



# VALISPACE

THE SMART COLLABORATION  
PLATFORM FOR ENGINEERS

Developing more with less:  
efficient engineering along the entire lifecycle.

The world's most innovative hardware companies use Valispace to keep complexity under control.



[nonprofitspaceship.org](http://nonprofitspaceship.org)

FLEET



AIRBUS



## Efficient engineering along the development lifecycle

### TODAY

A 'silent majority' of engineering data is buried in hundreds of inconsistent documents, Excel spreadsheets and emails.

Some data examples include power consumptions, data rates, velocities, temperatures, capacities, charging cycles, operating modes, coefficients, efficiencies...

- Values are often copy-pasted by hand into simulation tools and reports.
- Changes take very long to propagate to all parties.
- Inconsistencies and misunderstandings within teams, between engineers and disciplines lead to costly errors and schedule overruns.

### WITH VALISPACE

Throughout the development life-cycle of every space hardware project concurrent engineering plays a major role by enhancing collaboration via the web browser.

A Data Driven Systems Engineering (DDSE) tool such as Valispace:

- Manages non-CAD data & engineering values.
- Integrates different software tools through one single data hub: single source of truth.
- Automatically propagates changes through documents and simulations: technical change management.

Throughout the development lifecycle of a project, Valispace increases the efficiency of the overall team.

*"The workflow and tools in Valispace are clearly thought through by aerospace engineers and by people who have been encountering those problems themselves and wanting to fix them."*

Ben Howard  
Engineer, [nonprofitspaceship.org](http://nonprofitspaceship.org)



# 01. Requirements Engineering

Complex products often have a variety of requirements coming from different stakeholders. With the right tool, the interaction between requirements, design, production and testing changes from time-consuming overhead to a confidence building tool for every project.

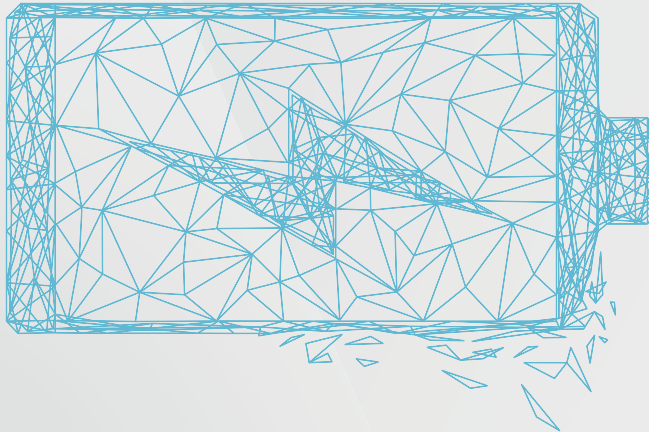
## TODAY

- **DOORS is heavy and expensive, can some of our engineers work on these requirements in a more lightweight way?**
- **Is there a way to automatically check our requirements continuously against our current design?**
- **Can we review & collaborate on requirements without sending around Word files and spreadsheets?**

## WITH VALISPACE

- Start immediately with your existing requirements from Excel or DOORS.
- Easy querying and visualization of requirements and dependencies.
- Keep track of the rationale and the history of any requirement.
- Automatic verification of requirements against your design and tests.
- Ensure compliance with international standards for quality and safety.
- Review requirements, comment on them within your team and assign tasks directly in Valispace.

RQ-047 - The total dry mass of the spacecraft shall not exceed 100kg.



- Bob changed the battery mass from 2 to 4.2kg
- ✓ Valispace re-calculated total spacecraft mass to: 101.6kg.
- ✓ Valispace automatically verifies all 491 requirements
- ⚠ Warning: The updated spacecraft dry mass is not compliant with RQ-047.

*"We did our review of user requirements directly in Valispace.  
Did you imagine that requirements engineering can really be fun again?!"*

Thomas Grübler  
Co-founder of Ororatech / Forbes 30 under 30

## 02. Concurrent Early Design

### TODAY

It takes us months to go from product idea to prototype.

- **How can we reduce the pre-development phase to a few days?**
- **How can we evaluate which potential new products or features are feasible, even with increasing product complexity?**
- **What is the right way to do agile hardware development?**

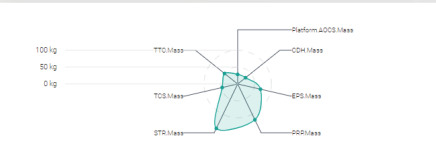
### WITH VALISPACE

Simultaneously connect your entire team to one design platform where design variables from all disciplines are stored.

