

# SSTL Company Overview





# SSTL – The Company

UK satellite manufacturer is owned by 99% Airbus Defence & Space 1% University of Surrey

Since 1985, employing ~550 staff Facilities in the UK (Surrey, Kent, Hampshire) & US (Colorado)

*Changing the economics of space –*

- *challenging the traditional space mission model*
- *through the innovative use of disruptive technologies*





# SSTL's fleet of small satellites



# Changing the Economics of Space



Years+ in operation.  
6 Oct 1981 to date.



SSTL  
satellites  
launched



Satellites in manufacture



Payloads in manufacture

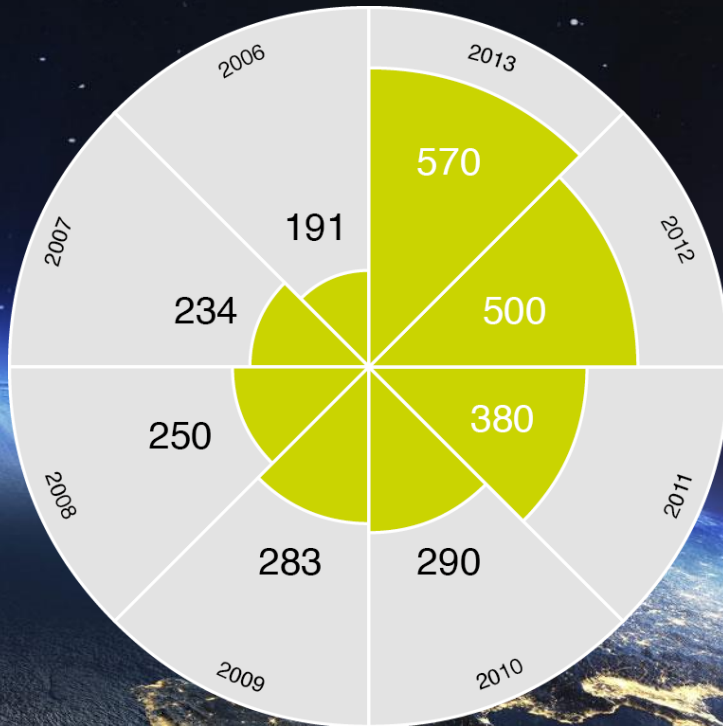


Number of SSTL constellations  
deployed and under contract  
(DMC, RapidEye, F7, DMC3,  
Kanopus)

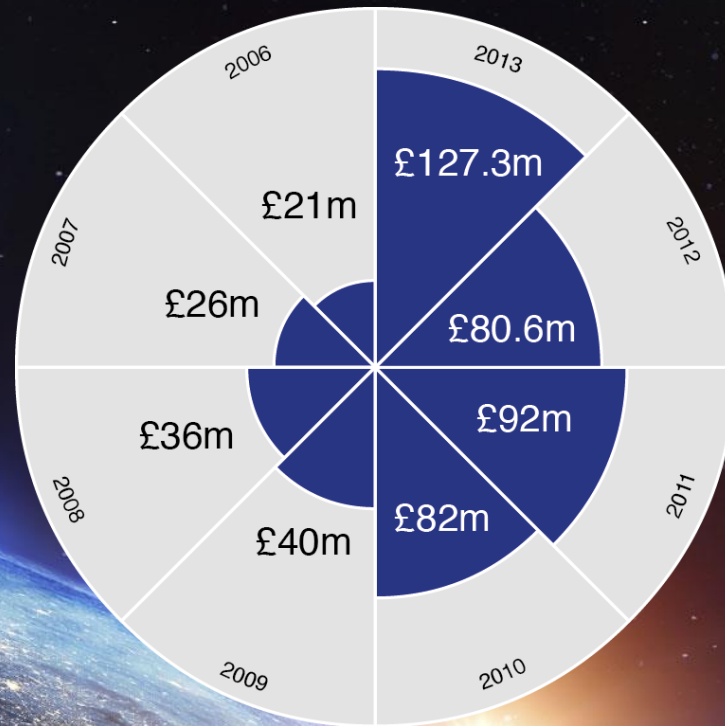


# Company Growth

## Permanent Staff



## Turnover



# International Customers



#

Major contracts : platforms, payloads or complete missions





# Mission Solution – The complete capability

Mission definition

Satellite manufacturing

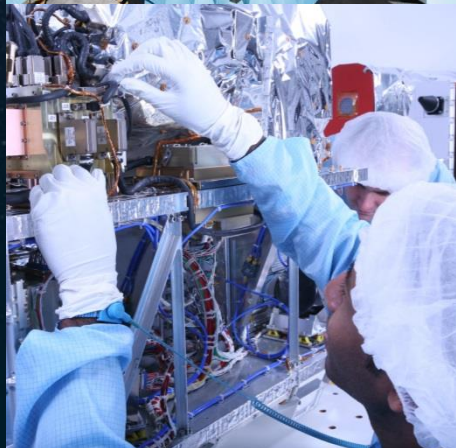
Satellite testing

Ground control segment

Satellite operations

Training programmes

Launch vehicle procurement





# Low cost – high value

Vertically integrated design and manufacturing

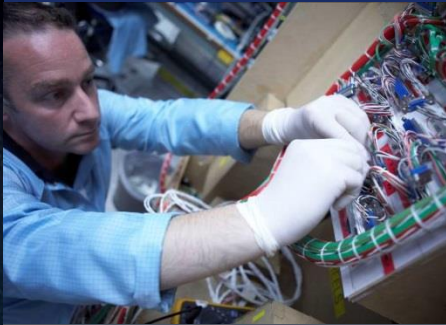
COTS hardware (DNA / fabric of the S/C)

