mission and mission architecture

Elements

Magnetic Stabilised Satellite

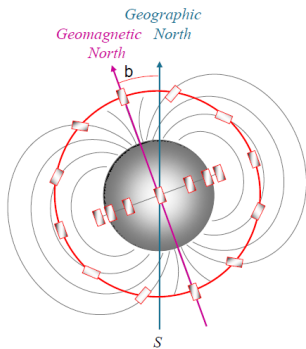
two methods:

Passive magnetic stabilisation:

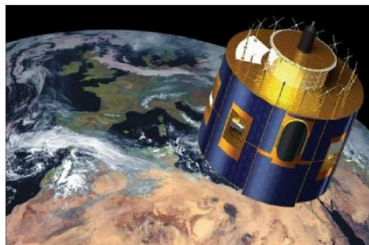
Use of the interaction of the remanent magnetism of a satellite or an built-in permanent magnet with the Earth magnetic field

Active magnetic stabilisation:

coils or torquers in the satellite generate active magnetic field for interaction with the Earth magnetic field, 2 axis stabilisation achievable



- highest moment of inertia.
- The rotation gives stability on all three axis against distortions.
- Simple and robust type of stabilisation with low need on satellite resources (passive stabilisation).
- The spin stabilisation can also be implemented as a double spin satellite with a payload platform pointing to the Earth continuously.



Spin stabilised MeteoSat-8 satellite (image: EUMETSAT)



Lecture of Klaus Briess. 2 day

FUNDAMENTALS OF SPACE MISSION OPERATIONS

1. Fundamentals of Ground Data Processing
2. Calibration and Validation

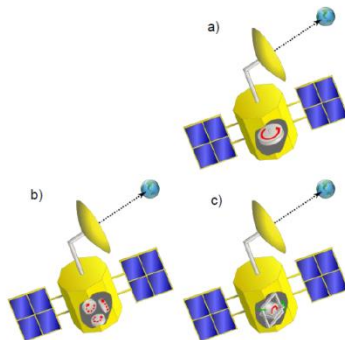
Flywheel Stabilised Satellite

3 types of flywheel stabilised satellite

a) Momentum1-biased stabilised satellite with a momentum wheel

b) zero-momentum stabilised satellite with a set of 3 or 4 reaction wheels,

c) Control moment gyro stabilised satellite with one ore more control moment gyroscopes for a high agility of the satellite



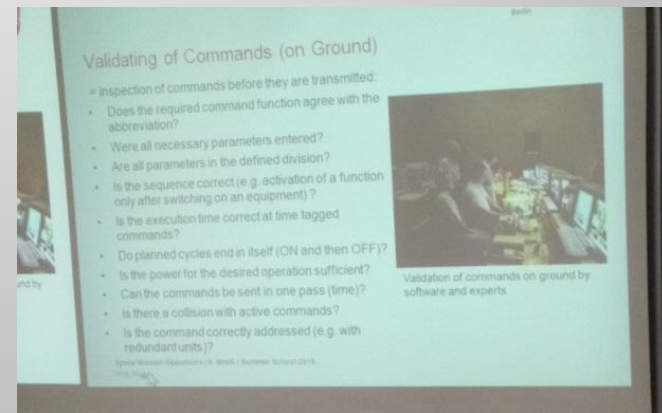
Elements of a Satellite Mission: Ground Station

A satellite ground station comprise the transmitting and receiving systems on ground for communication with the satellite. It consists of:

- A **controllable antenna** for receiving of telemetry and payload data of the satellite and for transmitting of commands,
- An **antenna control system** for orientation, justification and tracing the directed antenna to the satellite. The satellite tracking mode can be accomplished as "programme tracking" by using calculated flight path data or as "auto tracking" by using the received signal power,
- An **Antenna feed** with the radio frequency part of the receiver or transmitter including a Low Noise Amplifier (LNA) for received signals, and often including a down-converter for transmitting the signal to the receiver in an intermediate frequency range,
- A **receiver unit** with de-modulator and with bit-synchroniser and frame-synchroniser for digital signals,
- A **+transmitter unit** with high frequency generator, modulator, up-converter, and high frequency amplifier.



