



HoloShip Initiative —Expression of Interest

Table of Contents

1	BACKGROUND AND OBJECTIVES.....	3
2	APPLICATION PROCESS.....	6
3	APPLICANT INSTRUCTIONS AND KEY CRITERIA.....	10
4	HOLOSHIP INFORMATION SHEET	12

1 Background and Objectives

Under Canada’s National Shipbuilding Strategy’s (NSS) Value Proposition (VP) program Seaspan Shipyards seeks to identify and initiate activities that benefit the greater marine industry through three priority areas: Human Resources Development, Technology Investment, and Industrial Development. This initiative focusses on the Technology Investment and Industrial Development areas.

Seaspan Shipyards is issuing this call to participate through an Expression of Interest (EOI). The EOI is intended to identify projects and partnerships that accelerate the use of digital technologies, builds off Seaspan’s HoloShip Platform described below, and grows Canadian capabilities needed to fully capitalize on national and global opportunities in the marine industry.

Introduction

Seaspan Shipyards’ strategy for its VP investments includes establishing a healthy Canadian ecosystem that integrates market-leading solutions with sustainable business partnerships that create competitive advantage in our domestic and export markets. Seaspan Shipyards is supporting this process by allocating VP investment funds to support the development of a vertically integrated Canadian business ecosystem for the shipbuilding and marine industry.

Growing the Canadian marine industry will require members at all levels of the supply chain to develop innovative technologies and processes. This will enable the marine industry to be more competitive internationally and, in turn, expand its capacity to export. Figure 1 expands on our strategy in developing a vertically integrated Canadian Digital Ship ecosystem.

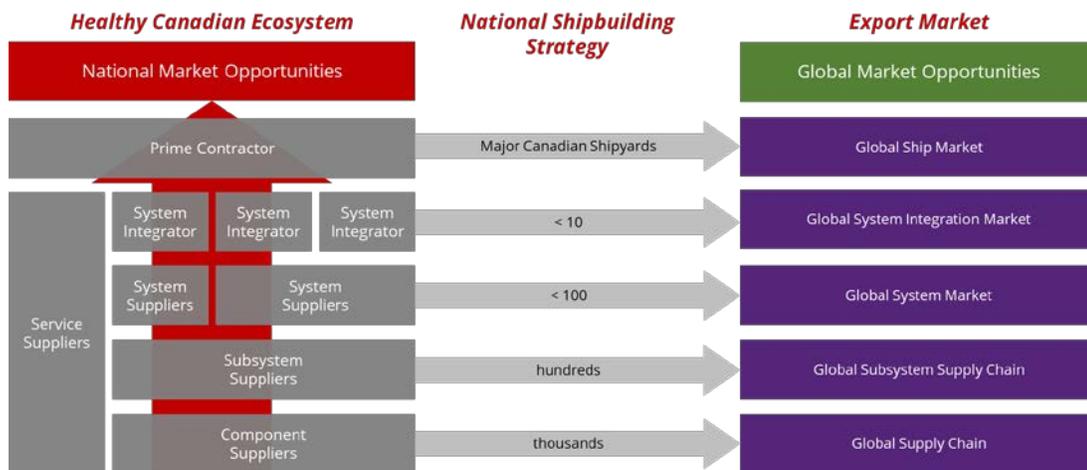


Figure 1 A Canadian Digital Ship Ecosystem to Access National and Global Markets

This Canadian Digital Ship ecosystem promotes collaborations and access for companies that provide both independent and integrated solutions to the global shipbuilding and ship repair/overhaul market – particularly in delivering digitally-enabled solutions that utilize digital twins, digital threads, integrated analytics, and real-time sensing systems to support collaborative development, optimized performance, efficient operations, and improved competitiveness.

The HoloShip Initiative objectives are to:

1. Create an integrated, Canadian digital ship capability that:
 - a. Builds global competitive differentiation.
 - b. Wins export opportunities for Canadian businesses both individually and as a team.
2. Develop and extend existing Canadian technology strengths both individually and as a team that:
 - a. Brings market-ready digitally-enabled solutions to the marine industry.
 - b. Fosters new or non-traditional business partnerships, such as virtual reality, game engines, and artificial intelligence.
 - c. Builds an integrated system-level, Canadian solution suitable for the export market.

Seaspan Shipyards believes that it can enhance Canada's competitive edge in shipbuilding and in-service support by providing a state-of-the-art HoloShip Platform that participating Canadian marine industry suppliers and integrators can use to visualize and work with their 3D models and digital threads across a range of different purposes from human factors validation and design reviews to system performance analytics and customer engagement.

