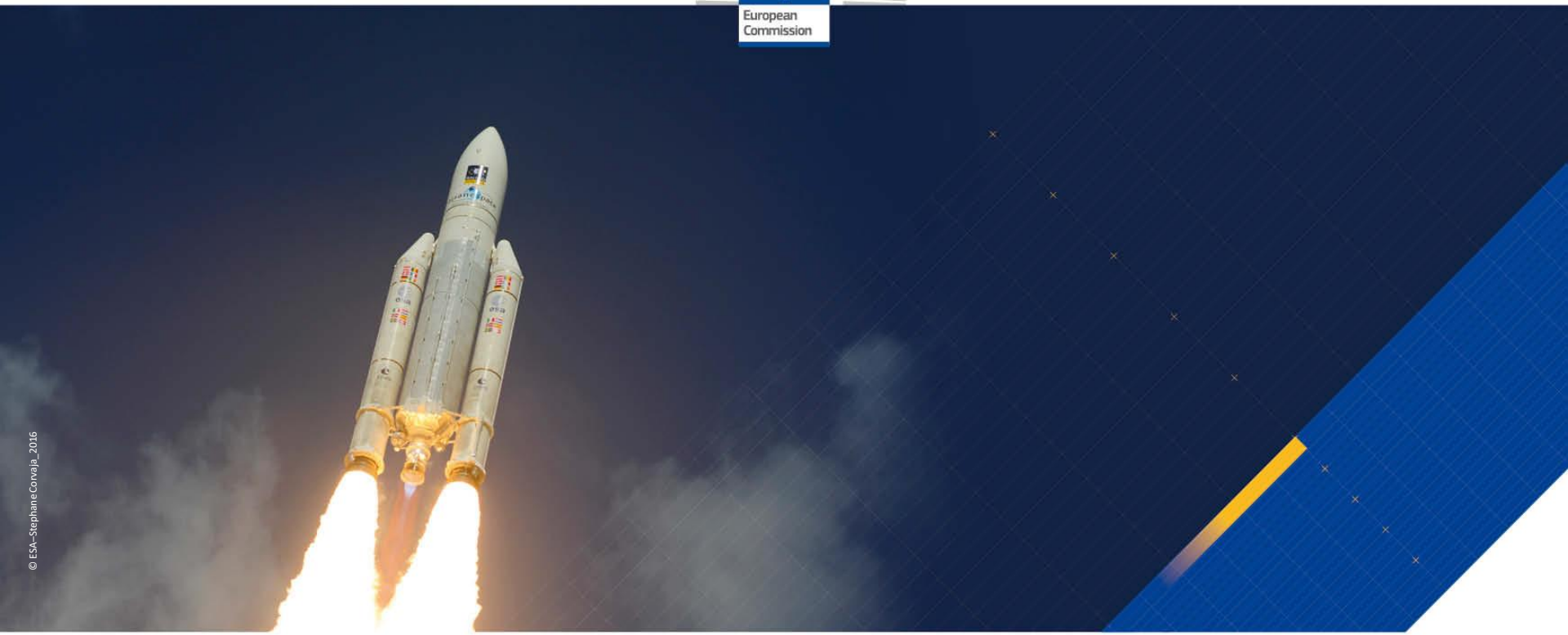


RNN Solna, 29 November 2018

Galileo next generation

Peter Wiklund, Lantmäteriet, the National Mapping, Cadastral and Land registration authority

Presentation based on slides from Eric Guyaders (EC) presentation at ENC 2018 and a presentation from the last WGEE meeting in Brussel November 21st.

GNSS TOMORROW

- **At least global constellations in Medium Earth Orbit**
  - > 120 satellites broadcasting signals
- **Use of positioning and timing information (PNT) generalized**
  - The 5th facility (after water, electricity, gas, phone)
- **Emerging new requirements from user communities**
  - e.g. authentication , for applications requiring ***trusted*** position and timing information
  - Key feature to enable new types of commercial applications such as "Pay As You Drive" (PAYD), "Road User Charging" (RUC), access to mobile content, etc.
- **New technologies could compete with GNSS**
  - Terrestrial technologies (e.g. miniaturized sensors, mobile networks used for positioning)
  - New concepts for satellite-based positioning (e.g. mega constellations of small-size satellites)

PREPARE TODAY TO FACE TOMORROW'S CHALLENGES

- Since 2013, the European Commission has been developing modernisation plans for Galileo for answering to the new challenges in the use of GNSS.

- Distinguish Galileo as an attractive option to ensure that it is widely used
  - Continuous and independent provision of relevant, robust and accurate services
  - Timeliness of delivery when introducing new features
  - Cost effectiveness of the infrastructure development, deployment and exploitation

- Reinforce the EU industrial capacity and its commercial competitiveness in GNSS
  - Facilitate access to all elements of the infrastructure supply chain
  - Increase EU market shares in all segments (infrastructure and downstream markets)

DEVELOPMENT PROCESS

- EC's approach towards the modernisation of Galileo is to:
  - Capture the strategic objectives and priorities of Member States (*top-down analysis*)
  - Understand the changing GNSS environment (*bottom-up entries*)
    - markets
    - lessons learnt
    - international scene
    - user changing habits
    - technological capabilities
    - signals and frequencies trends

- Approach largely supported by consultations:
  - Member States, in multi- and bi-lateral format
  - EC's internal services for sectorial inputs
  - ESA, GSA and JRC
  - Industry