S-Band Antenna of TU Berlin (Ø 3m)



Lecture of Prof. Dr.- Ing. Michael Orloff

Mass-scale and elite education in fundamentals
of (M)TRIZ = TRIZ + MTRIZ



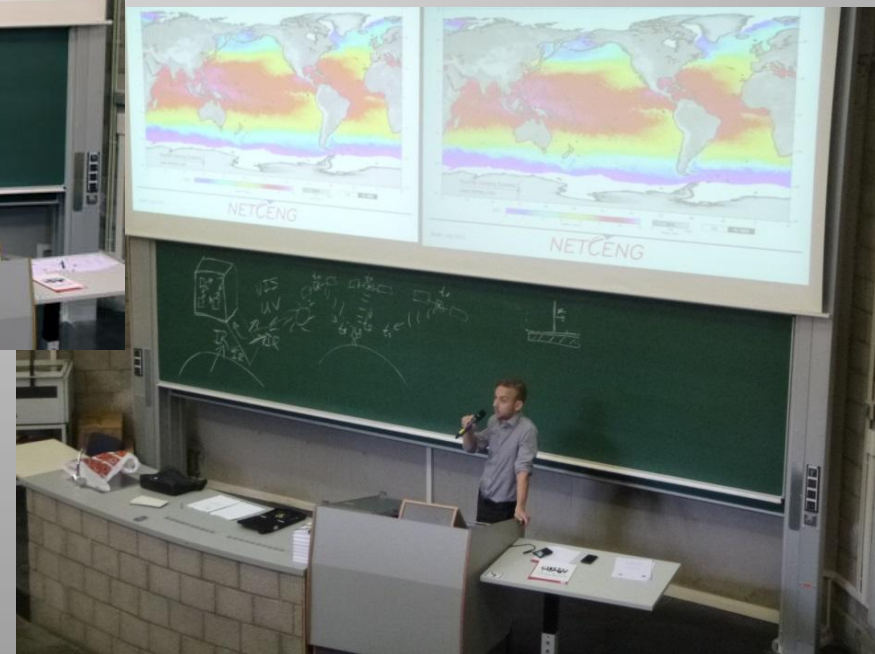
Training of Prof. Dr.-Ing. Michael Orloff

Practical matters



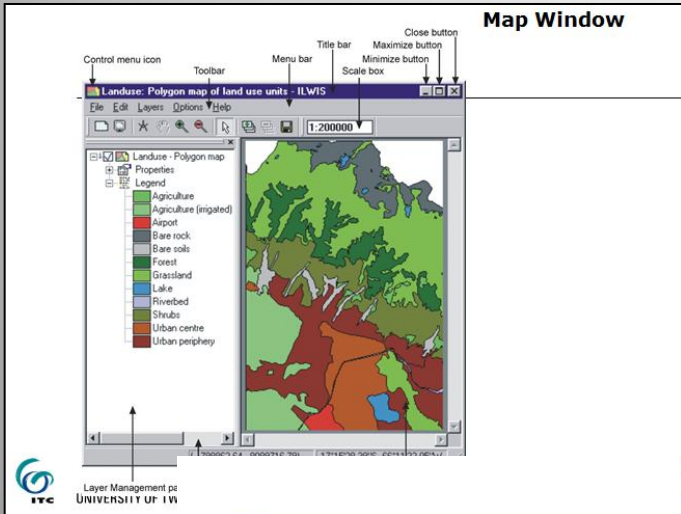
Lecture of Dipl.- Ing. Walter Ballheimer and Dipl.-Ing. Dmitry Ostoverkhov

