SPENVIS — CCMC relationship

M. Kruglanski
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Outline

- Who we are
- Our activities
- Which relationship
- What we plan

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Who we are

Section "*Space Weather Services*"

Belgian Institute for Space Aeronomy (BIRA-IASB)

- S. Calders
- S. Chabanski
- E. De Donder
- S. Hallet
- L. Hetey
- M. Kruglanski (head)
- N. Messios

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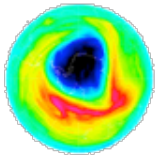
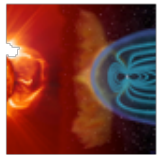
Belgian Institute for Space Aeronomy


Climate


Ozone


UV


Air Quality

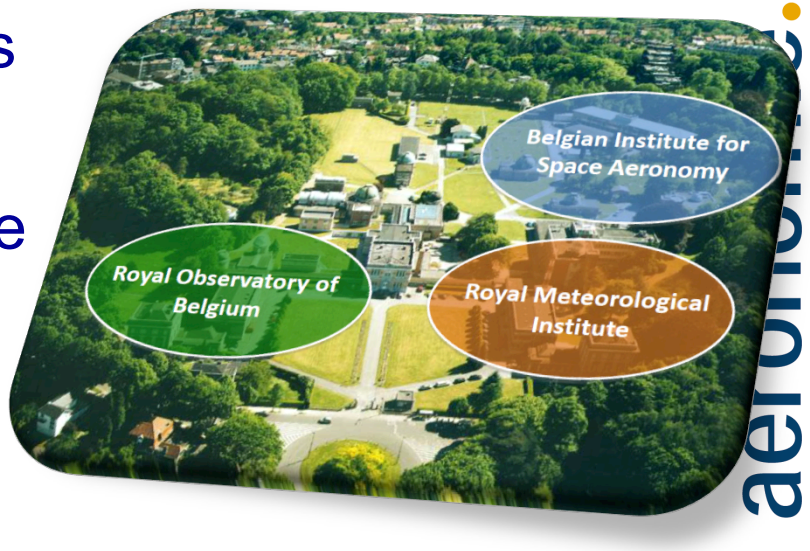

Space Physics


Planetary Aeronomy


Scientific Services

- Located at Space Pole in Brussels

- Federal scientific research institute
  - Royal Observatory of Belgium
  - Royal Meteorological Institute



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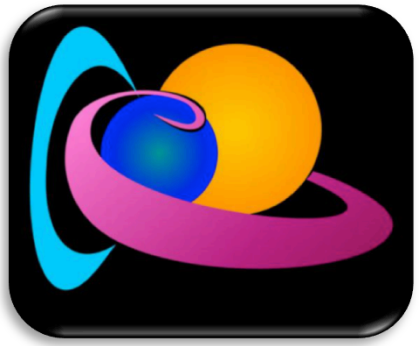

- Synergies through
  Solar-Terrestrial Centre of Excellence

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Our current activities

- **SPENVIS / SPENVIS-NG**
  SPace ENVironment Information System
  SPENVIS Next Generation → **ESA/GSTP**

- **SSCC**
  SSA Space weather Coordination Centre → **ESA/SSA**

- **COMESEP**
  COronal Mass Ejections and Solar Energetic Particles → **EU/FP7**

- **ESWEP**
  European Space Weather Portal → **ESA/COST**

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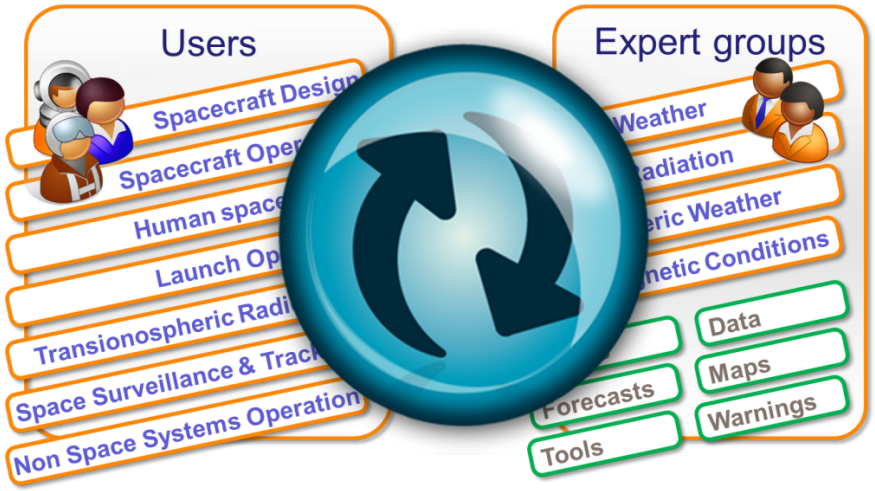
SSA Space weather Coordination Centre (SSCC)