Mission focussed system testing

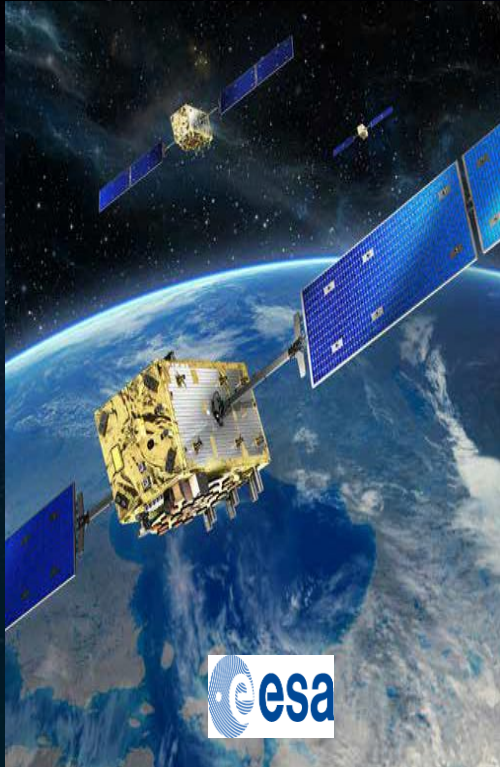
Multiple launch vehicles

Automated ground systems

Results focussed design







# Missions in Manufacture

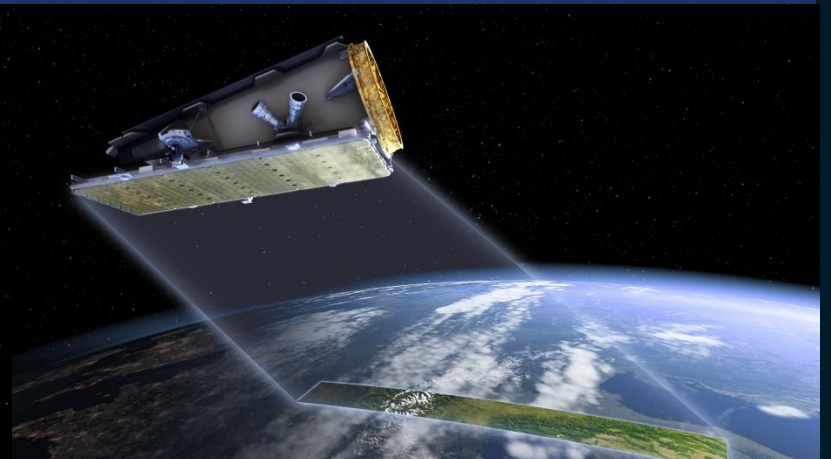
22 payloads for Europe's  
Galileo navigation system

