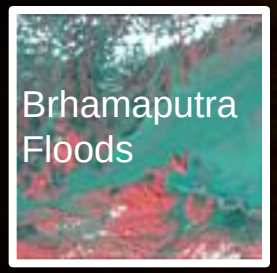
Small Satellites and Sensors Technology for Disaster Management

Why do we need SSTDM initiative and Why CANEUS?



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Answer: Disaster monitoring requires constellation of satellites with different sensor capabilities. No single satellite can cope with all these needs carrying a range of sensors

No single country can afford to develop such complete set of sensors and satellite system.

Dr. Navalgund and Prof Perminov, IAA Co-Chairs, 2010
led by Dr. Ray Johnson of LM

(Which, by the way, is the reason we are all gathered here from near and far)

This is the 56th anniversary year of the dawn of the space age, so why doesn't a Small Satellites and Sensors for Disaster Management Industry Sector exist?

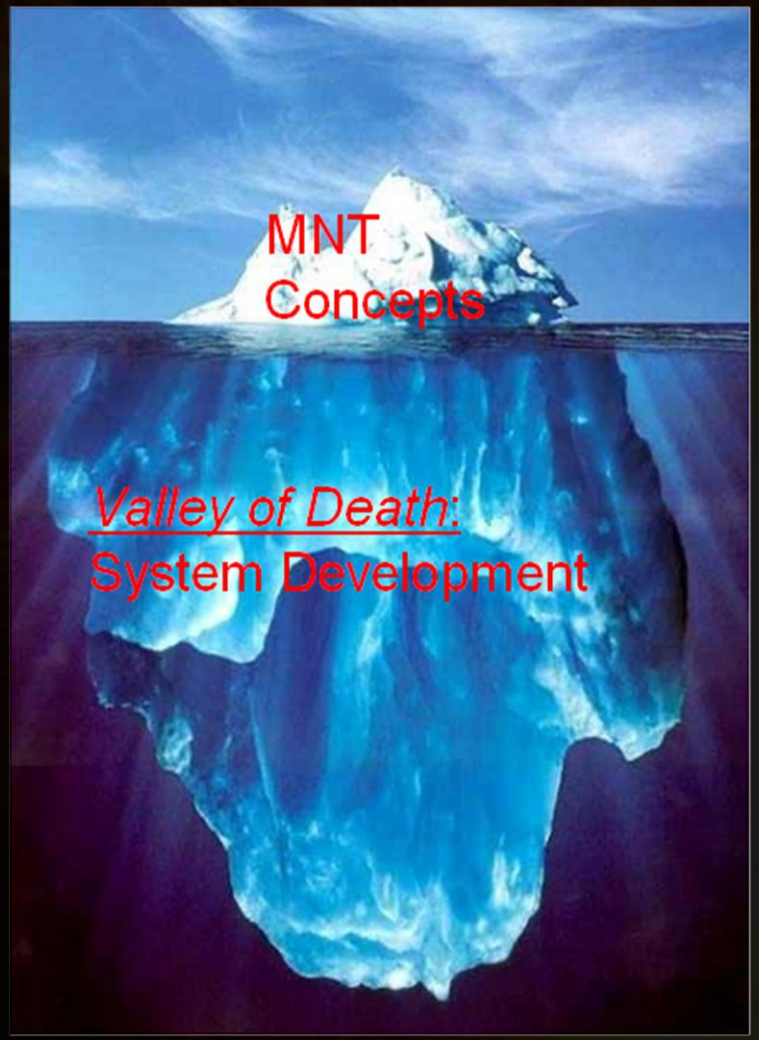
Mainly because of a Catch-22 that bigger is better! Until now there has not been a compelling business case

So what's different this time around?
And more importantly,
why CANEUS ?

CANEUS was the first international organization to draw attention to the Mid-TRL "Valley of Death" problem that afflicts the aerospace sector and to propose a coordinated, end-to-end solution

- **Maximize Return-on-Investment for MNT and laterally compress the S-Curve**
- **Pursue a coordinated, end-to-end technology development strategy**
- **Promote rapid insertion by creating application pull**

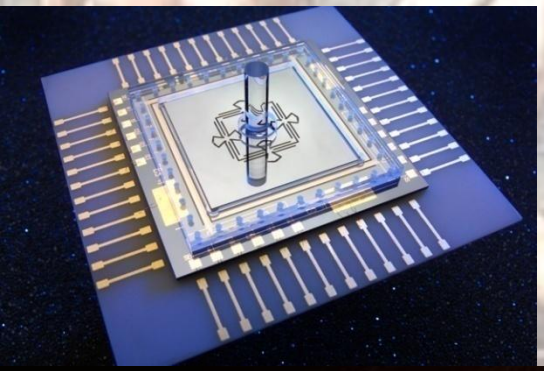
Why is overcoming the technology "Valley of Death" such a big issue for aerospace sector?

