

Russian “MegaProject”

ATLAS SW&C week

Plenary session : status, problems and plans

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Overview

- Russian Federation Government grants
- “Big Data Technologies for megaScience projects”

Russian Government Grant Program

- The program was started in 2010 to attract leading scientists to Russian Universities and Research Institutes

“...In order to strengthen governmental support for the development of science and innovations in tertiary education and to improve the quality of higher education, on April 9, 2010, the Government of the Russian Federation instituted monetary grants that are made available on a competitive basis to support of scientific research projects implemented by the world’s leading scientists at Russian institutions of higher learning...”

Resolution No.220 of the Government of the Russian Federation of April 9, 2010

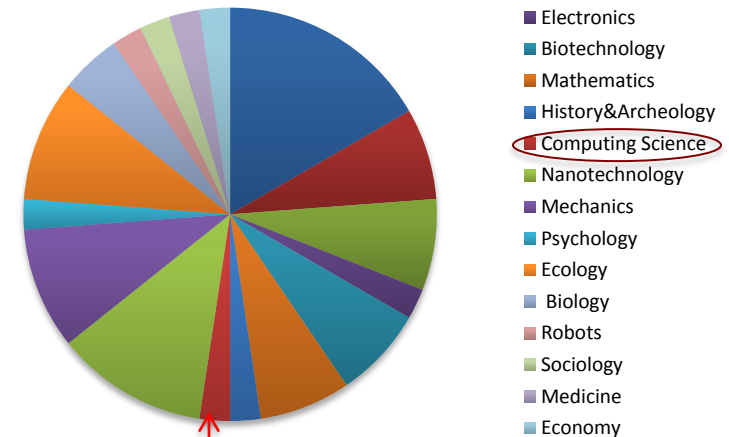
Grant Program Goals

- To bring world-renowned scientists, including scientists from among Russian citizens residing abroad, to Russian institutions of higher learning;
- To create scientific research laboratories capable of competing with the world's leading laboratories;
- To ensure achievement of world-class research results;
- To create conditions required to improve the professional quality of the faculty and research specialists of Russian institutions of higher learning, as well as to create an effective and efficient system of motivation of scientific work;
- To encourage young people to pursue professional development in the fields of science, education, and high technologies;
- To help create sustainable links between Russian institutions of higher learning and the world's leading universities and science schools;
- To facilitate commercialization of the research results and new technologies developed in the course of the scientific research projects supported under the program.

Russian Government Grant Program

- 2010-2014 grant winners
 - S.Smirnov (Fields medal laureate)
 - Sydney Altman (The Nobel prize laureate in chemistry)
 - Osamu Shimomura (The Nobel prize laureate in chemistry)
 - George F Smoot (The Nobel prize laureate in physics)
- The fourth open grant competition statistics
 - 720 applications
 - 576 : Universities
 - 144 : Research Institutes
 - Scientists from 40 countries
 - EU, USA, Canada, Brazil, Chile, Australia, Asia
 - 42 winners in 17 disciplines were announced on Dec 30, 2013
 - Research will be carried in 2014-2016
 - at 23 Russian Universities and Labs

2014 Grant Winners



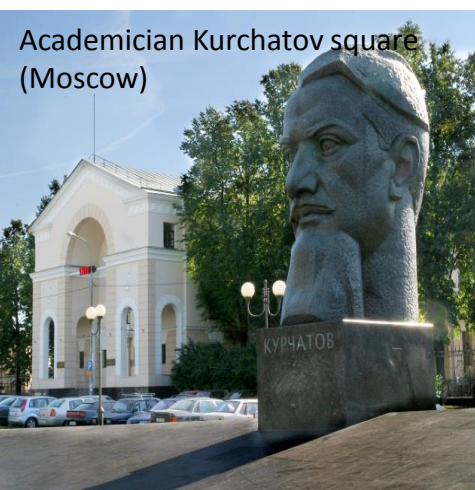
Computing Science : 1
“BigData Technologies For mega-Science Projects”

“BigData Technologies For megaScience Projects”



НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ЦЕНТР
«КУРЧАТОВСКИЙ ИНСТИТУТ»