➔ see previous talk by J.-P. Luntama



Mission:

- Supporting
- Monitoring
- Improving

SSCC is operated for ESA by a Belgian team:

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Royal Observatory of Belgium

SPACEBEL

spaceapplications SERVICES

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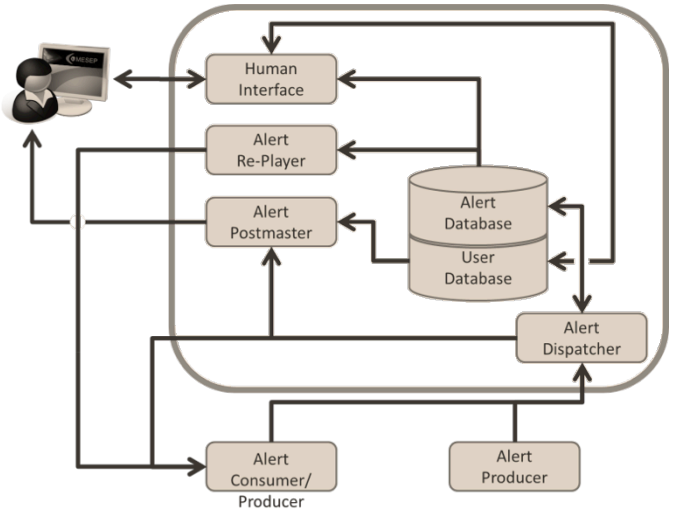
COMESEP forecasting the space weather impact

➔ see next talk by N. Crosby



Role:

- Defining the system alert architecture
- Implementing the alert dispatcher and viewer
- Maintaining the central node

COMESEP Consortium:

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European Space Weather Portal (ESWeP)

- Initiated and developed in the frame of COST actions
- Targeting the European space weather community to share their knowledge and results
- Hosted and maintained at BIRA-IASB
- Need to re-define goals and target public

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SPace ENVironment Information System (SPENVIS)

- ESA Operational software public available since 1998. Developed and maintained by BIRA-IASB

- WWW interface to models of the space environment and its effects including the cosmic rays, natural radiation belts, solar energetic particles, plasmas, gases, and "micro-particles".

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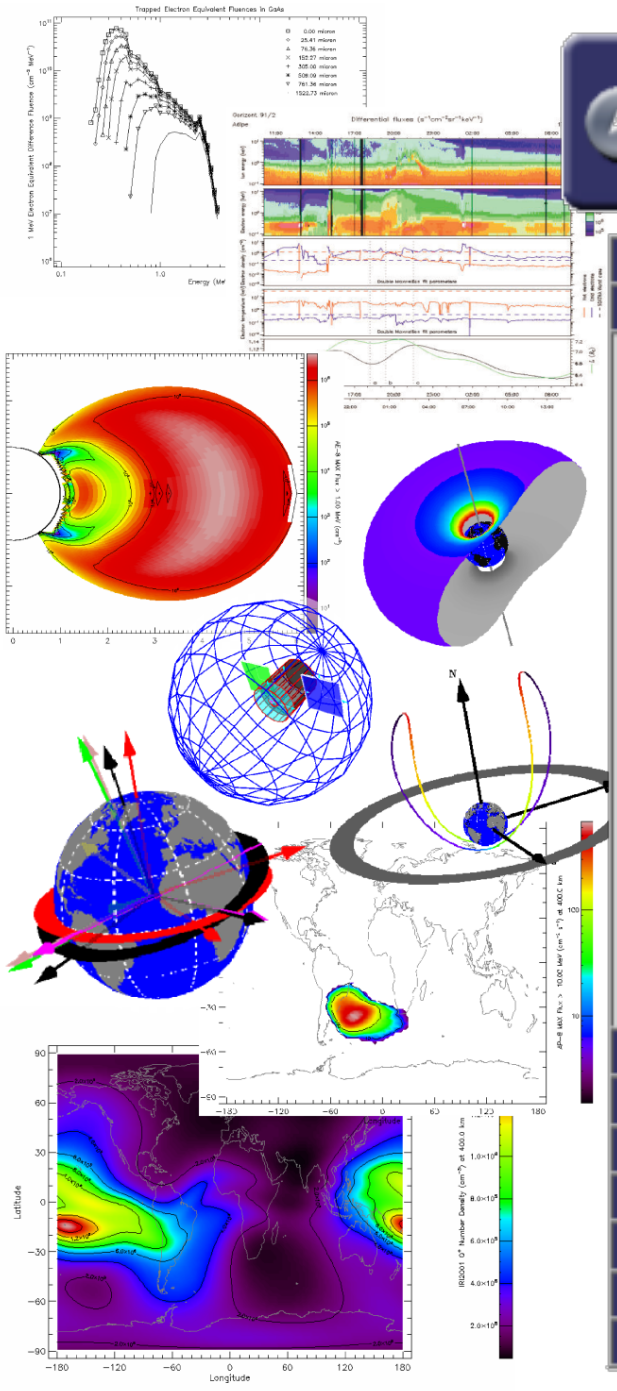