- All data points can be connected through formulas, allowing for changes to propagate automatically.
- When design variables change, Valispace sends out real-time updates and notifications, as well as tracebacks.
- Documentation is updated automatically and simulations are run again.
- Automatically generated engineering budgets keep you up to date, even between different design choices that you're assessing.
- Also useful when having to write proposals quickly with drag & drop engineering.

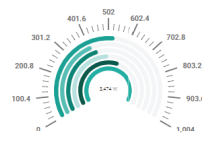
## 2. Mass Breakdown

The total liquid mass of the spacecraft is **1117,072 kg**. The Platform with all makes up the biggest part, with a mass of **488,9 kg**, followed by the Payload propellant.



Platform Mass distribution

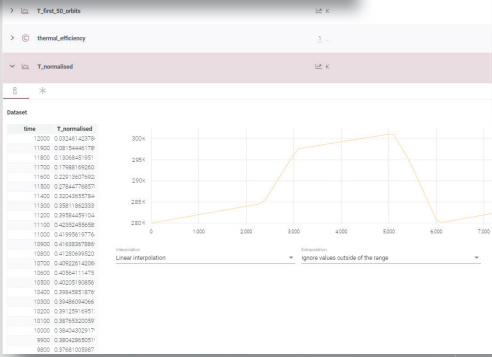
The spacecraft power consumption modes are as seen below. When both payloads are turned on, the highest power consumption of **1,024 W** is reached. This however only happens for short periods of time.



## Requirements

Requirement SPC-001 is automatically shown in the respective subsystem requirements. Analysis of the whole system.

ID	VERIFICATION METHOD	VERIFICATION RULES	VERIFICATION STATUS
SPC-030-111	Automatic	Edit Rules	Verified
SPC-030-111	Review	+ Add Rules	Verified
SPC-030-111	Analysis	+ Add Rules	Partially v...



*"It's the new tool for New Space and has improved our engineering process by cutting the Excel time."*

Matteo Emanuelli  
Systems Engineer at GOMspace

## 03. Detailed Design and Simulations

### TODAY

Early phase designs do not scale easily and simulations are often performed on old values.

- How do I iterate on existing preliminary designs as my project matures?
- How do I make sure that everyone works on the same parameters?
- How can I avoid searching for the newest inputs from colleagues when I want to rerun my simulation?
- How do I avoid having to redo my simulations, because I was not aware that the inputs were outdated?



### WITH VALISPACE

Data in a single source of truth contains design during all phases. Connecting all of your simulations to a central data storage.

- Build upon early design results and start detailing subsystems, analyse and perform trade-offs.
- Connect to simulations and requirements, identify the gaps in your design.
- Import existing parts from SatSearch as well as models & constants from a dedicated Valispace component catalog.
- An Octave simulator is built into Valispace for advanced calculations that can be automatically triggered.
- Easy to connect through integrations with STK and Matlab, and many other simulation tools through the Valispace Python and REST API.



“Valispace has become the reference for all technical data for the complete mission. We are able to clearly track on a daily basis the current design status.”

Jeroen Buursink  
Chief Engineer at Luxspace

The screenshot displays the Valispace Integration Plugin interface. On the left, there are two 3D visualizations: the top one shows the Earth with a satellite and its orbital path, and the bottom one shows a similar view with a different perspective. The main window contains a table of STK Objects/Attributes and their values. Below the table are buttons for 'Update STK Scenario', 'Update Valispace Project', and 'Revert Last Update'. On the right, there is a 'Valispace Project Browser' showing a tree view of the mission scenario.

STK Objects/Attributes	Value	Unit	Binded Valis	Value	Unit
ValisAT	ePropagatorAstrom				
Orbit: Astrogator	IAGVAMCSDriver				
ParkingOrbit	eVASegmentType				
Orbit Elements					
Apoapsis Altitude	2499.863	km			
Apoapsis Radius	8878	km			
Eccentricity	1.174993516519		ParkingOrbit.Eccentricity	0	
Inclination	18	deg	ParkingOrbit.Inclination	15	deg
RAAN	0	deg	Satellite.RAAN	0	deg
True Anomaly	0	deg			
Semi-Major Axis	8878	km	Satellite.SemiMajorAxis	6878	km
Period	8324.989447721	sec			
Mean Motion	0.0432432980551	rad/s			
Arg Of Latitude	0	deg			
Arg Of Periaapsis	0	deg	ParkingOrbit.ArgOfPerigee	0	deg
Mean Anomaly	0.0432432980551	deg	ParkingOrbit.MeanAnoma	0	deg
LAN	152.9649363584	deg			
Periaapsis Altitude	2499.863	km			
Periaapsis Radius	8878	km			
Spacecraft Initial Paramet					
Dry Mass	500	kg			
Drag Area	20	m <sup>2</sup>			
Cd (Drag)	2.2				

## 04. Reviews

### TODAY

Our design reviews are time consuming and require a lot of preparation.