- The project will be carried out at the National Research Center Kurchatov Institute in Moscow (NRC KI)
 - NRC KI is the lead Russian Organization involved in research at the LHC, FAIR, XFEL, RHIC
 - NRC KI will host Tier-1 center for three LHC experiments (ATLAS, ALICE, LHCb)
 - *Two talks later this week about RF Tier-1 status and plans*
 - Moscow Engineering Physics Institute (MEPhI), SINP and CNIR of Moscow State University, National University of Information Technologies, Mechanics and Optics (ITMO, St.Petersburg) are participating in the project
- 3 year project (2014-2016) with possible extension for 2 years, funding is expected in April
- “BigData Technologies” Laboratory will be set up within Center of nano, bio and information technologies at NRC KI



Key Considerations

- ATLAS is a Big Data and megaScience Project
- megaScience projects are international
- Software technologies development (and software development in general) for such projects is difficult without international collaboration and cooperation
 - Very positive discussions within ATLAS, NRC KI, with LHC and NP experiments, and WLCG
- The new Laboratory scientific program should be tightly coupled with LHC experiments priorities and address challenges we will meet in 2-3 years
 - And many “our” challenges are not ATLAS (HEP, LHC) specific
- ATLAS has a proven use case when software developed for the experiment is expanded beyond HEP and expanded to other areas and disciplines
 - PanDA project
 - ASCR DoE funded BigPanDA project : “Next Generation Workload Management and Analysis System For Big Data” – BigPanDA (*cf K.De talk at Oct 2013 SW&C week*)

First Steps

- Very strong support from NRC KI directorate
 - To build laboratory *NOW*
 - Two senior researches hiring process is started
- Very strong support from IHEP Protvino, MEPhI and StPINP ATLAS groups to involve young researchers and computing specialists in the project
- Very strong support from Moscow State University
 - 26 applicants will be interviewed in the next 2 weeks
 - From Physics, Mathematics and Applied Mathematics & Cybernatics faculties
 - Students, PhD students, researchers
- Scientists from JINR, Duke, UTA, ANL, BNL, IJS, Genova have expressed interest to collaborate
- Ongoing discussion with other experiments and WLCG to have a plan by June
 - Two days workshop at NRC KI (end of June, tentative days Jun 27-28)