TYPICAL QUESTIONS

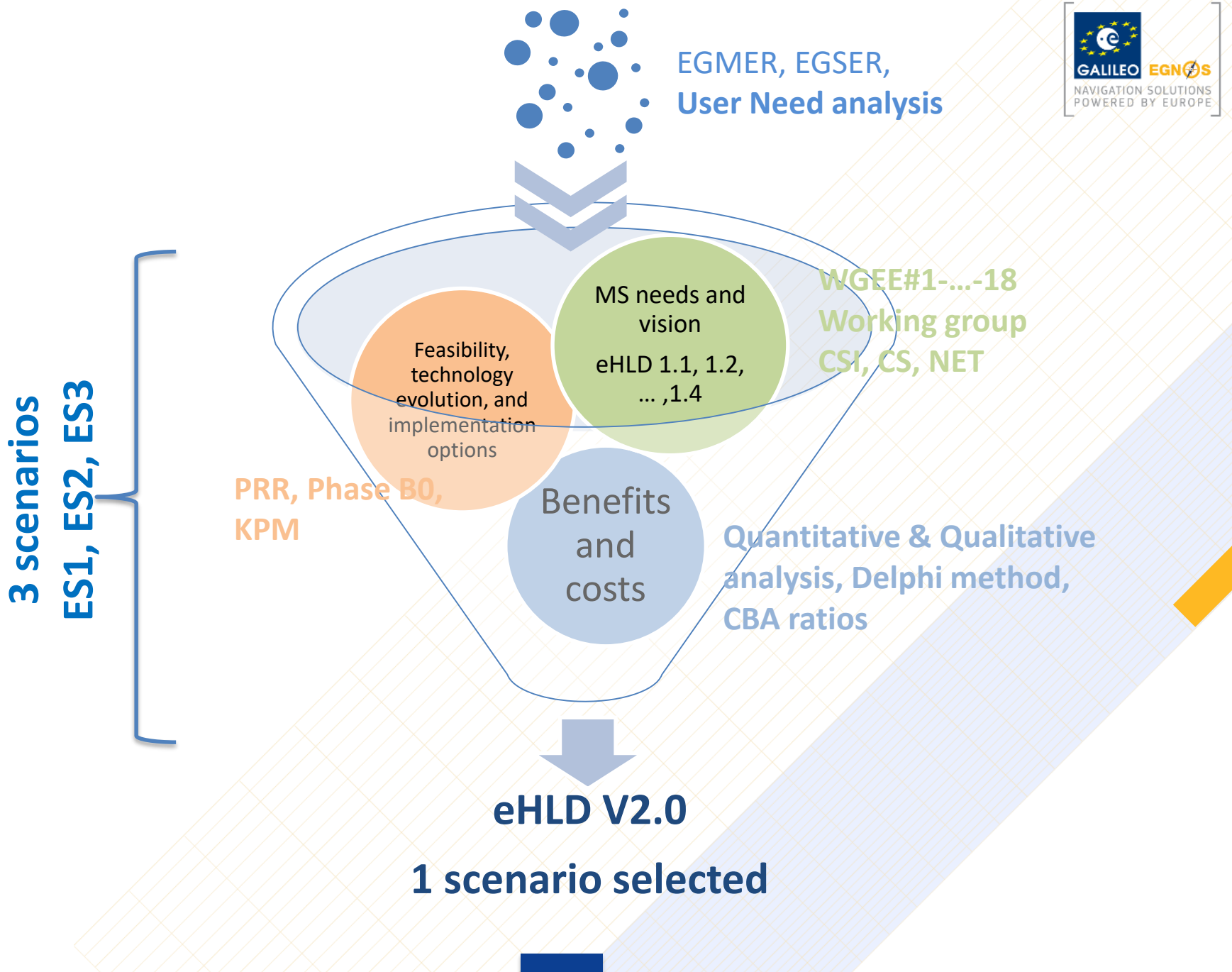
- Should Galileo be made more accurate?
  - From a few meters accuracy today to sub-meter tomorrow ?
- Should Galileo expand the current service portfolio with new services, and if so which ones?
  - Emerency Warning Service ?
  - Ionosphere prediction service ?
- How much would those evolutions cost?
- Should Galileo allow the hosting of potential new mission(s), beyond the navigation and SAR missions?

STATE OF PLAY

- As of 2018, the European Commission has stabilized a programme document that identifies **3 scenarios for evolution** (high level definition document for evolution)
  - Document approved by EU Member States
  - Cost-Benefit analysis for each scenario

- On this basis, the industry has been working on the feasibility of these scenarios ('Phase B').
  - System architectures
  - Technological readiness
  - Trade-off analysis between technical options

- Timeline
  - Review of phase B outcomes along 2018, Phase B0 Key Point Meeting in September 2018.
  - Target date for decision: 2019
  - Start of deployment: ~ 2025


EGMER, EGSER,
User Need analysis
3 scenarios
ES1, ES2, ES3
MS needs and vision
eHLD 1.1, 1.2, … ,1.4
WGEE#1-…-18
Working group
CSI, CS, NET
Feasibility, technology evolution, and implementation options
PRR, Phase B0, KPM
Benefits and costs
Quantitative & Qualitative analysis, Delphi method, CBA ratios
eHLD V2.0
1 scenario selected

STATUS TODAY

- **Definition phase concluded with Member States**
  - 3 scenarios identified for evolution - gradual ambition levels

- **Consolidation phase about to be finished**
  - 1 scenario down-selected (KPM conclusions)
  - Performance targets and service characteristics for that scenario are described in the eHLD.
    - Several versions of the document iterated with MS at WGEE
    - Current version V2.0 draft under review
  - eHLD V2.0 to be distributed within 1 week.
  - eMRD and associated engineering documents are being drafted.

- **Decision phase ahead**
  - First opinion of MS at EGPC, 11-12 December 2018
  - Last iteration at WGEE#19, February 2019
  - Endorsement by MS at EGPC, 19-20 February 2019
  - Final decision at Implementing Act level, July 2019