The HoloShip Platform

Central to the HoloShip Platform is the state-of-the-art immersive visualization system from Virtualis installed at Seaspan's Vancouver Shipyard in North Vancouver, BC. This facility offers a 5.6 m wide immersive 3D display wall that uses light-weight 3D glasses and 6-camera motion tracking to provide a responsive and collaborative visualization environment. The display wall can be used alone or in combination with head-mounted displays (3D goggles) that integrate multiple users in a single 3D scene. The HoloShip Platform also supports distributed teams in the 3D environment using our portable laptop/goggle system or by joining through the visualization software and your own on-site 3D head-mounted displays. An information sheet on this system is provided in Section 4.

Collaborative visualization environments empower better problem solving and decision-making by providing accurate spatial context and enabling multiple stakeholders to experience the same 3D scene. They support critical efforts such as resolving spatial integration conflicts, validating and reviewing designs, and incorporating non-technical stakeholders. However, the true power of the HoloShip Platform is the integration of data and analytics within an accessible 3D visualization system. This enables participants to use, explore, develop, and evolve digital twins and digital threads for efficient vessel design, optimized vessel operations, and integrated performance analytics.

Building on Canada's strong technology sector, our marine industry is poised to improve access and competitive advantage in our domestic and global markets through digitization to improve design, performance, logistics and maintenance of our fleets at home and abroad. Through this HoloShip Initiative, we seek to establish one or more projects that utilize the HoloShip Platform and contribute to the growth of a Canadian Digital Ship ecosystem focussed on bringing competitive digital technology solutions to the domestic and global marketplace.

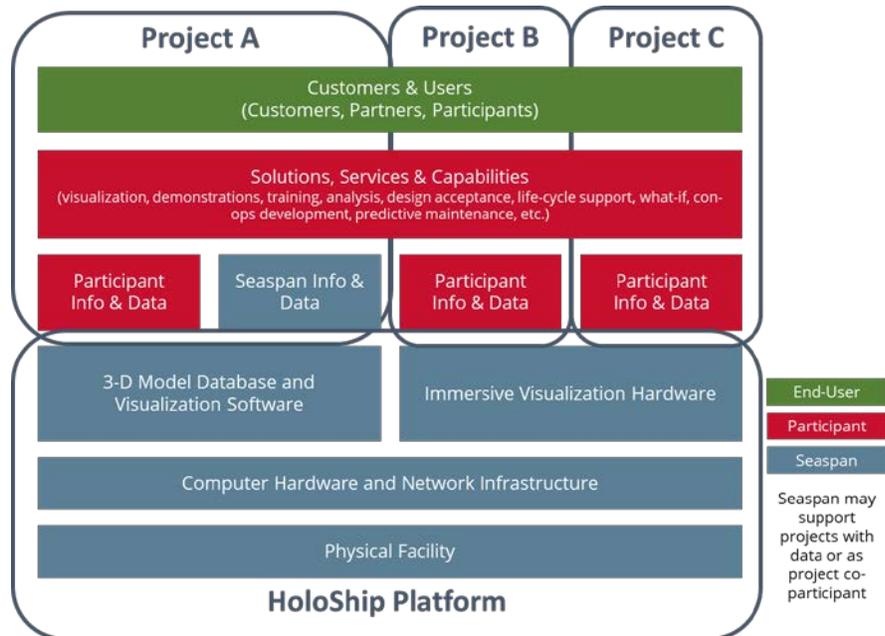


Figure 2 The HoloShip Initiative Concept

Benefits to Participants

The benefits to participating in this initiative are:

- Collaboration with marine-industry participants (including Seaspan Shipyards) to create a product, service or capability that is “more than the sum of its parts.”
- Access to and usage of an innovative 3D and Virtual Reality facility.
- Opportunity to work in an operational system-level context.
- Insights into the NSS program, anchor customers, and partnerships (e.g. Royal Canadian Navy and Canadian Coast Guard).
- Access to Seaspan Shipyards as an anchor shipbuilding and in-service support customer, including current NSS projects.
- Access to existing ship data and models through the HoloShip Platform (where appropriate and as permitted).
- Option to participate in collaborative marketing opportunities.
- Mechanism for companies to obtaining fund that supports their product development through Seaspan Shipyards’ VP investments, partnerships, and other co-funding opportunities.

