

Matthias Buhl, Björn Danziger & Tom Segert

Berlin Space Technologies GmbH

Examples & Lessons Learned...

...from the BST Capacity Building Program

United Nations / Brazil Symposium on Basic Space Technology

“Creating Novel Opportunities with Small Satellite Space Missions”

Natal, Brazil

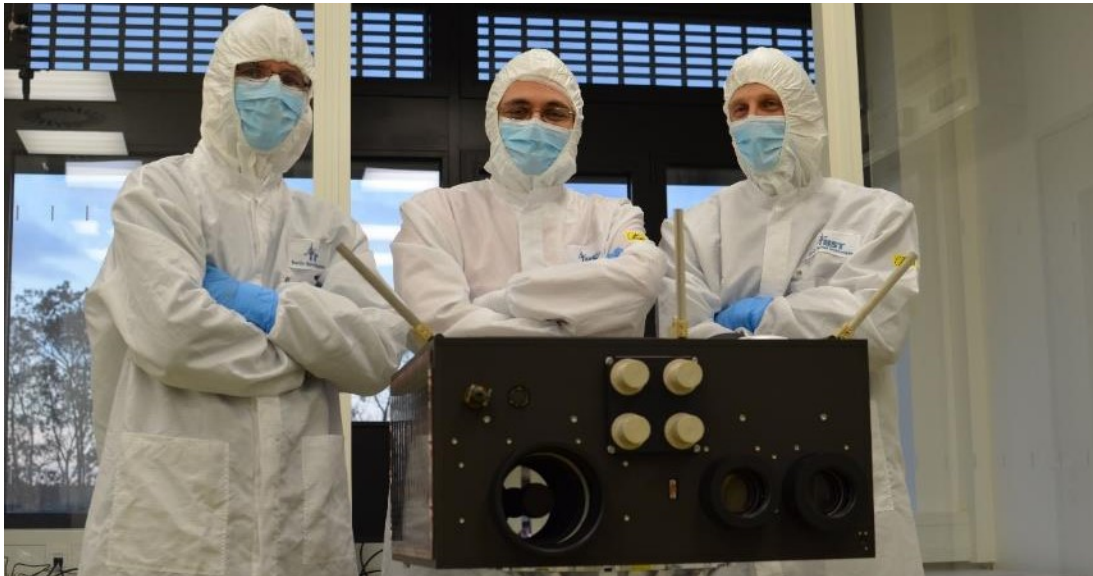
11 – 14 September 2018

Berlin Space Technologies

Who we are



- Provides system solutions based on small satellites & the leading German “new space” company
 - Implementing large scale mass manufacturing together with Azista Aerospace
- Experience:
Participated in 15 missions with 50+ satellites
 - 1000 sqm labs & facilities in Berlin
 - R&D focus on mass manufacturing

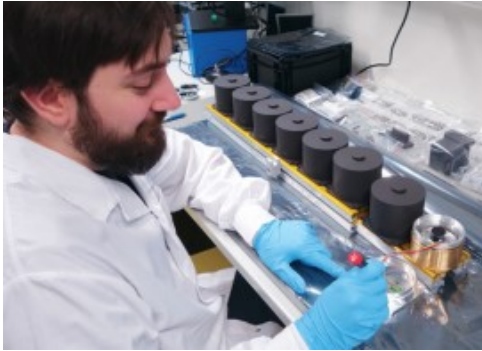


Tom Segert, Björn Danziger & Matthias Buhl



Berlin Space Technologies

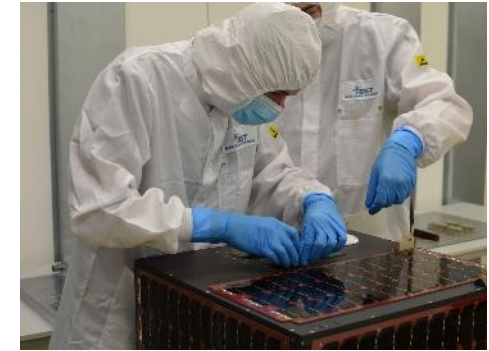
What we do



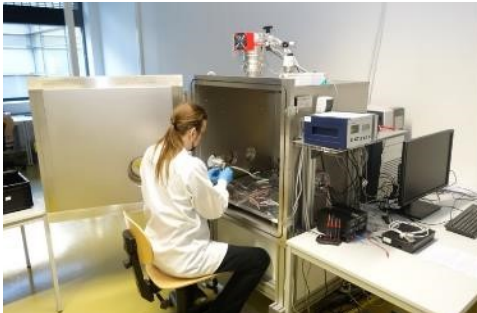
Mass manufacturing of satellite sub systems