NovaSAR

EarthCARE

Lomonosov

DMC3





# Missions in Manufacture

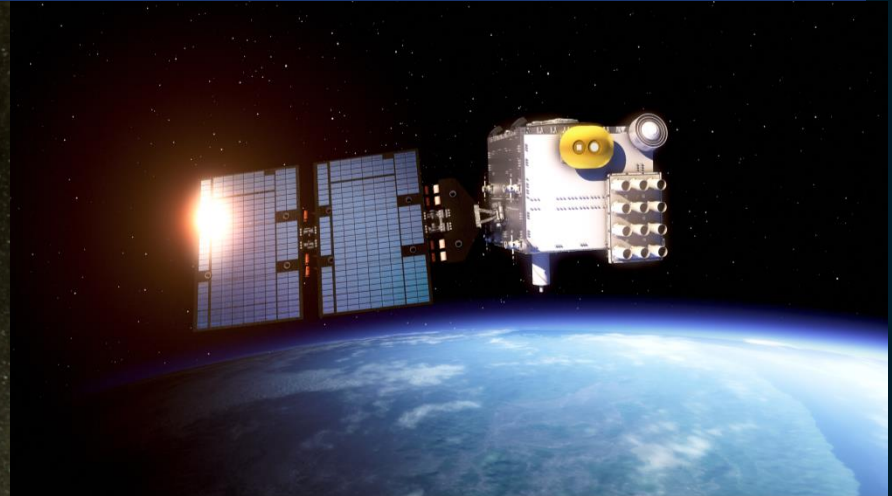
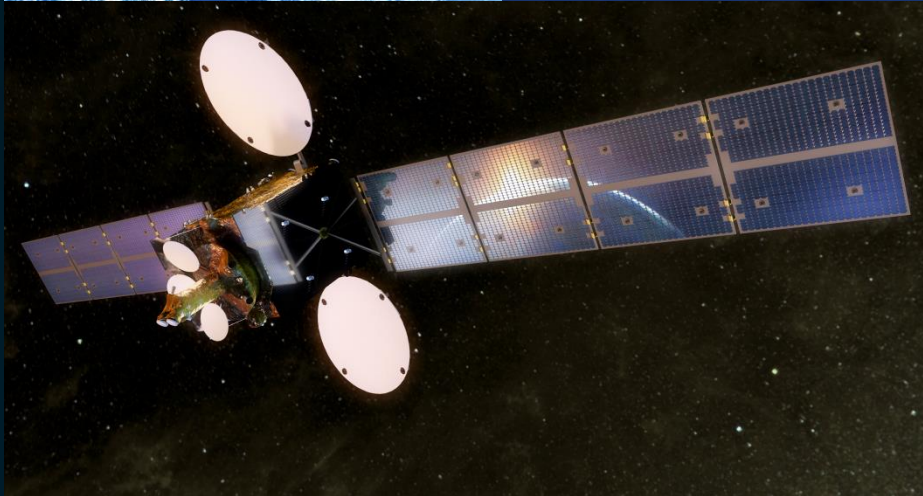
FORMOSAT-7

KazSTSat

Orbital Test Bed

GMP (Geostationary  
Minisatellite Platform)

AlSat-1B





# 5 Constellations in orbit or manufacture

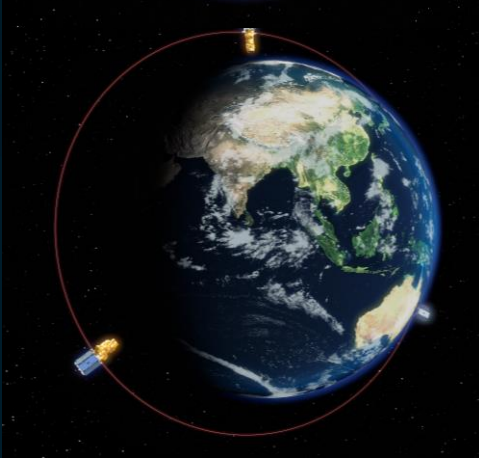
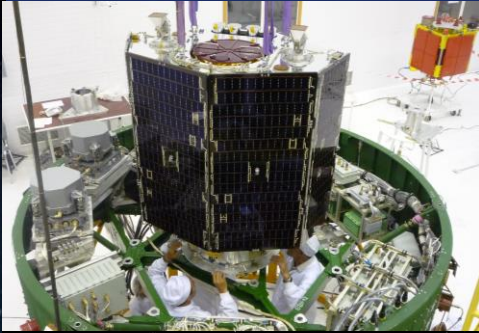
Disaster monitoring  
constellation