- **How do I reduce the number of email threads during design reviews?**
- **Can design reviews take less time?**
- **How can we waste less time in meetings but still have thorough control over our design?**

### WITH VALISPACE

Design reviews can be done continuously, fully digitally, directly in Valispace, and reused as a baseline to show the evolution of your project.

- Discuss with your team members in real-time, adding comments directly in the browser interface.
- Assign tasks to your team members and get notifications on changes that are important to you.
- Always have a full overview of your review and progress.

Requirements		Verifications	Connections
+	IDENTIFIER ↑ TEXT	CHILDREN	TAGS
✓	<b>BAT-001</b> The battery shall have an energy capacity of <u>549.605 Wh</u> at the Beginning of Life	+ Add Requirement	+ Add tags ☆ 🗨️ 🔔
✓	<b>BAT-020</b> The battery shall be able to operate between 20°C and 60°C	BAT-001	for review ☆ 🗨️ 🔔
✓	<b>BAT-030</b> The battery shall be able to operate in nominal condition for a minimum of 5 years (TBC). Nominal conditions are considered with a loss of 10% (TBC) from the BoL conditions.	+ Add Requirement	+ Add tags ☆ 🗨️ 🔔
✓	<b>BAT-040</b> The battery shall be compliant with the materials norm ISO-5259	+ Add Requirement	+ Add tags ☆ 🗨️ 🔔

### PDR Review

#### New comment:

This temperature range seems quite low considering the orbit, where do these numbers come from?

#### New task:

Please add a reference for this temperature range.

*“Instead of reviewing the design only during rigid milestone dates, we try to give access to the design at any point in time and exchange data more fluently, which enables everyone to be on the same page at any time and effectively contribute to the product development.”*

Stefano Redi  
Systems Engineer at Luxspace

*“We are now looking forward to our fully digital PDR!”*

Thomas Grübler  
Co-founder of Ororatech / Forbes 30 under 30

## 05. Technical Change Management

### TODAY

As systems engineer or project manager, when I am asked about the total power consumption of our product in development, it takes me two phone calls and three emails to find out the latest value.

- **How should I keep a technical overview over our project and its progress, if all the data is spread out in thousands of documents and spreadsheets?**
- **How do we make sure that at the end of the project we fulfill all the initial requirements?**

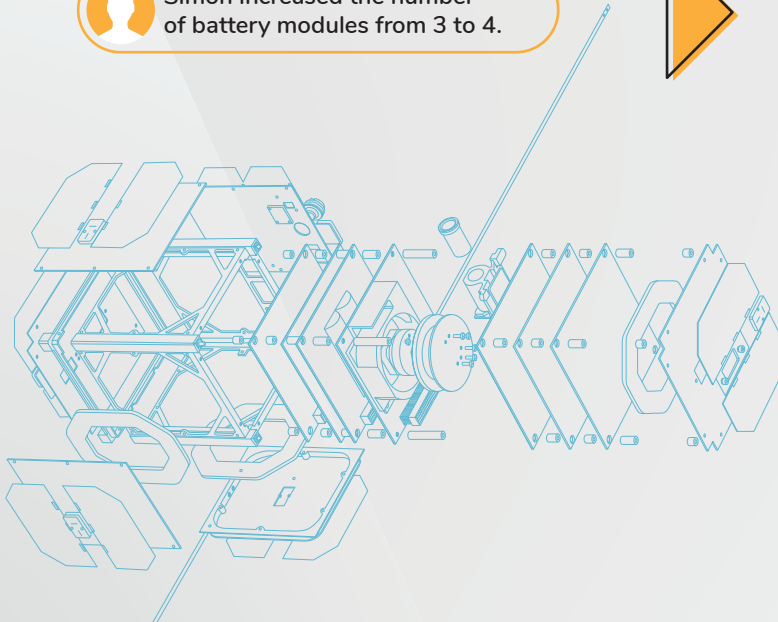
### WITH VALISPACE

Keeping an overview has never been easier. By using Valispace in your team, you increase transparency both for yourself and the team. Data is immediately digitized for day-to-day use and preparing for future reusability of project data.