SPENVIS Project: CCMC

Model packages

Planet: Earth

UP | Output | Help

Coordinate generators

Radiation sources and effects

Radiation sources

Trapped proton and electron fluxes

Trapped proton flux anisotropy

Short-term solar particle fluxes (only for SEU)

Long-term solar particle fluences

Galactic cosmic ray fluxes

Shielded flux

Solar cell radiation damage

Damage equivalent fluences for solar cells (EQFLUX)

NIEL based damage equivalent fluences for solar cells (MC-SCREAM)

Long-term radiation doses

Ionizing dose for simple geometries

Non-ionizing energy loss for simple geometries

Effective dose and ambient dose equivalent

Single event effects

Short-term SEU rates and LET spectra

Long-term SEU rates and LET spectra

Spacecraft charging

Atmosphere and ionosphere

Magnetic field

Meteoroids and debris

Miscellaneous

Geant4 Tools

ECSS Space Environment Standard

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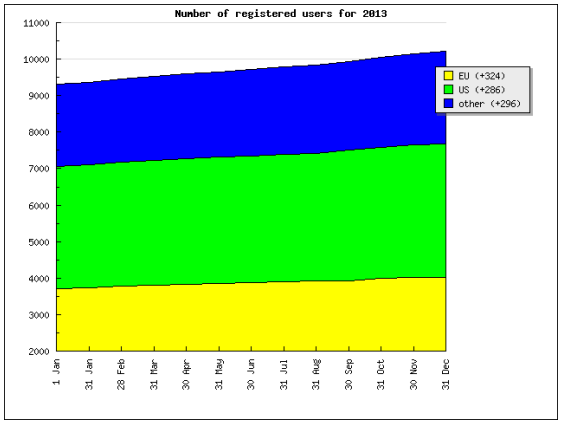
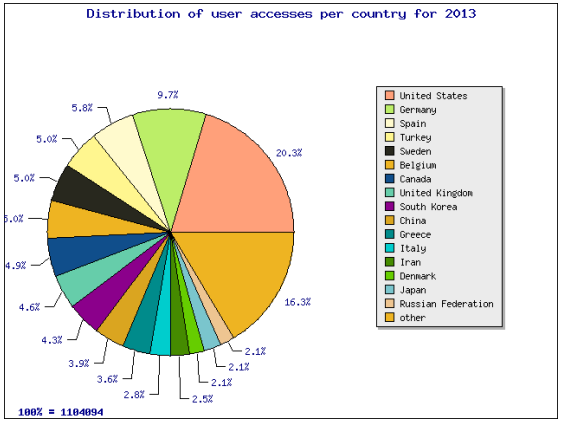
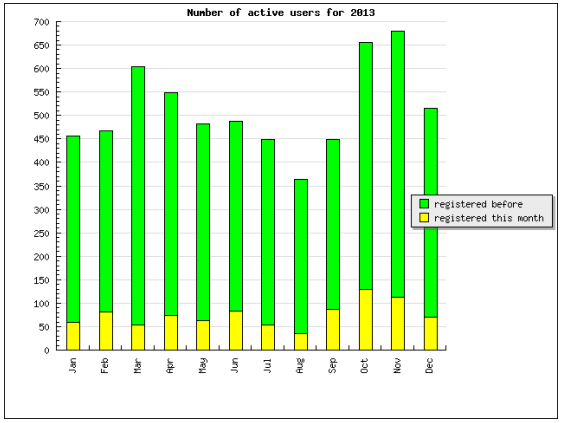
SPENVIS
Large User Community