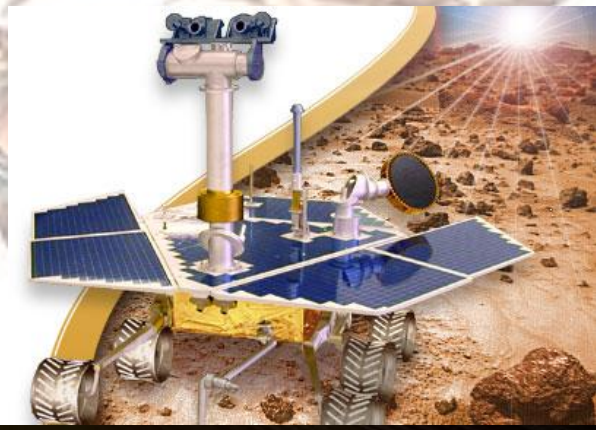


Many new and exciting technology concepts are generated every year. However, in order to overcome Darwinian Extinction in the "Valley of Death" (mid TRL system development) a significant amount of investment is required that is not possible for any one agency / organization / agency

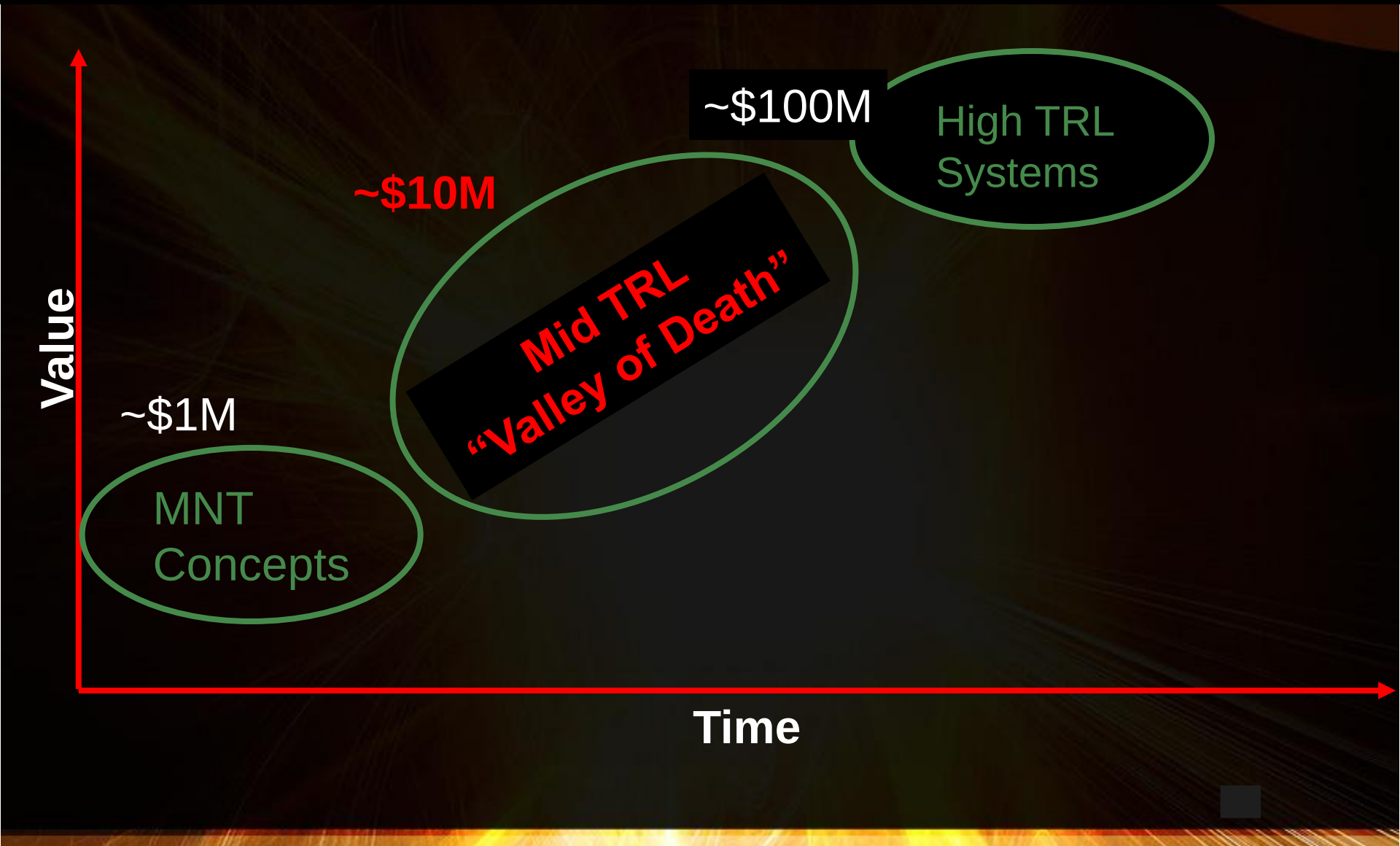
Unfortunately, the hard reality is that a majority of exciting MNT concepts are doomed to extinction!