Practical basics and conception of remote sensing devices

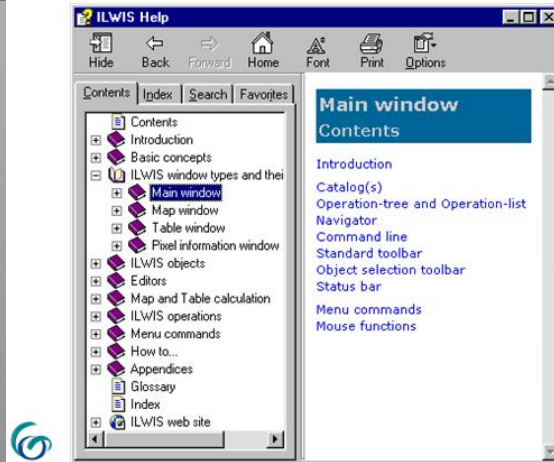


Lecture of Dr. Gabriel Parodi

Principles and Applications of Geographic Information Systems and Remote Sensing

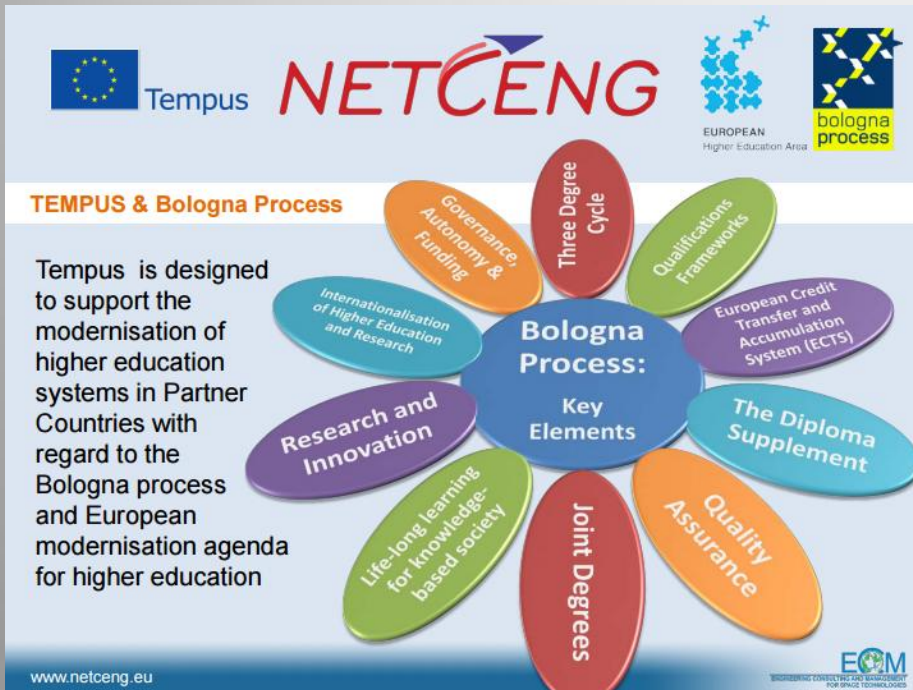


**On-line Help
<F1>**



Lecture of Dr. Arnold Sterenharz

Implementation of the basic principles of the Bologna process and introduction of ECTS system in higher institutions



Lecture of Prof. Dr.-Ing. Homchenko

Robotic



Lecture Elena Eyngorn and Ivan Zamoshchanskiy

Soft Skills for Engineers, Presentation Skills



Coordination reports

Experience of implementing the program of NETCENG at the Department of Air Navigation Systems of National Aviation University



Key Questions:

1. About National Aviation University (Kiev, Ukraine).

<http://nau.edu.ua/>

1. Department of Air Navigation Systems

<http://www.ans.nau.edu.ua/>

1. The experience of Department of Air Navigation Systems of National Aviation University

2. Development of curriculum for training of PhD.

Issuance of certificates



My certificates



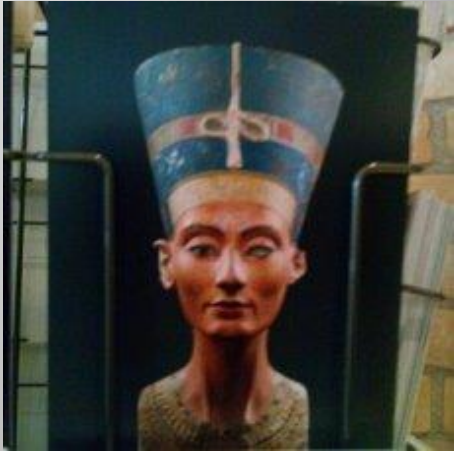




Part 3

We are resting.....