2 Application Process

The HoloShip Initiative has a multi-stage application process, as illustrated in Figure 3. Compliant responses to an Expression of Interest (EOI) will be evaluated and successful project concepts will be invited to submit a full proposal through a notification to the Lead Applicant. Applicants are strongly encouraged to submit an EOI that clearly and concisely captures the project concept, level of support requested, partnerships and benefits, the proposed solution’s market potential or competitive advantage, and how it fits the HoloShip Initiative criteria. Any detailed technical or market information should be reserved for the full proposal.

The complete timeline, number of responses to be selected for a full proposal, and total number of projects initiated from this current Call for Participation will depend on the scale and quality of submitted responses. As an inaugural Call for Participation, we will be assessing both responses and participation to determine if there is sufficient interest for future calls.

Eligibility:

The HoloShip Initiative is open to Canadian organizations with a substantial presence and technology development activities in Canada. VP investment proposals must represent Built-in-Canada content. Participation from Small Medium Enterprises, organizations led by or substantially employing under-represented populations, and non-traditional marine industry organizations is encouraged.

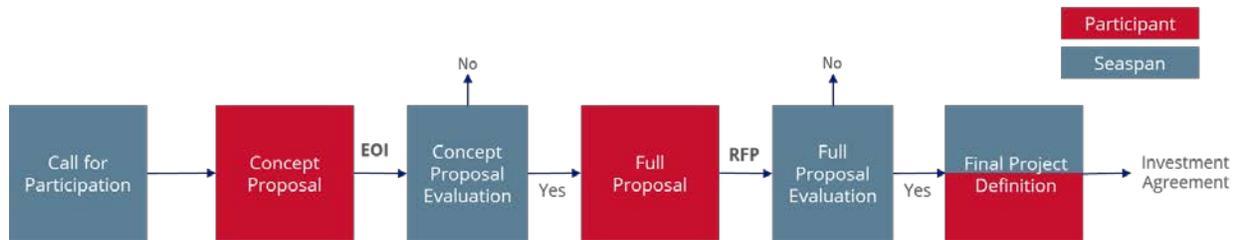


Figure 3 The HoloShip Initiative Application Process

The Call for Participation process consists of several steps:

Concept Proposal:

- Lead Applicant must complete and submit an EOI using the Seaspan Shipyards prescribed EOI template by the stated deadline.
- Compliant EOIs must satisfy the Key Criteria listed in Section 3 and should not exceed six pages in length.
- EOIs will be evaluated and all applicants will be informed of their outcome. Only selected applicants will be invited to submit a full proposal. Notifications will be sent to the Lead Applicant.

Full Proposal:

- Seaspan Shipyards will communicate the full proposal process details including timeline to each successful EOI applicant.
- Proponents must prepare and submit proposals in the prescribed format. Full proposals are not expected to exceed 30 pages in length (To Be Confirmed).
- Applicants will have approximately 3-5 weeks (To Be Confirmed) from the date of notification to develop and submit full proposals.

Proposal Selection and Award:

- Both EOI and Full Proposals will be evaluated by Seaspan Shipyards.
- Non-Disclosure Agreements will be implemented for applicants invited to submit a Full Proposal.
- Applicants will be notified of the selection outcome.
- VP investment amounts will be decided on a project by project basis.
- Requested Seaspan Shipyards Support and Co-Participation will be decided on a project by project basis.
- Selected applicants are required to enter into an Investment Agreement, which sets out the terms and conditions related to funding, intellectual property, schedule, disclosure, etc.
- The Investment Agreement will vary from project-to-project pending any details, constraints, and needs specific to individual projects and is an important part of the Final Project Definition phase prior to the Investment Agreement.
- License or other usage rights to intellectual property resulting from the VP investment is not pre-determined and may be included in the Investment Agreement dependent upon the amount of VP investment, Applicant co-investment, and level of Seaspan participation in the resulting project outcomes.

Seaspan Shipyards Support and Co-Participation:

Seaspan Shipyards participation can be requested and is welcomed in project concepts. Seaspan Shipyards support can include provision of ancillary data such as customer or market insights or access to NSS program vessel data or information. Access to NSS intellectual property is subject to approval by appropriate authorities at Seaspan Shipyards and the Government of Canada. If accepted, guidance on feasibility would be provided to Applicants with an invitation to submit a Full Proposal and would be a key element of the Final Project Definition phase and resulting Investment Agreement.