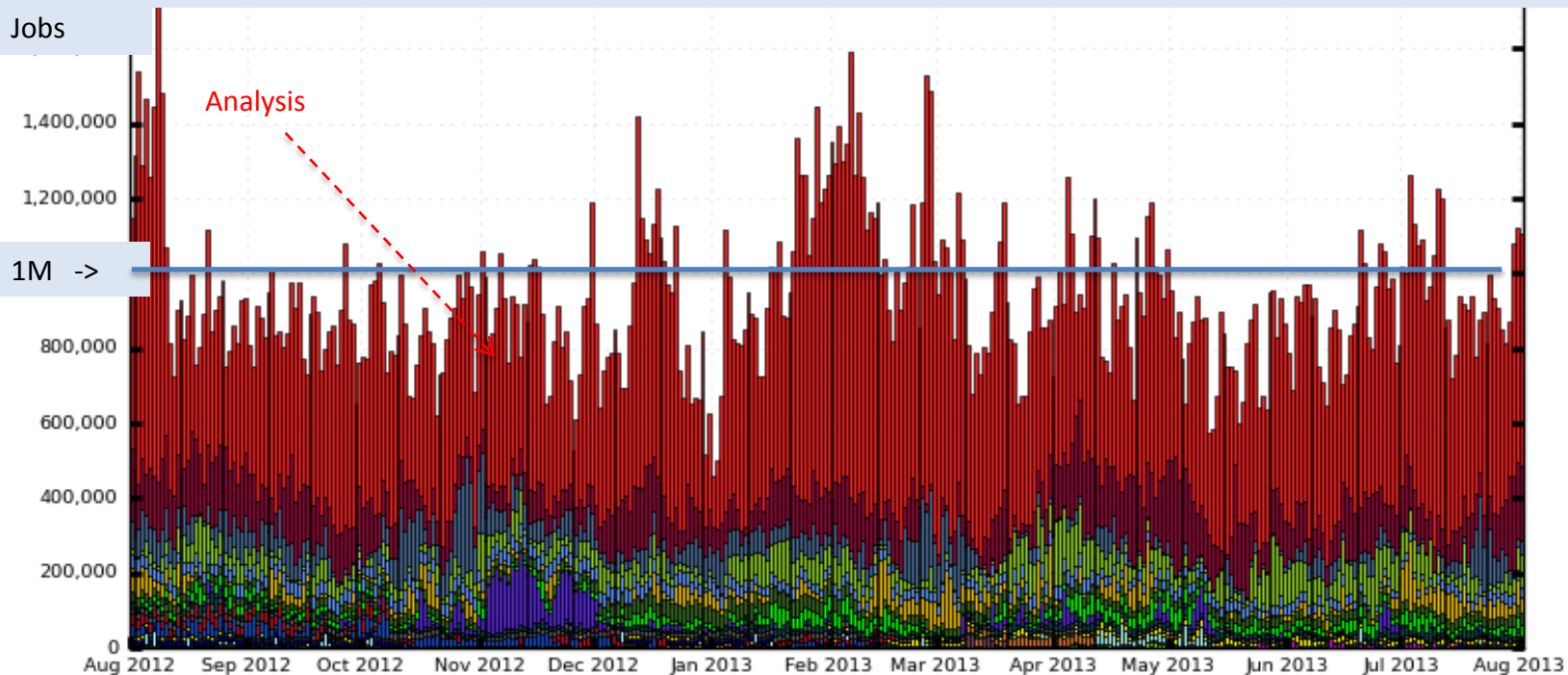
The Growing PanDA Ecosystem

- ATLAS PanDA
 - US ATLAS, CERN, UK, DE, ND, CA, Dubna, Protvino, OSG ...
- ASCR BigPanDA
 - DoE funded project at BNL, UTA – 3 years (2012-2015)
- ANSE PanDA
 - NSF funded network project - CalTech, Michigan, Vanderbilt, UTA
- HPC and Cloud PanDA
- Taiwan PanDA – not only astro-particle physics (AMS), but also biology, chemistry, ...
 - Dedicated meeting in March between ASGC, Rucio and PanDA teams
- CMS PanDA – Common Analysis Framework
- AliEn PanDA
- *MegaPanDA*
 - *MegaPanDA – RF funded project*

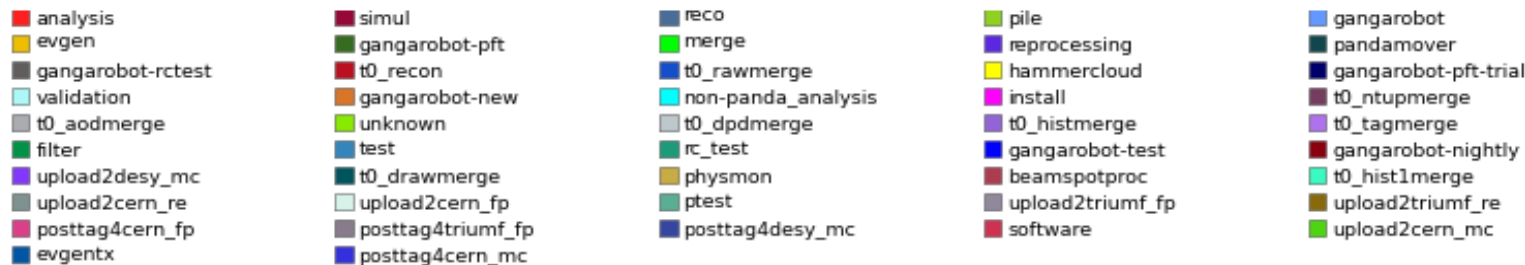
Original slide from K.De
ATLAS Oct 2013 SW&C week

ATLAS PanDA Completed Jobs

Number of completed PanDA jobs (daily average. Max 1.7M jobs/day).
Aug 2012 - Aug 2013