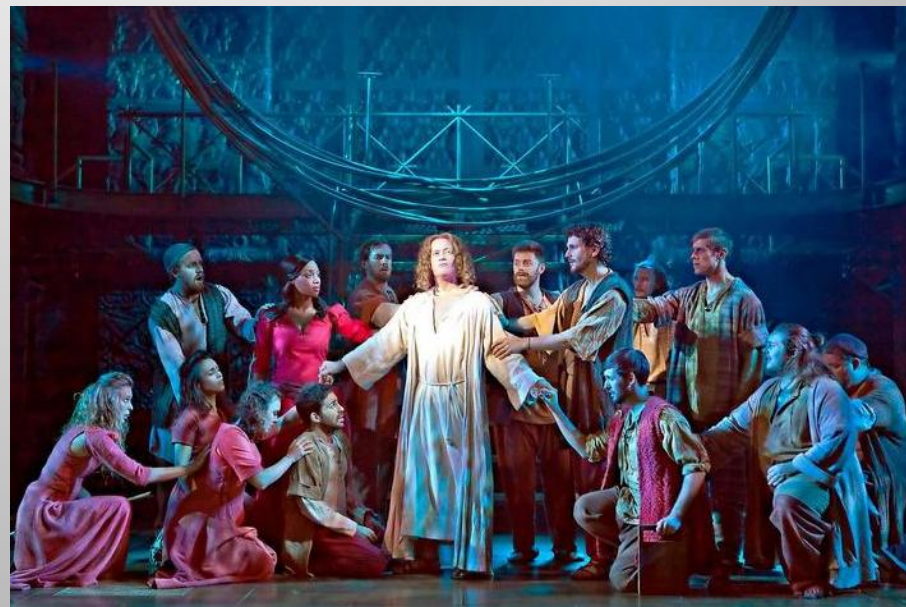
The Museum Island



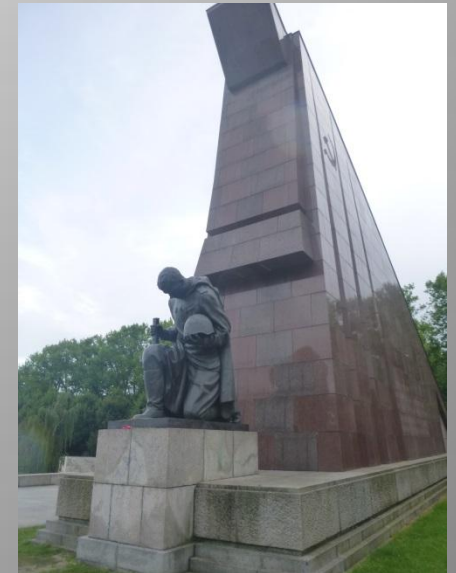
Impressionist exhibition



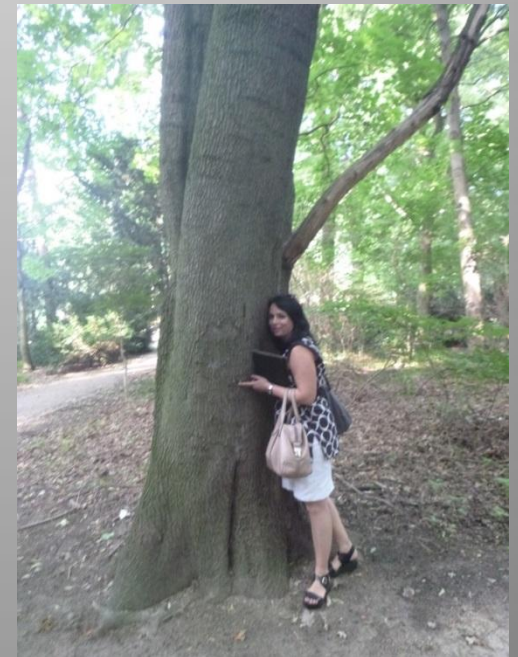
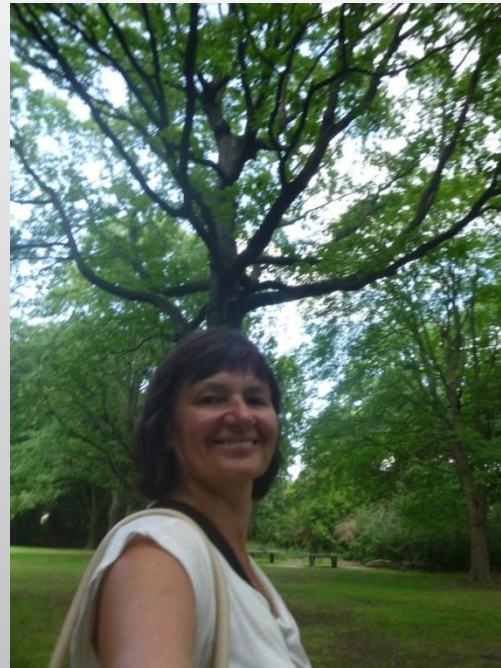
At a concert in Berlin opera "Jesus Christ - Superstar"