Seaspan Shipyards can also be invited to be a co-participant and provide direct engineering support, co-development activities, development of collaborative business opportunities, or other activities requiring deeper collaboration in project outcomes. Seaspan Shipyards co-participation is dependent upon capacity to support the work and identification of a mutually beneficial business case. If accepted, guidance would be provided to Applicants with an invitation to submit a Full Proposal and would be a critical element of the Final Project Definition and resulting Investment Agreement.

Applicants must clearly express if and what Seaspan Shipyards support is requested in EOI sections Project Description and Project Outcomes and Benefits (See HoloShip EOI Template). Additionally, under Project Support Needs please indicate:

None: Fully independent, no additional Seaspan Shipyards support requested

Low: Access to limited and readily available ancillary data

Medium: Access to substantial ancillary data or requiring customization and/or Seaspan Subject Matter Expert insight or consultation

High: Seaspan Shipyards co-participation to support collaborative development and, potentially, integrated products or services

Seaspan Shipyards support or co-participation is not required, and fully independent project concepts are welcome. Facilitation and use of the HoloShip 3D visualization system is included in the HoloShip Platform and is not considered a request for additional Seaspan support.

Financial Information:

The HoloShip Initiative has an allocated budget of CAD\$2,400,000 under Seaspan Shipyard's NSS Value Proposition commitment. EOI Applicants must provide an indicative estimate of the overall project costs, amount of VP investment requested and any co-funding sources that are proposed for the project. A detailed financial proposal is not requested until the Full Proposal stage. Key considerations:

- Co-investment or co-funding from the Applicant is not required. However, project concepts that clearly demonstrate co-investment to further leverage VP investment amounts are encouraged—particularly for larger investments.
- Proposed project concepts should include sufficient scope and market information to justify a minimum VP investment of CAD\$100,000.
- Applicants are encouraged to consider medium to large project concepts that can make significant near-term impact in technology advancement and market competitiveness (e.g. CAD\$500,000 or higher of VP investment amounts).
- Requested VP investment amounts should be proportionate with the maturity of the technical solution, competitive advantages, and market impact—all of which must be sufficiently captured in the EOI response.

VP investment amounts will be considered in the context of the project's overall risks, net benefit, and contribution to building a Canadian Digital Ship ecosystem. There is no pre-determined allotment of the allocated funding to either this inaugural Call for Participation or in the scope of individual projects. The scope and quality of responses will determine the allocation of the available VP investment funding.

Additional Notes:

- No financial support from Seaspan Shipyards is available for Concept or Full Proposal development.
- Responding with a Concept of Full Proposal does not constitute an agreement from Seaspan Shipyards to fund or participate the proposed work.
- Proposal selection and award are at the sole discretion of Seaspan Shipyards.
- The number of full proposals requested and the eventual number of projects that result from the Call for Participation is at the sole discretion of Seaspan Shipyards.
- Project and VP Investment approval and progress updates are subject to review from Innovation, Science and Economic Development (ISED) Canada.
- Seaspan will **not** provide any further detailed information on the HoloShip Initiative project requirements, review drafts, or provide project-specific feedback to applicants during the Concept or Full Proposal stages. Limited guidance may be provided to Applicants if invited to submit a Full Proposal.
- If proposed, applicants are responsible for complying with any funding stacking rules that are required by their co-funding arrangements. The HoloShip Initiative itself does not have stacking limits or conditions.
- Preference will be given to projects based on technology that is at or above Technology Readiness Level 5 (<https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html>)

3 Applicant Instructions and Key Criteria

Expression of Interest (EOI) Applicant Instructions:

- All EOI materials must be submitted by the Lead Applicant no later than **14:00 Pacific Daylight Time on Friday August 6, 2021 via Email to innovation@seaspan.com**.
- The submitted EOI must follow the template provided. It is available upon registration at <https://www.seaspan.com/seaspan-shipyards/innovation>.
- The EOI materials must not exceed six pages in length.
- Notification of EOI submission results is tentatively planned for early September 2021. This date may change pending volume of responses to be evaluated. Changes in this timeline will be posted on the same website.

Selected projects must demonstrate a compelling solution and strategy aligned with the HoloShip Initiative goals and objectives.