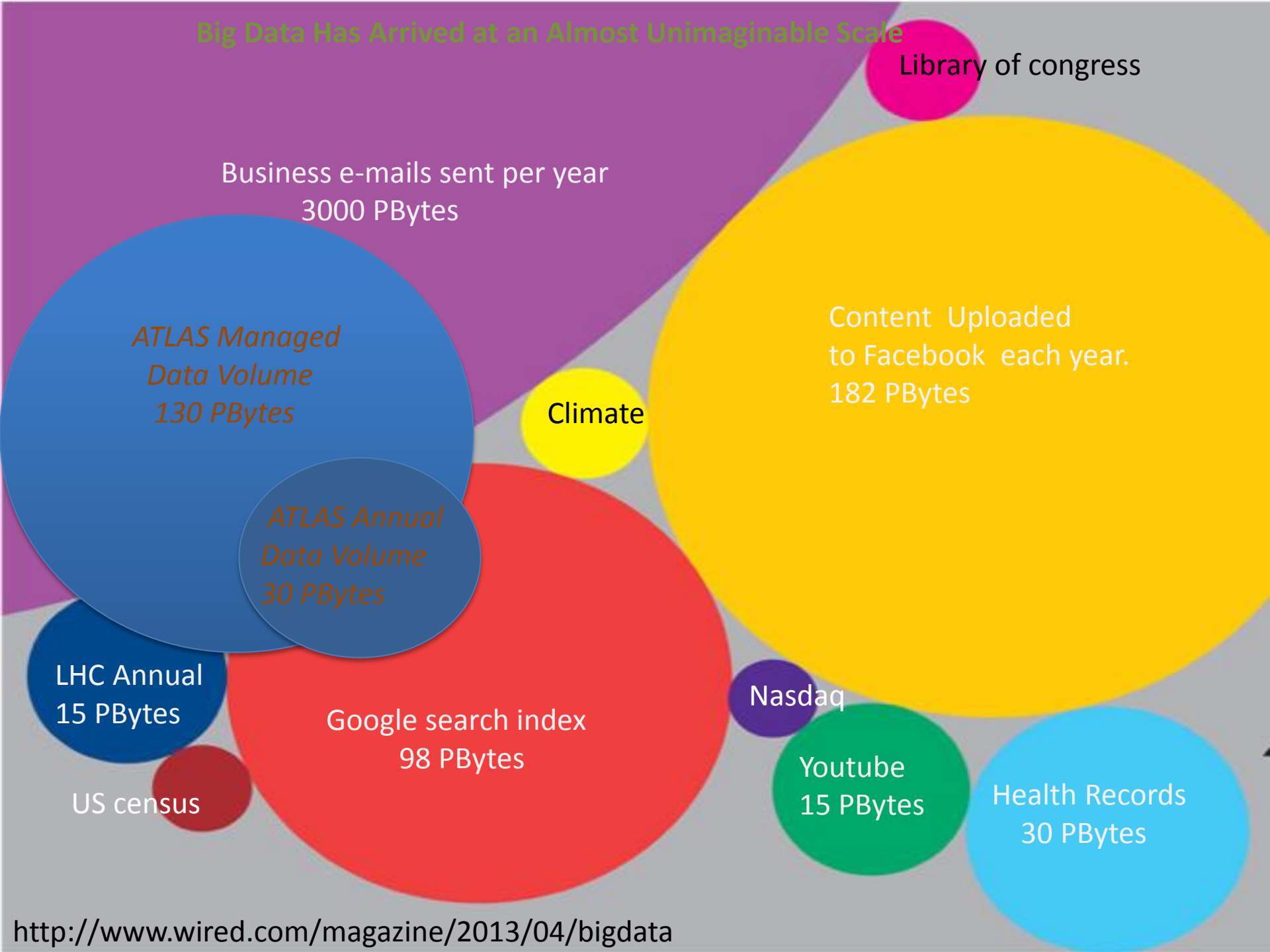


Jobs types



Maximum: 1,754,926 , Minimum: 11.00 , Average: 719,998 , Current: 1,105,968

Big Data Has Arrived at an Almost Unimaginable Scale



Library of congress

Business e-mails sent per year
3000 PBytes

*ATLAS Managed
Data Volume
130 PBytes*

Climate

Content Uploaded
to Facebook each year.
182 PBytes

*ATLAS Annual
Data Volume
30 PBytes*

LHC Annual
15 PBytes

Nasdaq

Google search index
98 PBytes

Youtube
15 PBytes

US census

Health Records
30 PBytes

BigData Technologies For Mega-Science

- Workload *and Data* Management System

LHC Upgrade Timeline. 100 times more data in 2018