Concepts → **Systems**

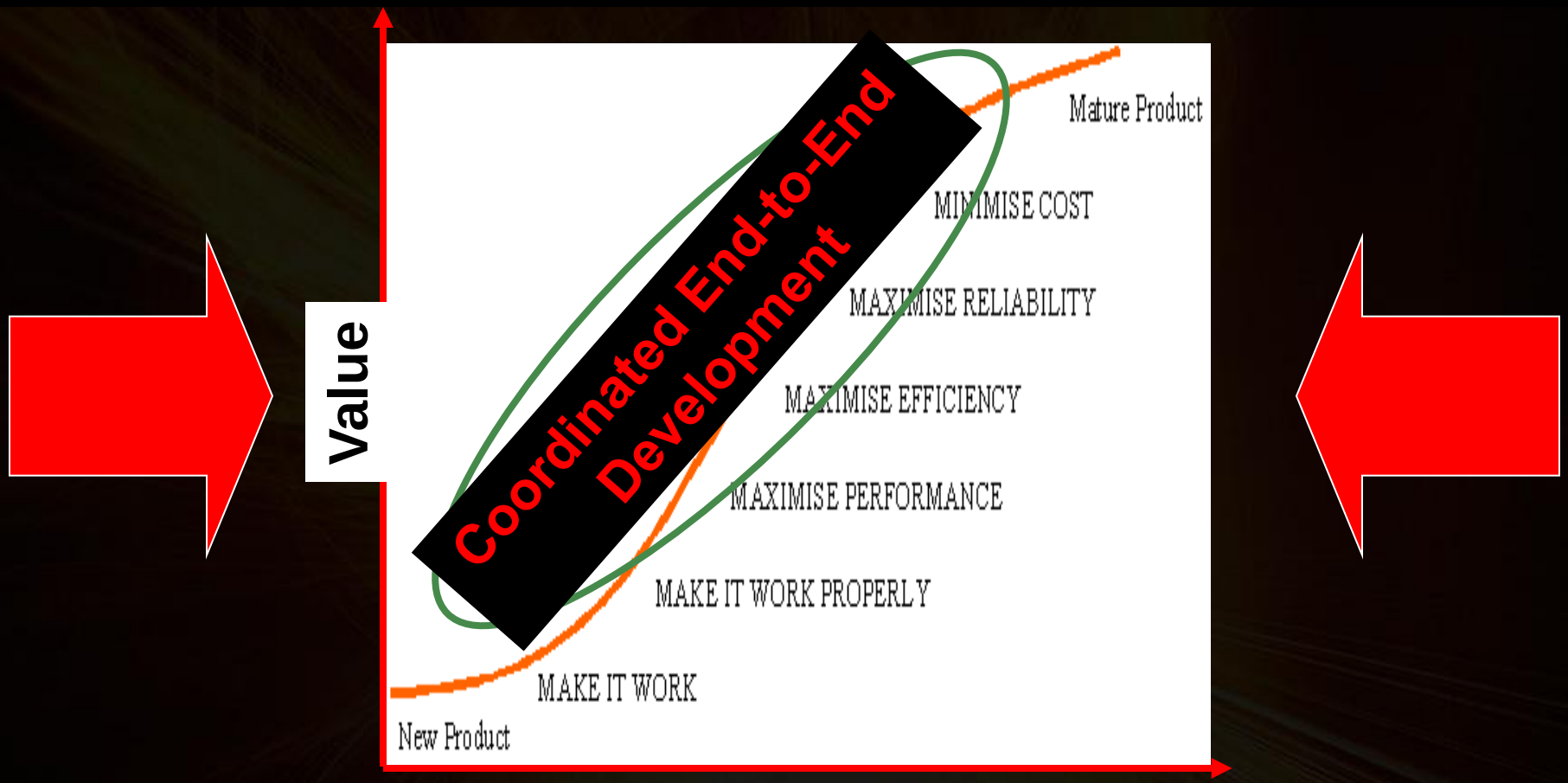




Very few concepts make it to the ~$10M system prototype demonstration stage!