Application Criteria:

1. Alignment to use of digitally-enabled technology in marine industry
2. Strength of commercialization and market potential
3. Alignment to Canadian business opportunity focus

1. Alignment to use of digitally-enabled technology in marine industry

Project concepts must demonstrate adoption, maturation or advancement of digital technologies that utilize or expand on the HoloShip Platform. Successful submissions will incorporate and sufficiently describe the following:

- The project concept should demonstrate relevancy and focus on development of integrated digital twins, digital threads, real-time sensing and/or robust analytic solutions for the marine industry.
- The project concept should produce near-market-ready solutions that seek to accelerate or advance vessel design, operations, and/or performance in the marine industry.
- The project concept should utilize one or more elements of the HoloShip Platform.
- Market-ready solutions can be pre-commercialization but should be sufficiently mature with demonstrated performance in representative environments (i.e. at TRL 5 or higher, <https://www.ic.gc.ca/eic/site/080.nsf/eng/00002.html>). Solutions with demonstrable technology maturation or promoting crossover innovation during the project are encouraged.

2. Strength of commercialization and market potential

Project concepts must demonstrate development of sustainable, scalable, and globally competitive solutions. Successful submissions will incorporate and sufficiently describe the following:

- The project concept should present a strong competitive or market purpose or strategy.
- The project concept should demonstrate relevancy to advancing or market expansion of an existing or new digital product towards a scalable or global solution for maritime.
- The project concept should develop or advance a product and/or service towards commercialization.

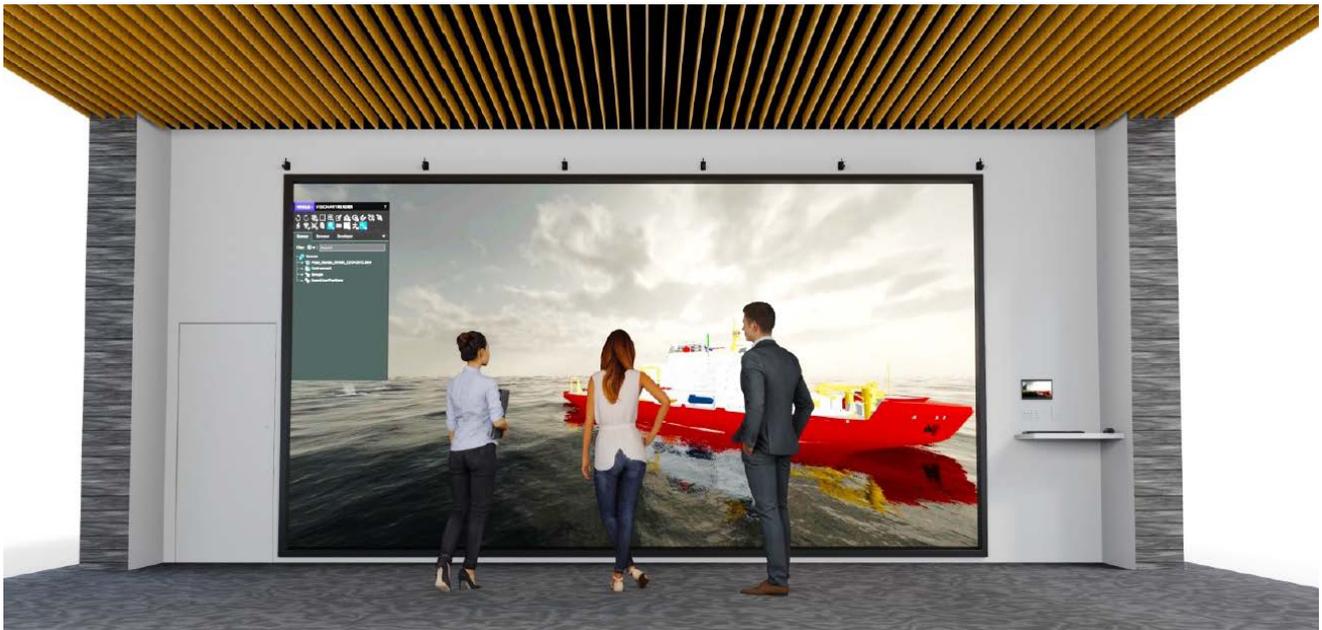
3. Alignment to Canadian business opportunity focus

Project concepts must demonstrate Canadian project leadership and participation with a Built-in-Canada focus. Successful submissions will incorporate and sufficiently describe the following:

- The project concept must demonstrate how it positions Canadian organizations and Built-in-Canada capabilities within the global marketplace.
- Lead Applicant must be a registered Canadian entity with a meaningful Canadian presence.
- Participants and project outcomes must demonstrate Canadian Content and provide value to the Canadian Marine Industry.

