GMV 2012 USER’S CONFERENCE

GMV Portfolio
WHAT IS GMV TODAY

A high technology multinational conglomerate, founded in 1984, with presence in Spain, USA, Portugal, Germany, Poland, India, Romania, Malaysia and France.

GMV technology is deployed in 5 continents

140M$ (total revenue)
100M$ (space-related)
Over 1.200 employees worldwide

CMMI
Level 5
WHAT WE DO

GMV provides engineering, expert support services and turn-key IT systems and solutions for these markets

- Space
- Aeronautics
- Defense
- Security
- Healthcare
- Transportation
- IT & Telecommunications
GMV IN SPACE

- Active in space segment, ground segment (control and mission/payload segments), operations and space applications (transport, defense & security, environment, etc.)
- A cumulative number of almost 300 satellites supported by GMV (all domains)
- Prime provider for ESA and NASA

Active in all market segments:
- Telecom
- Earth Observation
- Navigation
- Exploration
- Science
- Transportation
- Robotics
- Technology demonstrations
OUR OFFER IN SPACE

Main areas of specialisation:

- Complete Ground Segment integration (HW/SW). Turn-key systems procurement
- Mission and Payload Data Processing Ground Segments (Telecom CSC, Earth Observation PDGS and Science SOC)
- Global Navigation Satellite Systems (GNSS)
- Engineering of satellite systems, mission analysis, simulation, test benches
- Applications: GNSS application, EO user segment and services
OUR PORTFOLIO OF MAIN CUSTOMERS

INSTITUTIONAL CUSTOMERS: SPACE AGENCIES

TELECOM SATELLITE OPERATORS

SATELLITE MANUFACTURERS / SYSTEM INTEGRATORS
MORE THAN 20 YEARS OF EXPERIENCE

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GMV IN TELECOM

- #1 worldwide independent supplier of ground control systems to commercial telecom satellite operators.
  - 45% of all launched commercial telecom satellites during 2010 and 2013 using GMV technology
  - GCS technology for 23 commercial satellite operators
  - More than 151 satellites using GMV technology
GMV IN GROUND SEGMENT

SPACE SEGMENT

- STRUCTURE
- POWER
- THERMAL
- PROPULSION
- COMMS
- AOCS / GNC
- DATA HAND / OBSW

- PAYLOAD / INSTRUMENT(S)
  - ...
  - ...
  - ...
  - ...
  - ...
  - PROT. PROCESSORS
  - DATA HAND / OBSW

- ENGINEERING
- MA & SIMULATION
- TEST BENCHES
- OPERATIONS

GROUND SEGMENT

GROUND CONTROL SEGMENT

- TELEMETRY, TRACKING & COMMAND STATIONS
- OPS
- SCC (RTS)
- FDS
- G/S M&C
- P/L M&C
- MPS

PAYLOAD/NETWORK CONTROL CENTER

- COMMUNICATIONS MONITORING STATIONS
- G/S M&C
- CAPACITY
- MPS
- CSM
- MONITORING
- GEOLOCATION
GMV IN GROUND SEGMENT

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MANUFACTURERS AND PLATFORMS

- Eurostar 2000/2000+
- Eurostar 3000
- 376
- 601 / 601 HP
- 702
- A2100
- Ekspress
- STAR-2
- LS 1300
- Spacebus 3000
- Spacebus 4000
- LUXOR bus
- Insat 3000
- DS 2000

Flight proven
Work in progress
Future implementation (TAA and data available)
45% of all launched commercial telecom satellites during 2010 and 2013 have selected GMV technology to support key satellite operations.
**hifly, WHAT IS?**

**hifly family**
Satellite fleet monitoring and control real-time system

- **hifly**
  TM, TC and raw archive

- **satDB**
  Offline satellite database

- **archiva**
  TM parameter archive

- **autofly**
  Procedures automation

- **hifly anywhere**
  Remote access via the Web
**hifly HIGHLIGHTS: hifly 6.x**

- Eksingis 376n
  - **hiflyviews** standalone in **hiflyviews** in Windows

- hifly 6.2
  - **hiflyviews**

- hifly 6.4
  - Boeing 376
  - **hiflyviews**
  - **autofly**
  - **hiflyviews** in Windows

- hifly 6.5
  - TM file service
  - Short/long term
  - **archiva** automatic server switch
  - Loral 1300