FORMOSAT-7

Galileo

RapidEye

DMC3







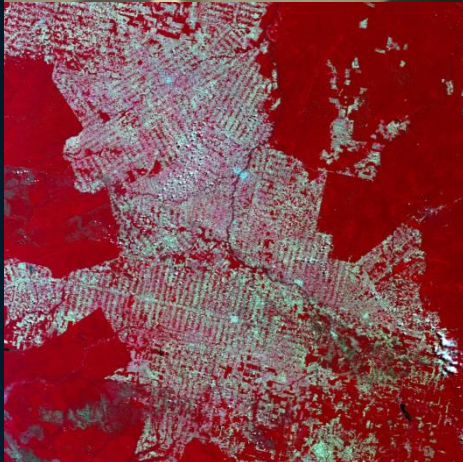
## Wide area

Rapid revisit

Achieved more than 10 years in-orbit heritage

Accurately and regularly monitor vast areas

Suitable for wide range of applications



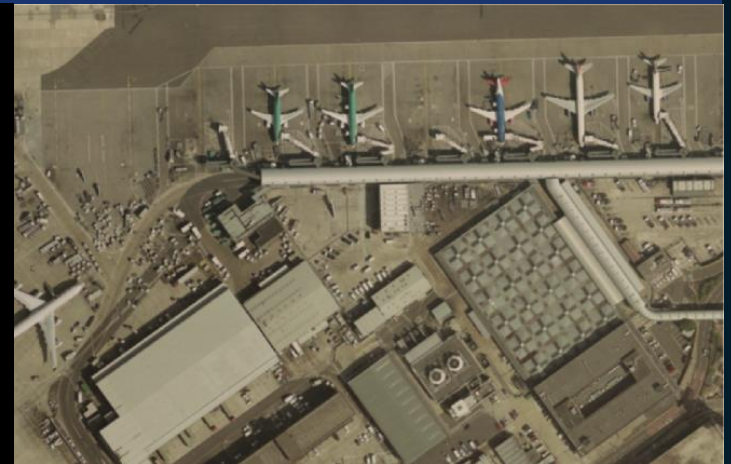
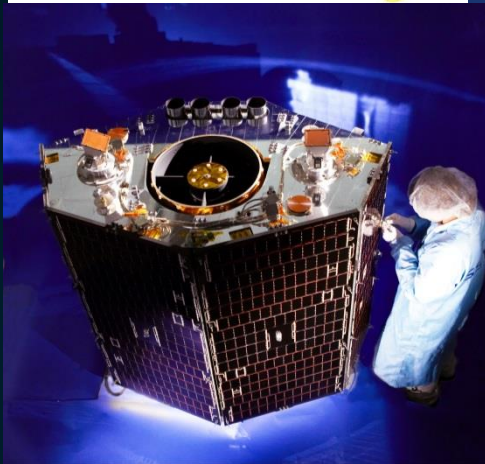
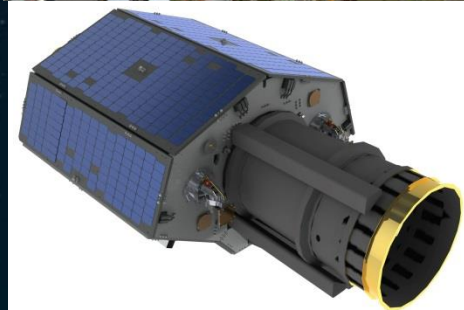


# High resolution / high performance

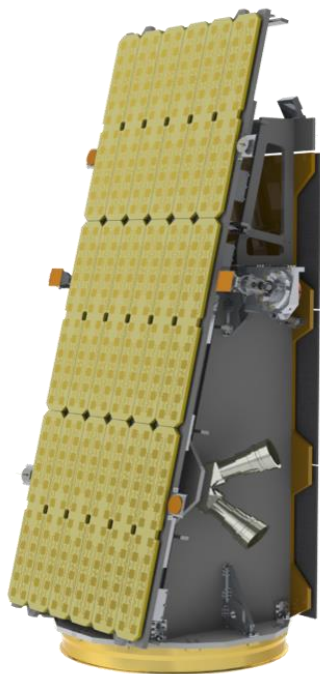
7+ year missions combining 1 metre class imaging

High agility and accurate geolocation

Designed for highly demanding applications







# Radar – NovaSAR

Low-cost SAR Satellite

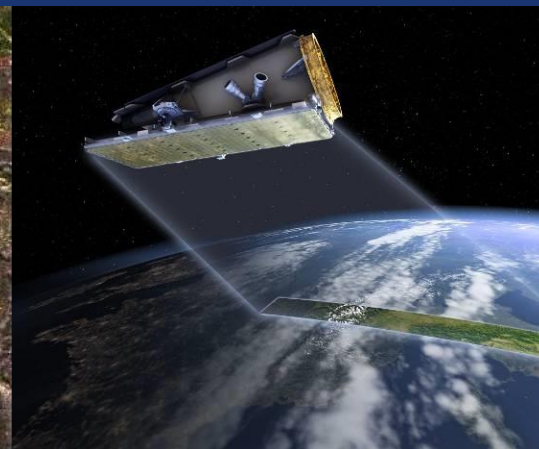
SSTL–Airbus (D&S) Joint  
Programme

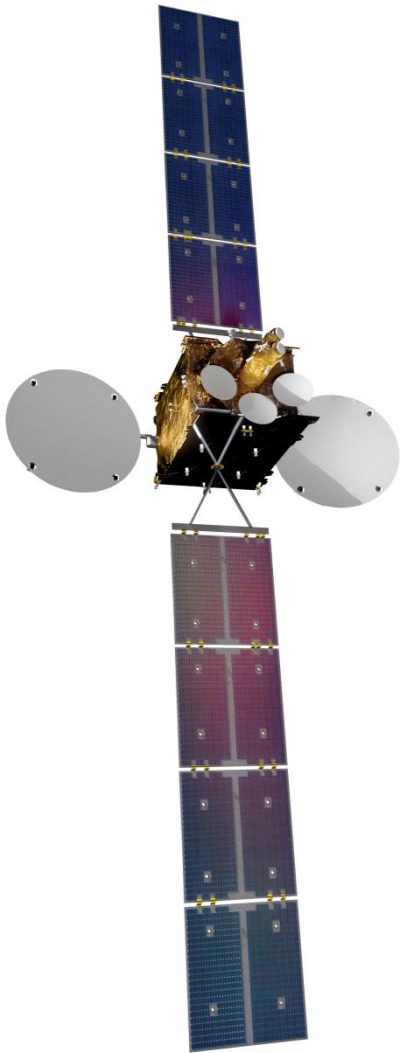
4 Modes: 6–30m  
Resolution

HMG £21m investment in  
first satellite

Constellation operations

Ready for launch 2015





# Telecommunications and Navigation

## GMP-T Range



### Structural Configuration

#### Small

#### Mid-range

#### Full-size

### Payload mass

< 450kg

< 450kg

< 450kg

### Payload power

1.2kW

3.5kW - 4kW

1.5kW - 4.5kW

### Top-floor area

2m x 1.7m

2m x 1.7m

2m x 1.7m

### Payload panel size

#### No extensions

2m x 0.6m

2m x 1.1m

2m x 1.9m

#### Max extensions

2m x 1.3m

2m x 1.8m

2m x 2.6m

### Propulsion options

- ▶ Single mono-prop of 700 - 1108 litres
- ▶ Electric and/or cold gas (Xenon)