4 HoloShip Information Sheet

HOLOSHIP



Seaspan Shipyard’s HoloShip Initiative is an innovation effort that will bring industry leading Immersive 3D Visualization to its partners across the B.C. and Canadian marine sector.

The flagship component of Seaspan’s HoloShip is an advanced immersive visualization suite produced by [Virtalis](#) called *ActiveWall*. The suite is a purpose-built facility at the Headquarters of Seaspan Shipyards in North Vancouver, B.C. It consists of a 5.6 meter wide immersive 3D Display Wall that includes technology identical to that used on world leading marine digital twin visualization systems.

This immersive Display Wall provides a fully tracked stereo 3D experience in a display format that is large enough for groups to collaboratively experience (even with COVID required distancing and protocols). The Display Wall uses 3D glasses and a six-camera motion tracking system to deliver a responsive 3D scene with full depth perception. Collaborative visualization of this scale empowers better problem solving and decision making, by providing accurate spatial context and enabling multiple stakeholders to be immersed in the same 3D scene. This will support time critical efforts such as resolving spatial integration conflicts, validating and reviewing designs with customers and stakeholders, and rapidly providing non-technical stakeholders with a complete understanding of the design intent.

VIRTUAL REALITY

For scenarios requiring even more immersive visualization, Seaspan's Holoship also includes head mounted display (HMD) type Virtual Reality (VR) headsets. These systems use cutting edge inside-out tracking to transport users fully into virtual worlds and includes tracked controllers to enable users to interact with these environments. The VR headsets can be used on their own or in tandem with the 5.6 m display wall – supporting multiple combinations of individual and group viewing options.

One of the VR systems is fully portable, driven by a laptop and able to be packed away into a suitcase. This enables an immersive VR experience to be delivered wherever it is most useful, be that on the shop floor, at a customer facility, or even just a different part of the Seaspan Shipyards campus.

The complete immersion offered by HMDs will be of particular use for interaction-focused use cases, including Human Factors Validation (such as GBA+), Design for Maintenance / Producibility, Operational Validation, and pre-simulation of critical Build Evolutions.

The final key capability of this system is the ability to integrate multiple users into a single 3D scene. For example, a group of viewers can view the same 3D scene on the display wall, while a single subject matter expert virtually performs a specific task wearing the VR headset. The VR user is visible as an avatar in the 3D scene, providing both a visual and immersive context for a task or design element from each participant's observation point.



Features and Capabilities

Visualize in interactive and immersive 3D

- Custom developed for immersive virtual environments
- Feature-rich material system
- Dynamic lighting and real-time shadows
- Dynamic previews of parts
- Advanced scene management allows display of multiple views with different positions and scale
- High performance rendering supporting 120Hz Stereo3D
- Works with current VR systems, incl Virtualis ActiveWorks

3D GUI

- Reinforces the 3D experience
- Semi-transparent to maximize the visible area for a complete 3D desktop
- Customizable immersive interfaces for end-user applications
- Desktop, Stereo and Immersive modes supported via a single, common interface

Collaborate

- Link multiple, disparate VR systems globally
- Supports tracked avatars for enhanced collaboration

Support for huge models

- 64 bit compatibility for datasets 4GB and beyond
- GUI allows fast browsing of models over 1 million parts
- Model size limited only by system and graphics memory
- Future-proofed as technology progresses

Dynamic sections and dynamics

- Add multiple cut planes at any position/orientation
- Section the whole model or just sub-trees
- Provide collision detection on all objects in the scene
- Add constraints and behaviours

Scripting and animation

- Uses LUA scripting
- Commonly used scripts built in
- Create animation sequences and movies

Handles range of data sources

- Wide range of CAD sources can be imported directly:
 - Creo Parametric (Pro/E)
 - SolidWorks
 - Inventor
 - SolidEdge
 - ParaSolid
 - Tribon
 - Foran
 - JT
 - UG/NX
 - Catia
 - 3D PDF
 - DVMockUp
 - PDMS
 - CreoView
 - 3DS Max
 - IGES
 - Step
 - And more....

- Maintain naming conventions and product structure
- Maintain product metadata, attributes or PMI
- Guaranteed to support latest CAD software releases
- Supports positional/spatial sound
- Works with Virtualis ActiveView picture-in-picture software

Cluster aware

- Use multiple PCs for massively increased performance
- Supports multiple visual-channels, including Virtualis ActiveCube
- Flexible GUI positioning