- hifly 6.6
  - Caches removal
  - Reporting based on BIRT
  - OSC Star 2

- S/C Manufacturers

- hifly 6.2
  - Arabsat 60201
  - SES4 & SES5 B2 B3 B4

- hifly 6.5
  - Hispasat H1E

- hifly 6.6
  - Astra 2F
  - Hispasat Amazonas 1,2, H1E
  - Coming soon: Amazonas 3 & Starone C3

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**hifly HIGHLIGHTS: hifly 7.x**

- HMI in Java
- SOA architecture
- **hiflyViews**
  spreadsheet and multi-satellite displays
- **archiva** upgrades

**hifly 7.0**

- Mitsubishi Electric
  DS2000
- **hiflyanywhere**
- satDB based on eclipse RCP
- **hifly4office**

**hifly 7.x**

Coming soon: Turksat, NBNCo, Measat
hifly ROADMAP for 2013

New Platforms
- SS/L LS 1300
- Omega 3
- Boeing 601
- OHB Luxor bus

archiva
hifly4office

hiflyanywhere
synoptic displays

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hifly ROADMAP beyond 2013

**Autofly**
- Timeline
- Workflow chart edition

**Fleet monitoring**
- Events
- Out of limits

**And more!**
- Native clientes on Windows
- Packet distribution based on message bus
magnet, WHAT IS?

magnet

Ground segment monitoring and control system

- Allows for real-time monitoring and control of all ground station equipments across multiple sites
- Provides individual equipment configuration and operation
- Provides a synoptic with hierarchical views including site, station and equipment layers, with navigation among them
Dramatically integrated with **hifly**: the ground segment appears as yet another satellite of your fleet.
magnet HIGHLIGHTS

- Commanding from **hifly** stacks (manual stack & equipment view)
magnet HIGHLIGHTS

- Sharing of most **hifly** functionalities adapted to the specifics of ground equipments:
  - Prime/backup or standalone configurations
  - TC history: ability to share satellite and ground equipment telecommands
  - Retrieval mode
  - TM out-of-limits, derived parameters...: ability to mix satellite and ground equipment TM parameters
  - TM display: ANDs, GRDs...
  - Alarm management, events...
  - **autofly**: ability to develop procedures combiing satellites and ground equipment
  - Ground equipment monitoring data is collected into packets, time stamped and can be exported
magnet HIGHLIGHTS

- magnet provides advanced synoptic representations of the ground segment, with hierarchical views including site, station and individual equipment layers, with navigation among them.
**magnet ROADMAP**

**Drivers & Commanding**
- Equipment view wizard for final users
- Commanding from mimics

**Reports & Views**
- User configurable reports
- Visual scheduler for pre-programmed tasks

**Web access**
- Secure access for ground parameters monitorization
- E-mail notification of selected alarms
smart payload FAMILY, WHAT IS?

**smart payload** family

Satellite payload operations management

- **smart rings**
  Payload reconfiguration management

- **smart power**
  Power consumption evaluation and simulation

- **smartHz**
  Satellite capacity management and optimization
**smart payload HIGHLIGHTS**

Captures payload information

User input and/or real time TM

Monitoring

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S/C Manufacturers

S/C DB

Teleports

SIGNALS

CTC

FREQ, PLAN

smartHz

autofly

MANOEUVRE

focussu

GCS
smart payload HIGHLIGHTS

- User input and/or real-time monitoring captures payload information.
- Provides alternative payload configurations.
- Configurable views.
smart payload HIGHLIGHTS

User input and/or real-time TM Monitoring captures payload information. Provides alternative payload configurations.

Configuring customizable views.

Re-configurations procedure.

Reporting detailed reports.
### BUS Power Consumption

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Power</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude Control Subsystem [ACS]</td>
<td>90.20</td>
<td>W</td>
</tr>
<tr>
<td>Command and Data Handling [CDH]</td>
<td>60.90</td>
<td>W</td>
</tr>
<tr>
<td>Electrical Power Subsystem [EPS]</td>
<td>61.90</td>
<td>W</td>
</tr>
<tr>
<td>Propulsion [PSS]</td>
<td>4.10</td>
<td>W</td>
</tr>
<tr>
<td>Thermal Control Subsystem [TCS]</td>
<td>106.90</td>
<td>W</td>
</tr>
<tr>
<td>Telemetry, Command and Ranging [TCR]</td>
<td>40.50</td>
<td>W</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>364.50</strong></td>
<td><strong>W</strong></td>
</tr>
</tbody>
</table>

### Payload Power Consumption

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Power</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Panel [NPL]</td>
<td>2420.25</td>
<td>W</td>
</tr>
<tr>
<td>South Panel [SPL]</td>
<td>2501.91</td>
<td>W</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4922.16</strong></td>
<td><strong>W</strong></td>
</tr>
</tbody>
</table>

### Overall Power Consumption

<table>
<thead>
<tr>
<th>Total</th>
<th>Threshold</th>
<th>Units</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>5286.65</td>
<td>7100.00</td>
<td>W</td>
<td>PASSED</td>
</tr>
</tbody>
</table>

Created on: Oct 3, 2012 2:47 PM
smart payload HIGHLIGHTS

Based on expected values or in real telemetry, smart payload checks power limits in different conditions (e.g., Eclipse).