Design & manufacturing of demanding payloads



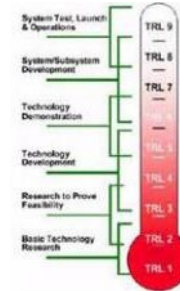
Satellite systems & solutions



Ground segment & GSE



In orbit demonstration service



Capacity building

Vertically integrated to provide full satellites systems & solutions

Berlin Space Technologies



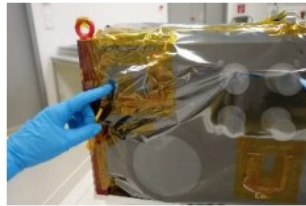
Our programs

Kent-Ridge-1
(BST: 2013-2015)



Level 1B

Kent-Ridge-1B
(BST: 2015-2016)

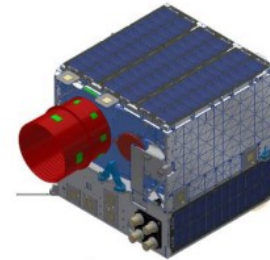


NExSat
(BST: 2015-2018)

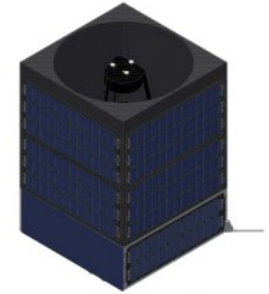


Level 2B

Lagari
(BST: 2017-2019)



LEOS-100
(Azista & BST: 2019+)



Level 3A

Heritage Programs
(BST KP*: 2004-2009)



AIV & Operation



Technology

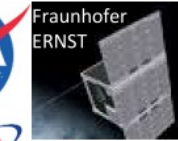


Subsystems



Subsystems

Satellite Subsystems
BST: 2012-2018)



UrtheCast: Space Station
(BST: 2012-2014)



2x Star Tracker, 6x IMU

*) by BST Key Personnel before foundation of BST

Intention of the customer

- Started out as a consumer
- Aims to be part of the global space community
- Has ambitious goals to inspire generations



Need of customer: a well trained workforce

- Great need for vocationally trained engineers
- Excellence is should be sustainable & homegrown
- Meaningful space education sets the path



Berlin Space Technologies is an experienced partner

- Sound training model
- Excellent track record
- Meaningful satellite missions



Lets work together to make today's dreams tomorrows reality!

Level 0

Client engineers operate a turn key satellite independently

Level 1

Client engineers are participate building the satellite at host's lab.

Level 2

Client engineers design & build satellite on system level in their own labs while buying key subsystems from foreign suppliers.