- More than 10000 registered users
- About 500 active users each month
- About 3000 active users in 2013







- Dedicated user workshops

- 2002 (Noordwijk)
- 2005 (Leuven)
- 2006 (Pasadena)
- 2010 (Mechelen)
- 2013 (Brussels)

- 2013: More than 80 participants

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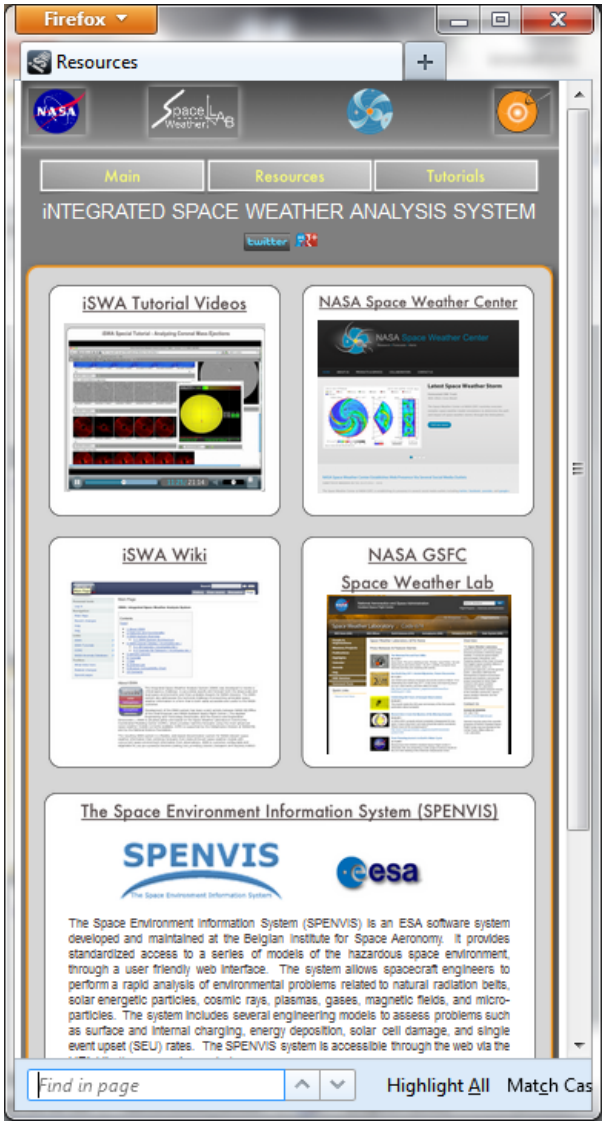
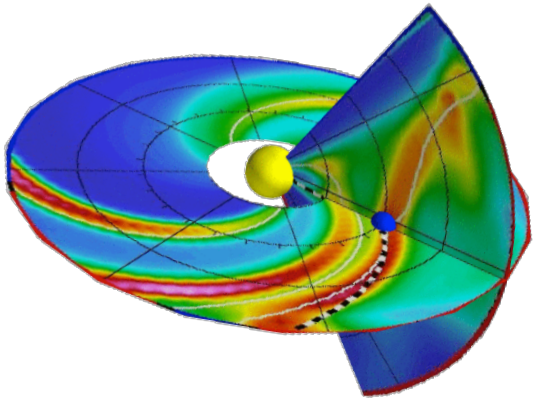
Our relationship with SWRC/CCMC



Past:



- Exchange of information (and friendships) during informal meeting
- Support transfer models to CCMC
  H Lamy & V Pierrard models:
  exospheric solar wind,
  plasmasphere
- Support in trying to revive legacy models
  (e.g. Huston/Boing TPM-1)

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Our relationship with SWRC/CCMC

Future:

- Interfacing the SPENVIS-NG and the SWRC tools in order to connect their respective models