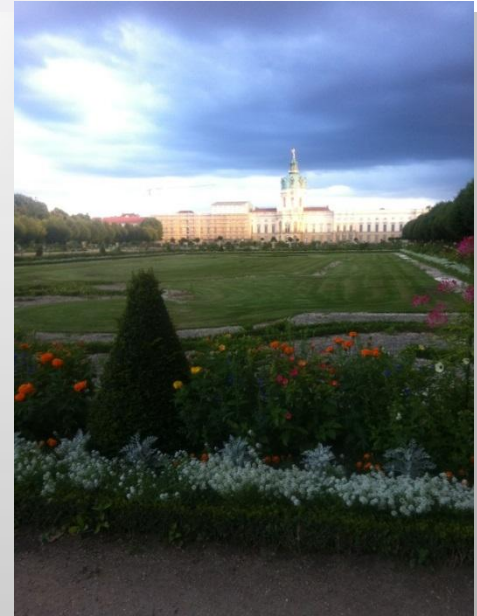
Monument Liberator Soldier



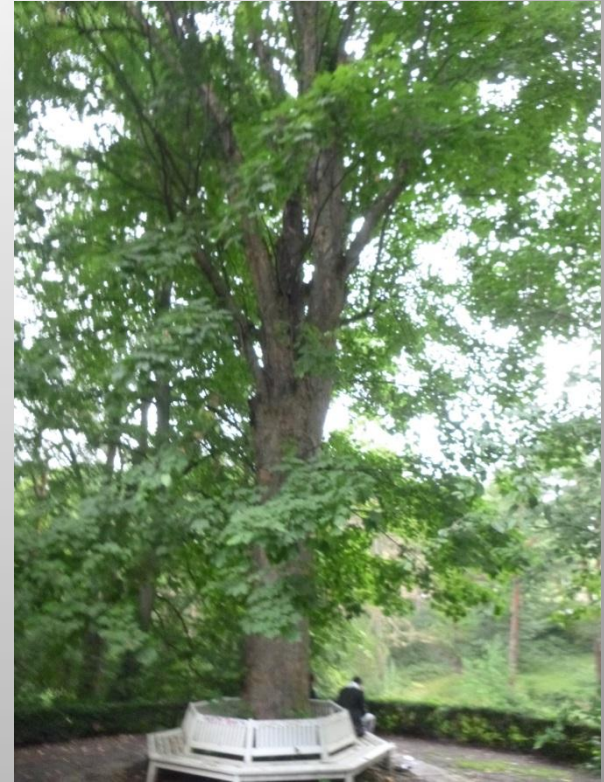
Parks of Berlin



Charlotte park



Park near hotel



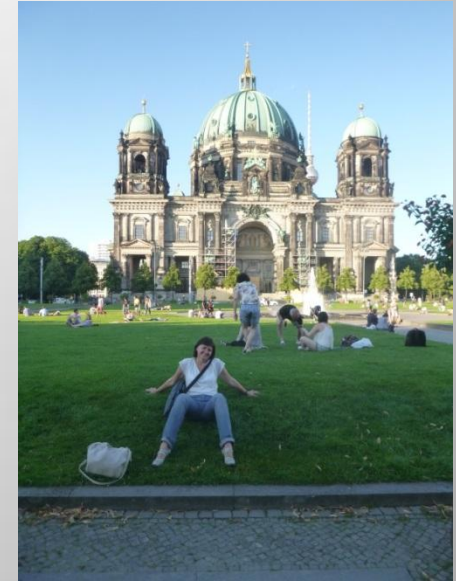
Potsdam Park Sanssouci



Potsdam Park Sanssouci



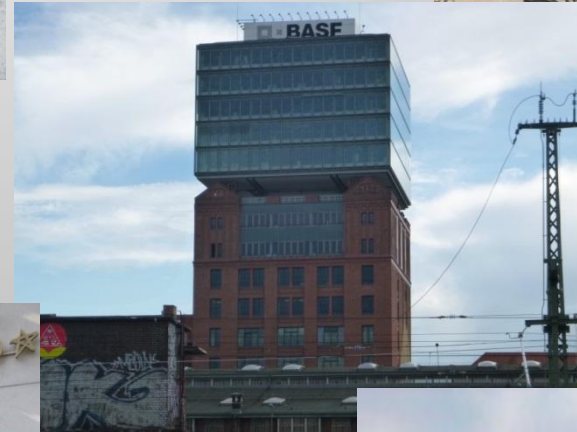
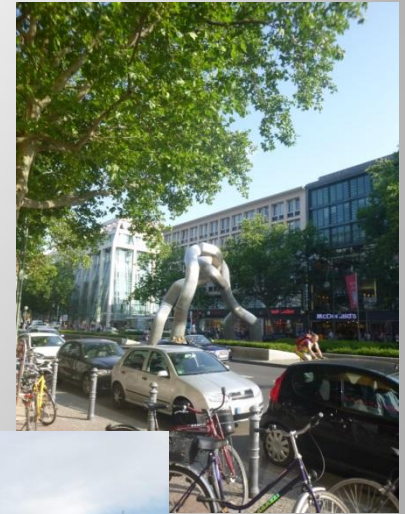
Walks.....



Fountains



Cityscapes



Tegel Airport – homeward!