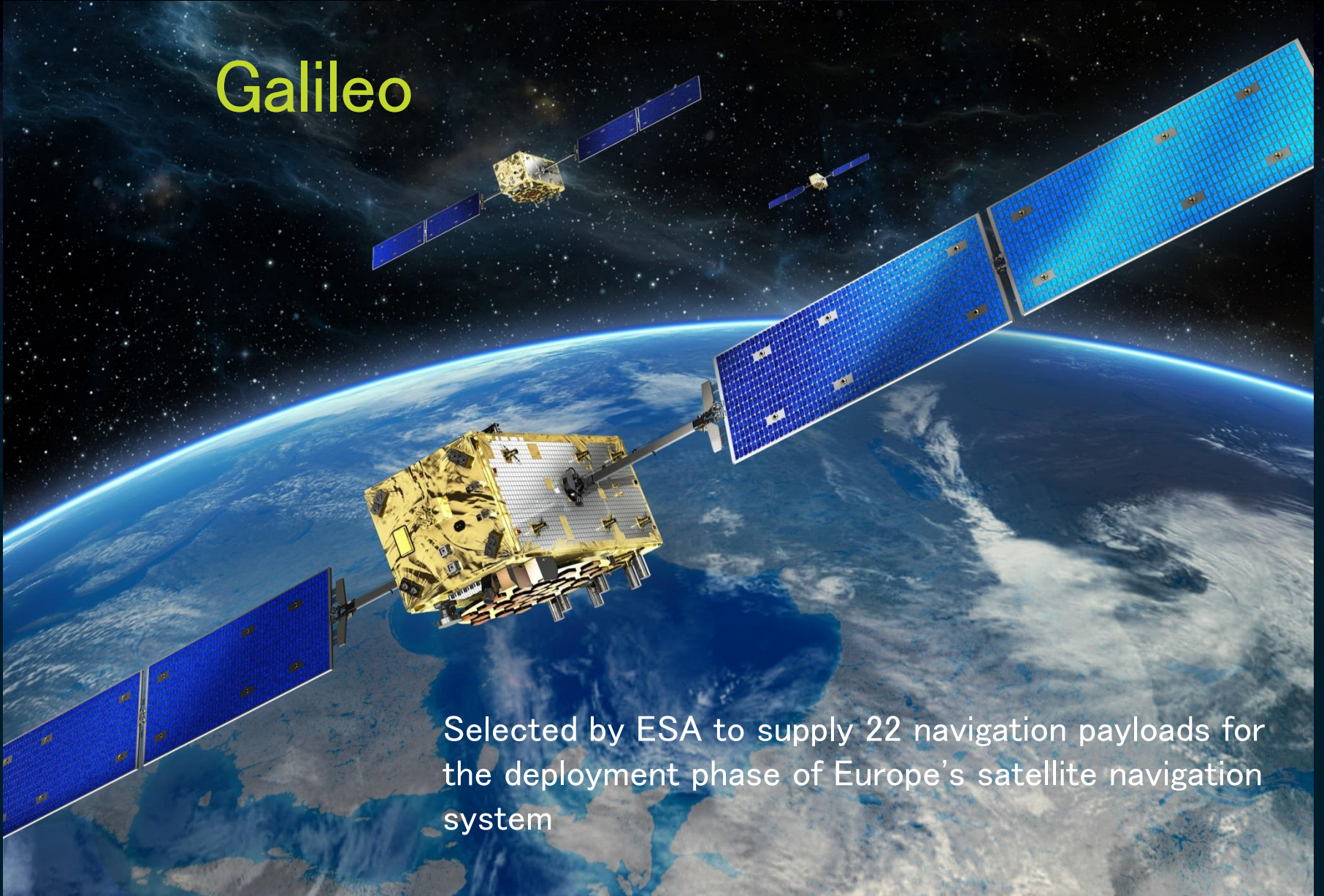
- ▶ Single mono-prop of 700 - 1108 litres
- ▶ Mono-prop and electric
- ▶ Electric and/or cold gas (Xenon)

- ▶ Bi-prop tank up to 815 litres
- ▶ Mono-prop and electric



# Galileo

Selected by ESA to supply 22 navigation payloads for the deployment phase of Europe's satellite navigation system