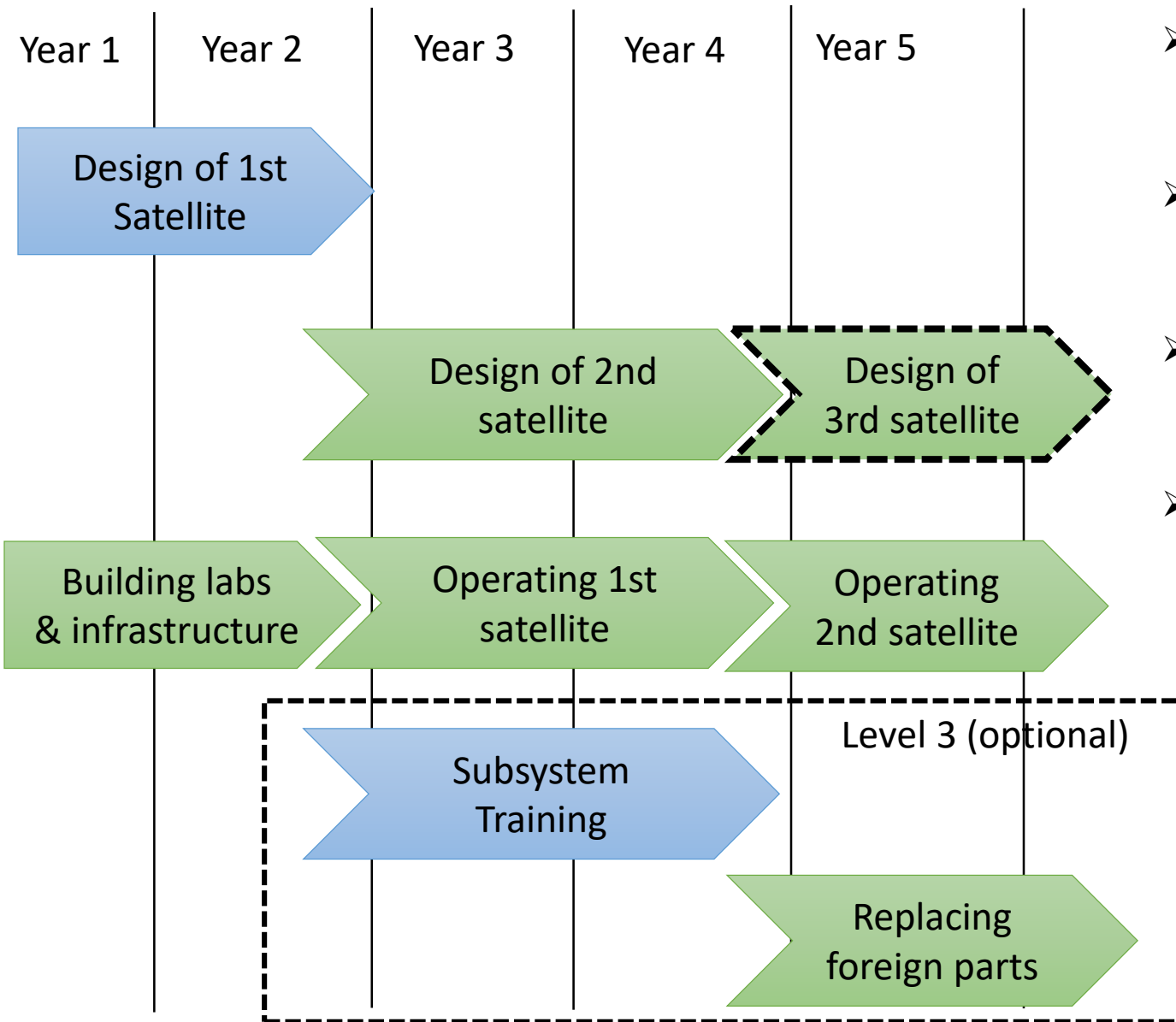
Level 3

Client engineers build & design key subsystems & the whole system independently in their own labs

Berlin Space Technologies



BST approach



- Multi step instead of one giant leap
- Training adjusted to trainee capabilities
- Building up client labs in parallel to program
- Business model that supports success

In Berlin

At client labs

Berlin Space Technologies

Example training programs from BST experience

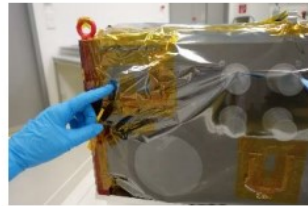


Kent-Ridge-1
(BST: 2013-2015)

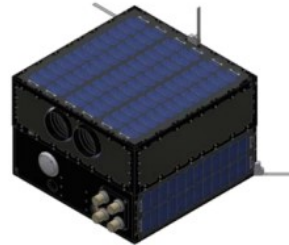


Level 1B

Kent-Ridge-1B
(BST: 2015-2016)

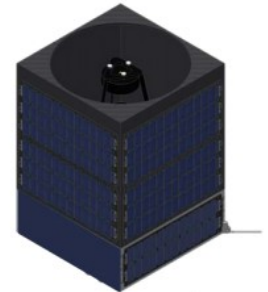


NExSat
(BST: 2015-2018)



Level 2B

LEOS-100
(Azista & BST: 2019+)