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SPENVIS
Next Generation

Complete re-design of the SPENVIS system as

a web-based service-oriented distributed framework

supporting plug-in of models

related to the hazardous space environment,

and including both

- **user-friendly interface for rapid analysis and**
- **a machine-to-machine interface**

for interoperability with other software tools

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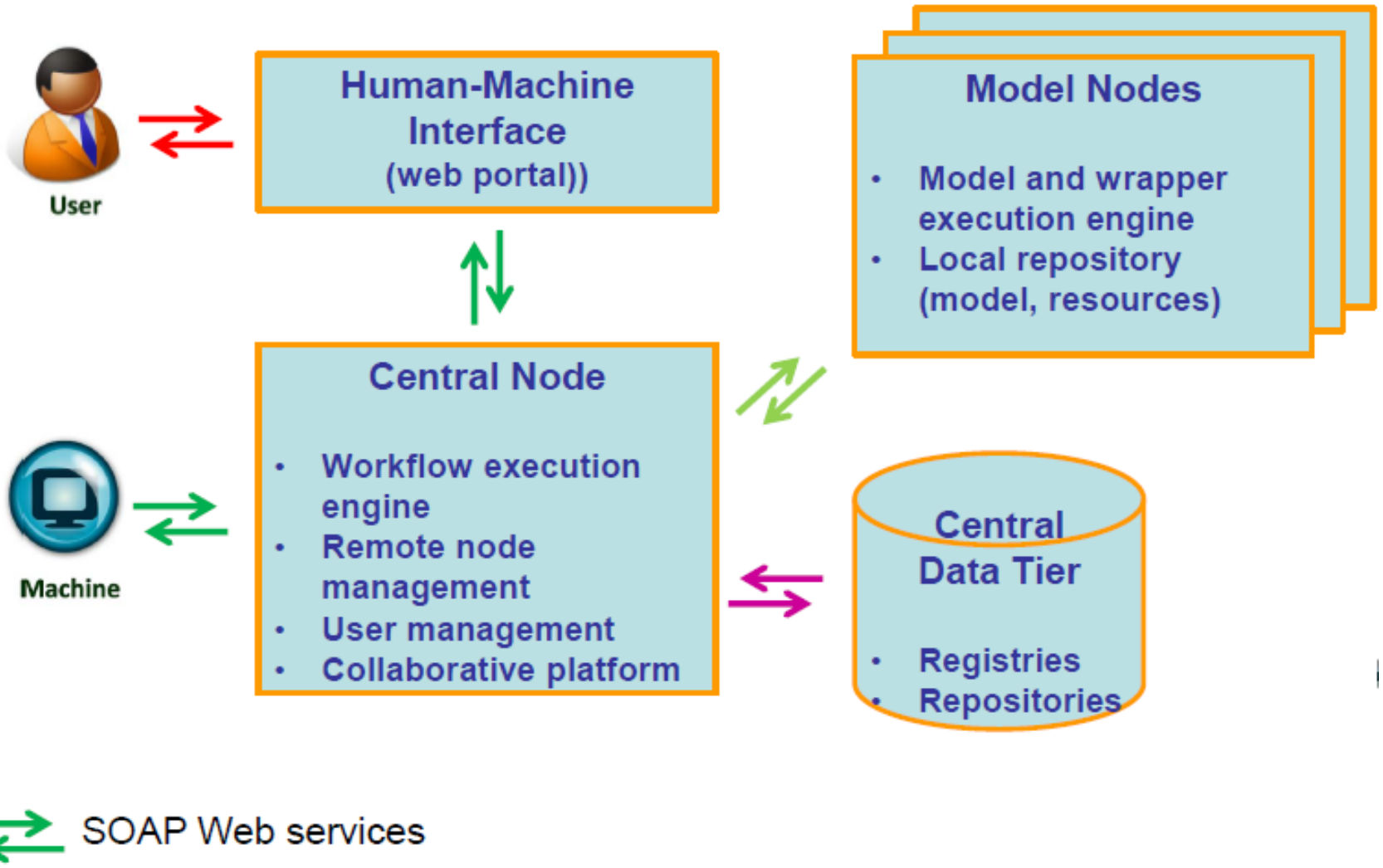
SPENVIS-NG
System architecture



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In the future

SPENVIS-NG system architecture should allow SWRC tools

- to execute SPENVIS models remotely
- to expose CCMC model runs to SPENVIS users

Models migrated from SPENVIS-4

- Solar cell radiation damage (EQFLUX, MC-SCREAM); Long-term radiation dose (SHIELDOSE-2Q, NIEL); Single event effects, Spacecraft charging (EQUIPOT, DICTAT), Geant-4 tools (MULASSIS, GRAS, GEMAT)

New ESA models

- MEO model, Interplanetary Electron Model (IEM), Slot Region Radiation Environment Model (SRREM), JOREM Radiation Environment Model

Others

- AE9/AP9 (already in SPENVIS-4)

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