# Ground segment

Mission Control Centre &  
Ground Station

Mission Planning System

Image Processing, Storage  
and Archiving

Installation

Training

Mission Support and  
Operations

Maintenance

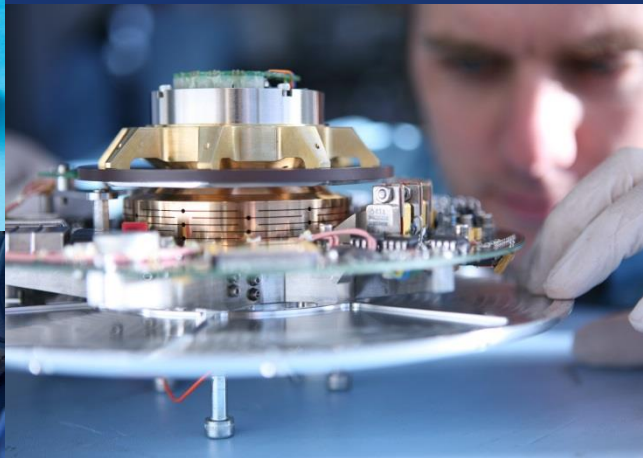
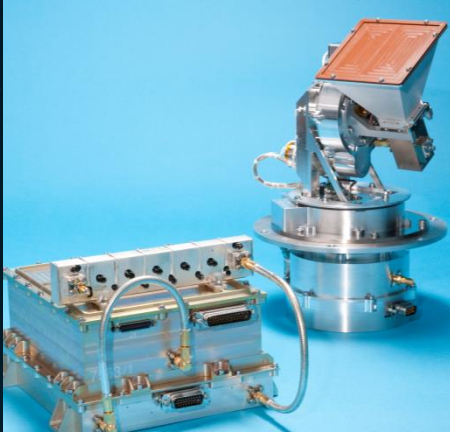




# Subsystems

*Fly the subsystems we fly* – choose from a wide range of space qualified platform technologies:

- S-band TTC, PDH&T over X-band
- OBC, AOCS, Propulsion, GNSS
- Power Systems & Solar Panels
- Platforms, Payloads



# Know-how Transfer and Training (KHTT)

18 SSTL international development and training programmes completed

3 Spin-out companies



















6 Space Agencies formed

Hands on training

Academic training – Underpinned by the University of Surrey





Nation	Period	Team	Mission
 Kazakhstan, Ghislaam	2014-2016	14	KazSTSAT
 Algeria, ASAL	2014-2016	18	AISAT-1B
 Kazakhstan, KGS	2012-2013	24	MRES
 USA, NASA / MSU	2007-2008	3	Magnolia
 Nigeria, NASRDA	2006-2009	26	NigeriaSat-2/NigeriaSat-X
 Nigeria, NASRDA	2001-2003	12	NigeriaSat-1
 Turkey, Biltan	2001-2003	12	BILSAT-1
 Algeria, CNTS	2000-2002	12	AISAT-1
 China, Tsinghua University	1998-1999	12	Tsinghua-1
 Malaysia, ATSB	1996-1998	9	TrungSat-1
 Singapore, NTU	1995-1997	2	UoSAT-12 (payload)
 Thailand, MU	1995-1997	12	Thai-Paht
 Chile, FACH	1994-1998	8	FASAT-A&B
 Japan, Fujitsu	1992-1994	3	(FJSAT)
 Portugal	1992-1994	6	PoSAT-1
 South Korea, KAIST	1989-1993	12	KITSAT
 South Africa	1989-1992	2	UoSAT 3/4/5
 Pakistan	1984-1988	10	BADR-1



# Launch services

Own missions, Customer missions and Third party missions.

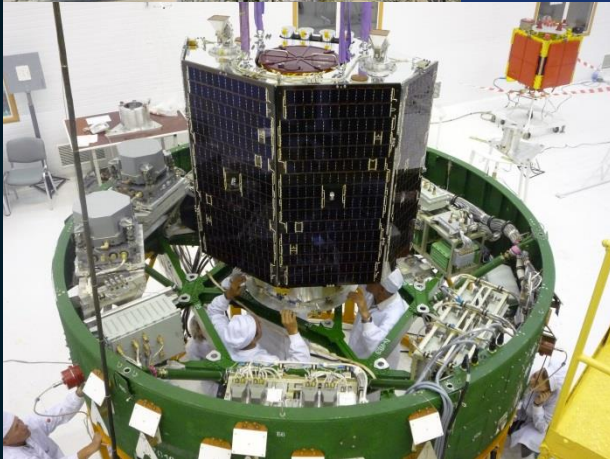
Launch contract and interfaces

Licences and shipping

Launch campaign

Design / Procurement of  
separation system

Launch insurance support





# Managed data supply

SSTL supports customers with both the supply and sale of commercial satellite data through established channels.