- Everybody in your team has access to the right information at the right time. Prepare data to be used within the project as well as in future projects.
- At the same time, Valispace allows for automation of many engineering operations. Margin tracking, requirement verification and countless more manual operations are fully configurable through scripts and are fully integrated within the landscape of engineering tools.



Simon increased the number of battery modules from 3 to 4.



### Valispace is calculating...

Battery Mass: 460g ▶ 581g  
 Battery Capacity: 3.2Ah ▶ 4.3Ah  
 Max Eclipse Time EOL: 2.4h ▶ 2.9h  
 Spacecraft Mass: 2.1kg ▶ 2.2kg  
 Max Sunpointing Time: 12min ▶ 16m

...

### Valispace is executing...

- 6 simulations re-executed
- 15 documents updated
- 72 requirements verified
- 19 engineers notified

Total implementation time: 42 seconds

"Using Valispace gives us a clear snapshot of our spacecraft, makes sure everything is up to date and significantly decreases my stress levels."

Ben Howard, Engineer  
 nonprofitspace.org

## 06. Test

### TODAY

Testing and verification of requirements is a very manual process today, which takes a lot of time from engineers.

- ▀ **Requirements and test specifications and test values are not connected.**
- ▀ **Everything is done by hand due to lack of digital continuity.**
- ▀ **We need full traceability to be sure the system performs well, but we cannot afford to spend most of our time and resources in chasing down verification data.**

	<b>Measure voltage over batteries</b> Measured value: 24.3V	 RQ-BAT-012
	<b>Inspect batteries for visual damage</b> Measured damage: none	 RQ-BAT-02
	<b>Do vibration testing on battery casing</b> Test to be performed	 RQ-BAT-042

### WITH VALISPACE

Having an easy and automated way to connect documents with checklists to requirements and verifications save huge amounts of time of these engineers.

- ▀ Immediately reference requirements in your test specifications.
- ▀ Overview which shows how many requirements still need to be tested, how many requirements are not connected to a check yet and how many checks are not connected to a requirement.
- ▀ Update values from your tests into the database with a single click or through API automation.
- ▀ Automated requirement verification for requirements connected to a value, and notifying relevant engineers.

# 07. Documentation



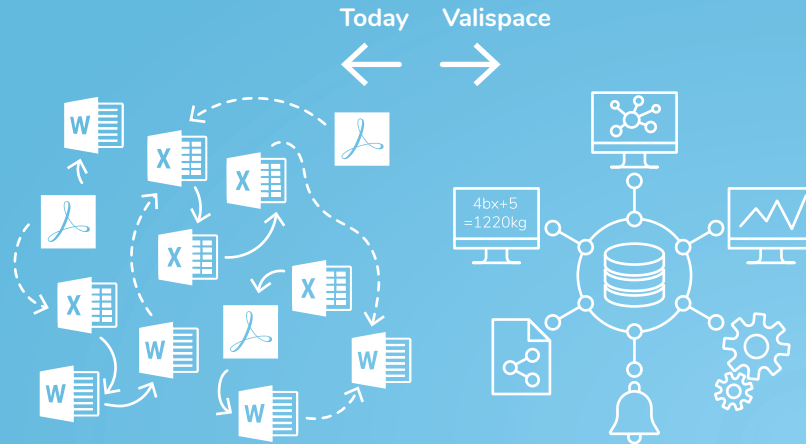
## TODAY

Technical documentation is necessary, and:

- How do I avoid updating the same document over and over again with the latest values?
- How do I know how my design has changed since our last review?
- Can't progress reports just be auto-generated?
- How can I know whether the value in this document is outdated or how it has been calculated?

## WITH VALISPACE

- Automatic document updates let your engineering team focus on solving problems instead of updating files.
- Valispace has a seamless integration with Word and Excel.
- Reference values, graphs, break-down-charts, requirements, etc. in your Word file.
- If someone updates a value in Valispace, it also appears in the documents and Excel files of their colleagues.



**I'm interested, what now?**

**Let's work together.**

To get you started, we offer a free two-week trial, which starts with a 1.5h training. Together we identify what your specific use case is and we help you set up everything you will need to assess the value of Valispace for your team.

**Value is what you get.**

Valispace is available in on-premise and cloud versions. Pricing ranges from 50 to 150 euro per user per month. We also have special start-up packages for young companies. So for the price of one engineering hour per month, you digitize your entire engineering process and save over 15% of development costs.