Multiple formats for Reports & Views, including LCTWTA, solar panels, and batteries.
smart payload HIGHLIGHTS

Models based on measures

Real footprints

You can optimize transmission plans

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You can optimize transmission plans based on measures.

Multiple users can use its state-of-the-art web interface from multiple workstations.
smart payload HIGHLIGHTS

- **Satellite: AZ1A (48.0° E)**
  - Summary of power level and intermodulation interference in the selected transponder
  - Models based on measures
  - Multiple users using its state-of-the-art web interface
  - Engineer reports
  - Satellite user reports

- **Power and Frequency Distribution**
  - Pie charts showing power and frequency distribution among different networks.

- **PSD Transponder Intermodulation**
  - Graph showing PSD transponder intermodulation with frequency bands and interference levels.

- **Summary Table**
  - Table listing data for different transponders and their corresponding parameters.
smartpayload ROADMAP
2013 and beyond

smartstrings & smartpower
Support of new platforms

smartHz
Link budget booking

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focussuite - WHAT IS?

focussuite is GMV’s advanced off the shelf flight dynamics solution for satellite operations. Our system provides the most complete solution to the needs of both end-user products and flight dynamics system developers.

100% Flight Proven focussuite can be regarded as:

 A multi-mission, multi-user, multi-satellite, COTS product that sets a new standard in functionality, reliability, flexibility and user friendliness.

 A framework that is oriented to minimizing technical and programmatic risks, while greatly improving the efficiency of operations and reducing the risk of human errors.
focussuite - CHARACTERISTICS

- Powerful scalable and extensible 3-tier, client/server architecture
- Generic infrastructure (mission independent)
- Portability to different operating systems: Linux, Unix, Windows
- Enabling execution of the system functions from external systems (Open)
- An advanced HMI and HMI development toolkit
- Advanced Graphical capabilities
- Advanced automation means through autofocus
- Perform Undo/Redo of all operations
- A reliable and highly efficient data manager (compatible with any SQL database)
  - privileged data access mechanisms
  - allow concurrent access and data access locking
  - allow simultaneous operational scenarios
- Extensibility (add new modules, third party software)
All *focussuite* products and solutions share the same reference architecture and many common components.

- **focus GEO**
  - Full life cycle support of Geostationary satellites

- **focus LEO**
  - Tools needed for launch and early orbit phases of satellites, including transfer strategies.

- **focus LEO**
  - Components necessary for low and medium earth orbit satellites

- **focus CN**
  - Supports satellite constellation management
All *focussuite* products and solutions share the same reference architecture and many common components.

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**focus**

**MATOOL**

Tool for the definition, assessment and optimization of station keeping strategies for Geostationary satellites.

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**focus**

**CONSIGO**

Tool for multi-mission tracking scenario analysis for the evaluation of expected orbit determination accuracies.
focussuite – Advanced HMI

focussuite provides an efficient and ergonomic human machine interface optimized for flight dynamics operations.
focussuite – Advanced Graphics

focussuite provides advanced graphical capabilities: Gantt Charts, YX and XYZ plots, 2D&3D displays.
focussuite – Platforms Supported

- Spacebus 2000/3000/4000; Satelcom; Proteus
- Eurostar 2000/2000+; Eurostar 3000
- BSS376/BSS601/BSS702
- A2100
- SS/L 1300
- Star-2
- DS-2000
- Luxor
- Ekspress
- I-3000
focussuite USERS

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focussuite ROADMAP from 2013 onwards

HMI in Java
- Migrate focussuite HMIs to java/Eclipse RCP

Convergence
- Converging towards a single computational library (all phases LEOP, LEO, MEO, & GEO)

Synergy
- Synergy between SCC and FDS products
focussuite ROADMAP from 2013 onwards

More Java
- Precursor developments of space mechanics modules in Java (I + D)

Coverage
- Maintain full coverage of commercial platforms

Conjunction
- NEW Collision risk assessment modules based on covariance info
Thank you