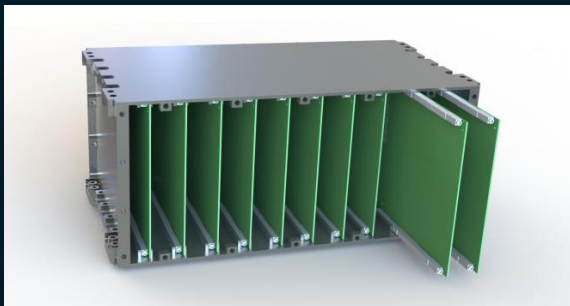
# Cost Reduction Programme

- In 2011 SSTL embarked on a cost-reduction programme called FIREWork
  - Objective was to challenge SSTL behaviour in the way it delivered mission solutions
  - Invoke change – define new design-for-manufacture model
  - Drive sea-change in core avionic design principles to adopt a card-in-rack architecture
  - Delivering to the customer cost saving, shorter lead-time & smaller spacecraft footprint so reducing launch costs
  - Disruptive behaviour to deliver value-added to the customer

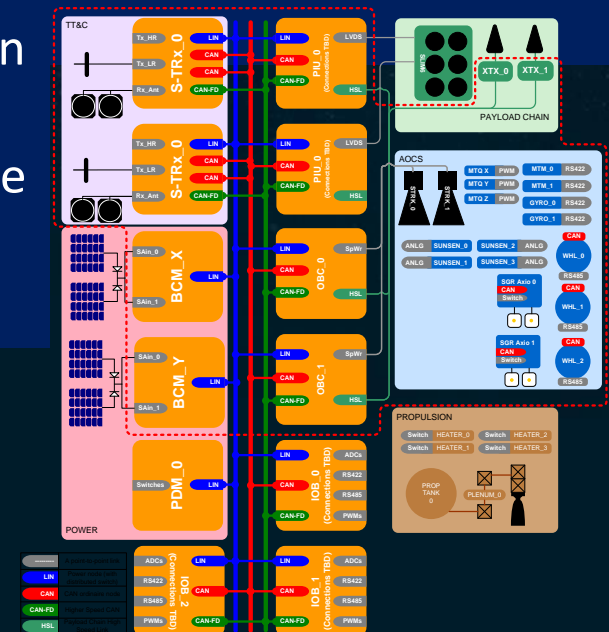


# Spacecraft – automated manufacture

- SSTL has investigated, qualified and implemented a new satellite platform production process
- The process makes significant use of modern automated manufacture and test techniques, and the avionics are designed taking this into consideration
- The consequence of this is that significant savings in production costs and schedule are achieved
- The first mission which will be produced using these new avionics and processes has been contracted, and will be using a new SSTL-X50 platform

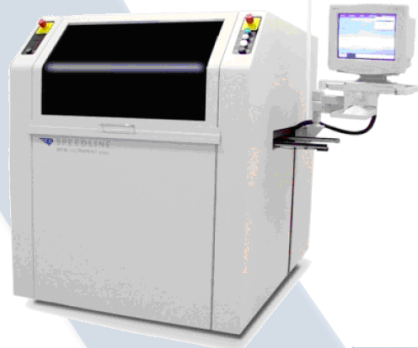


Card in Rack  
Avionic Core

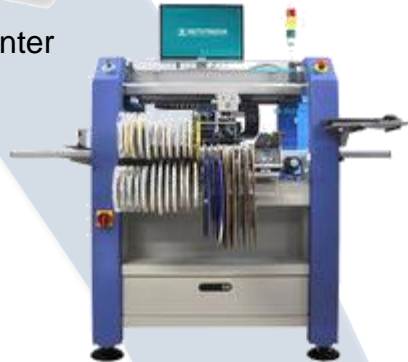


Satellite system block diagram for the  
SSTL-X50 Earth-Mapper mission

# SSTL-X50 - Space avionics production line



Stencil Printer



(Pick and Place)