Level 3A

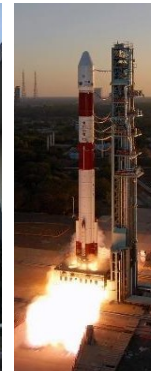
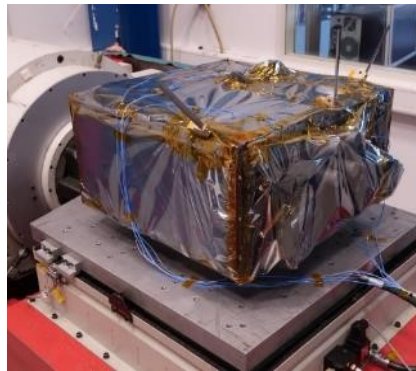
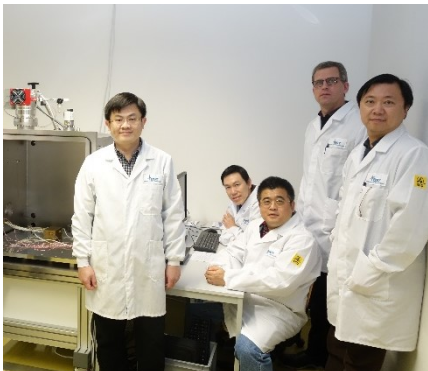
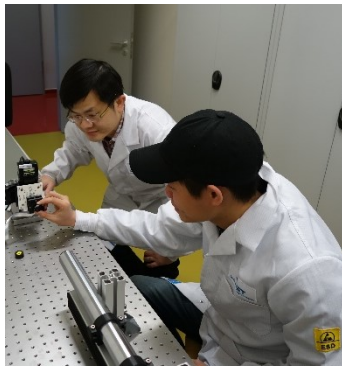
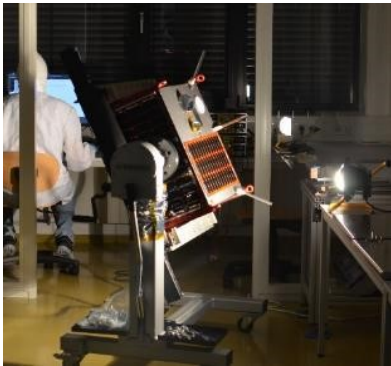
Mission	Kent Ridge 1 / 1B	NExSat	Satellite Factory
Client			
Type	System training & AIT (Level 1)	Components & support (Level 2)	Full tech transfer (Level 3)
Participants	7	10+	20+
Scope	University satellite	Experimental satellite series	Mass manufacturing of satellites
Timeline	2013-2016	2015-2019	2018-

Berlin Space Technologies

Level 1 training program



National University of Singapore together with Berlin Space Technologies built a sustainable space program. 1st satellite in Space. 2nd under construction in Singapore



Summary

- 12 months of training
 1. 6 months university training
 2. 6 months industry training

- Two satellites built

Lessons learned

A training program should have a simple mission & a relaxed schedule

1. have two satellites; one to be launched & one kit or flatsat - is very helpful.
2. for the client: keep team focused & committed for 2nd mission



65kg satellite for NARSS

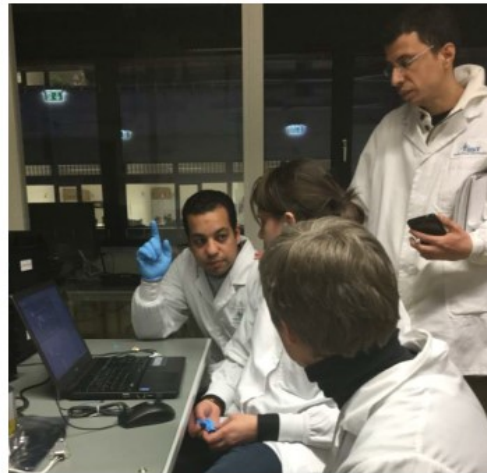
- Wide swath EO payload
 - 30km swath
 - 7.7m GSD
- Launch planned 2019

Summary

- Delivery of components only
- Client responsible for system design & system AIV
- Laboratories built by 3rd party

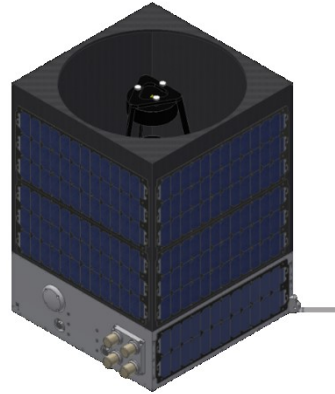
Lessons learned

1. Program continuity very important for program success.
2. Teams should not have too much time between 1st & 2nd satellite otherwise brain drain might deteriorate capabilities.
3. BST programs usually already include 2nd satellite



Berlin Space Technologies

Level 3 training program



Summary

- Joint venture for satellite mass manufacturing
- Covers all BST systems & subsystems
- Laboratories currently under construction (opening 2019)
 - 10,000m² facility
 - 150 engineers
 - Capacity of 100+ satellites per year
- BST is one of the few players willing & able to do a full level 3 program



Implementing Satellite Mass Manufacturing for Mega Constellations

Berlin Space Technologies is;

- An experienced provider of capacity building
- Has successfully done all levels of capacity building
- One of the few players who can offer full Level 3 programs



Contact:

Berlin Space Technologies GmbH

Max-Planck-Str. 3 - 12489 Berlin, Germany

Tel: +49 30 639280219 - Mobile: +49 176 70085941

Email: info@berlin-space-tech.com

Web: www.berlin-space-tech.com

Best Practice in Capacity Building (Panel Session)