To take advantage of the evolution of component technology

- Reduces possibility of damage to SMT devices from hand soldering

- Reduce the schedule and cost of manufacturing

- Reduces manufacturing cost of PCA's

- Build into stock



Cleaning



Automated  
Optical  
Inspection



Reflow Machine



X-Ray Machine



+ *Extensive design  
and qualification effort*

\* Equipment type for illustrative purposes



# SSTL-X50 - Production Cost Efficiency

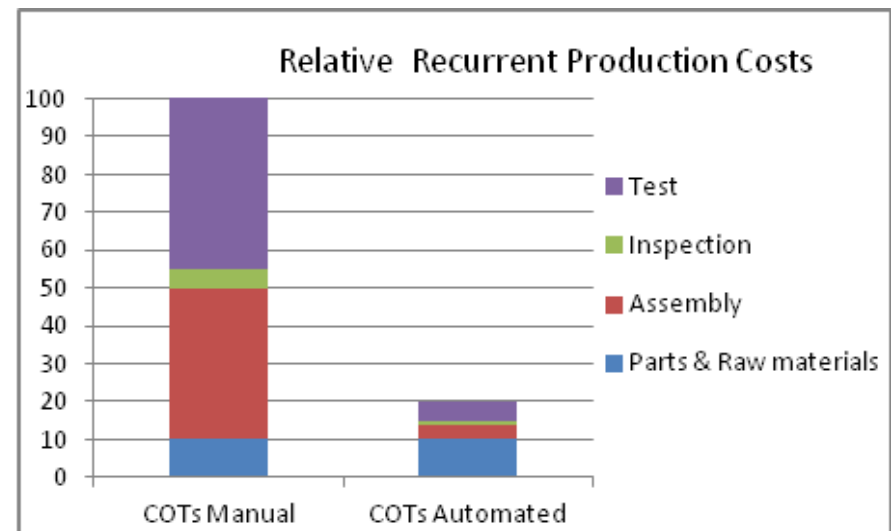
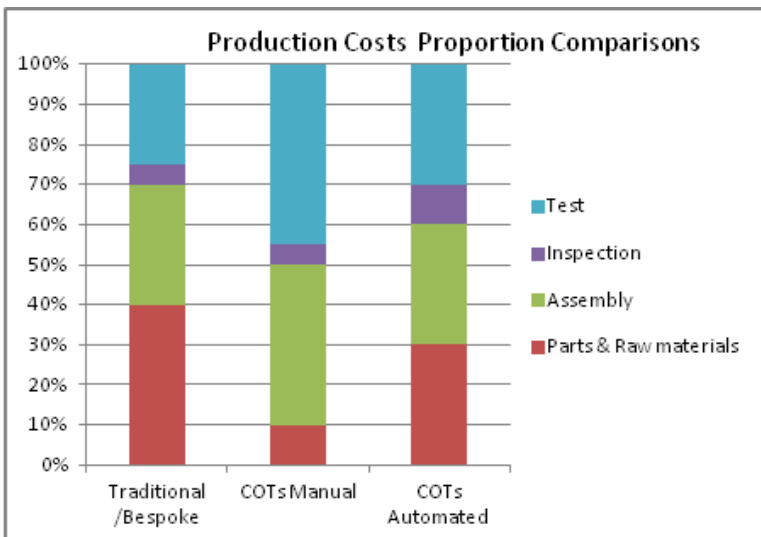
## Step Change in Production

Costs achieved through use of:

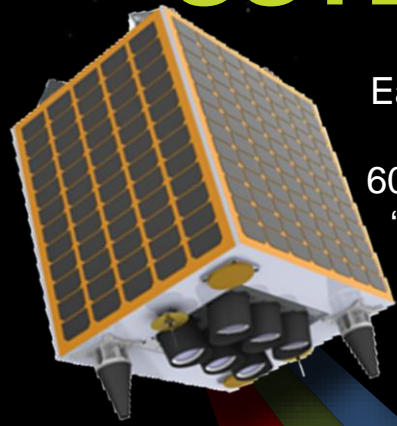
- Component Pick & Place
- Automated Solder (Re-flow)
- Automated Inspection
- Automated Test

Automated Testing of system at Platform Level

	Approach Scenario	Traditional/ Bespoke	COTS Manual	COTS Automated
Production Phase Durations	Procurement	Weeks	Days	Days
	Assembly	Weeks	Weeks	Hours
	Inspection	Days	Days	Hours
	Test	Weeks	Weeks	Hours
	Overall	Months	Weeks/ Months	Days

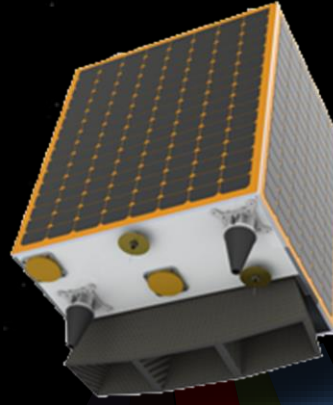


# SSTL-X50 Constellation Platforms



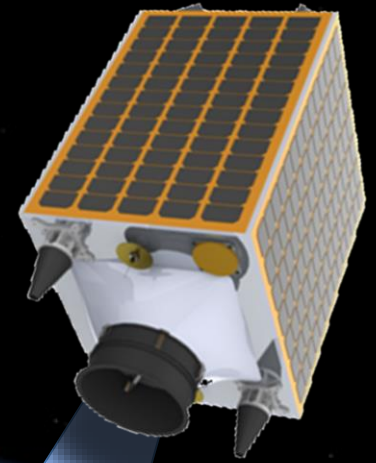
Earthmapper  
22m GSD  
600km swath  
*"Always on"*

NIR R G



TrueColour  
5m GSD  
390km swath

SWIR NIR R G B



Precision  
0.7m GSD  
1m HD video

pan  
R G B

## Training and Development

- Hands-on
- On-the-Job



## Launch and Insurance



## Mission Control Centre





# Summary

Pioneer of low cost mission solutions

Focus on applications, innovation and value

Partnership approach to deliver low cost, high value capability

Harness synergies in the space industry that deliver added value

Generate growth, employment and knowledge development



# Thank you



**Changing the economics of space**

[www.sstl.co.uk](http://www.sstl.co.uk)