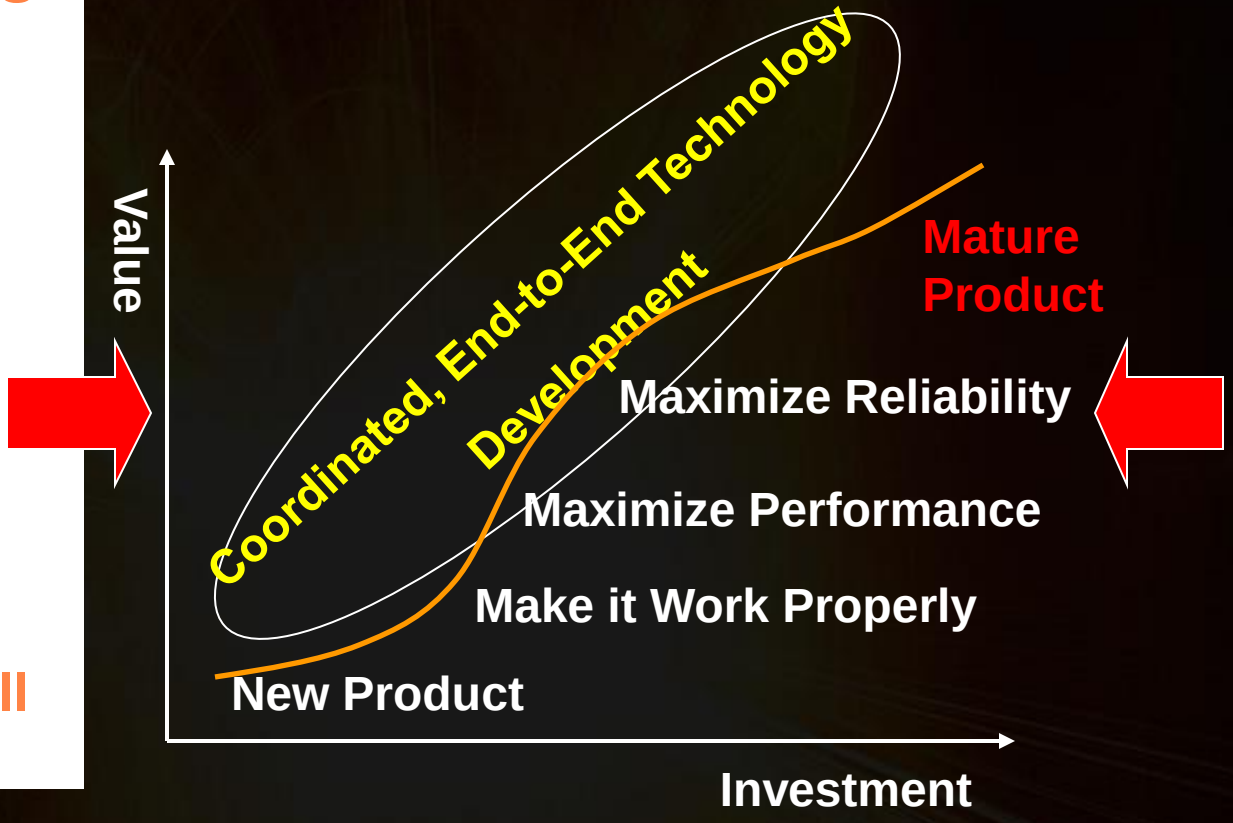


Cornerstone of CANEUS' strategy: Compress S-curve through application pull driven coordinated development



The CANEUS Mission

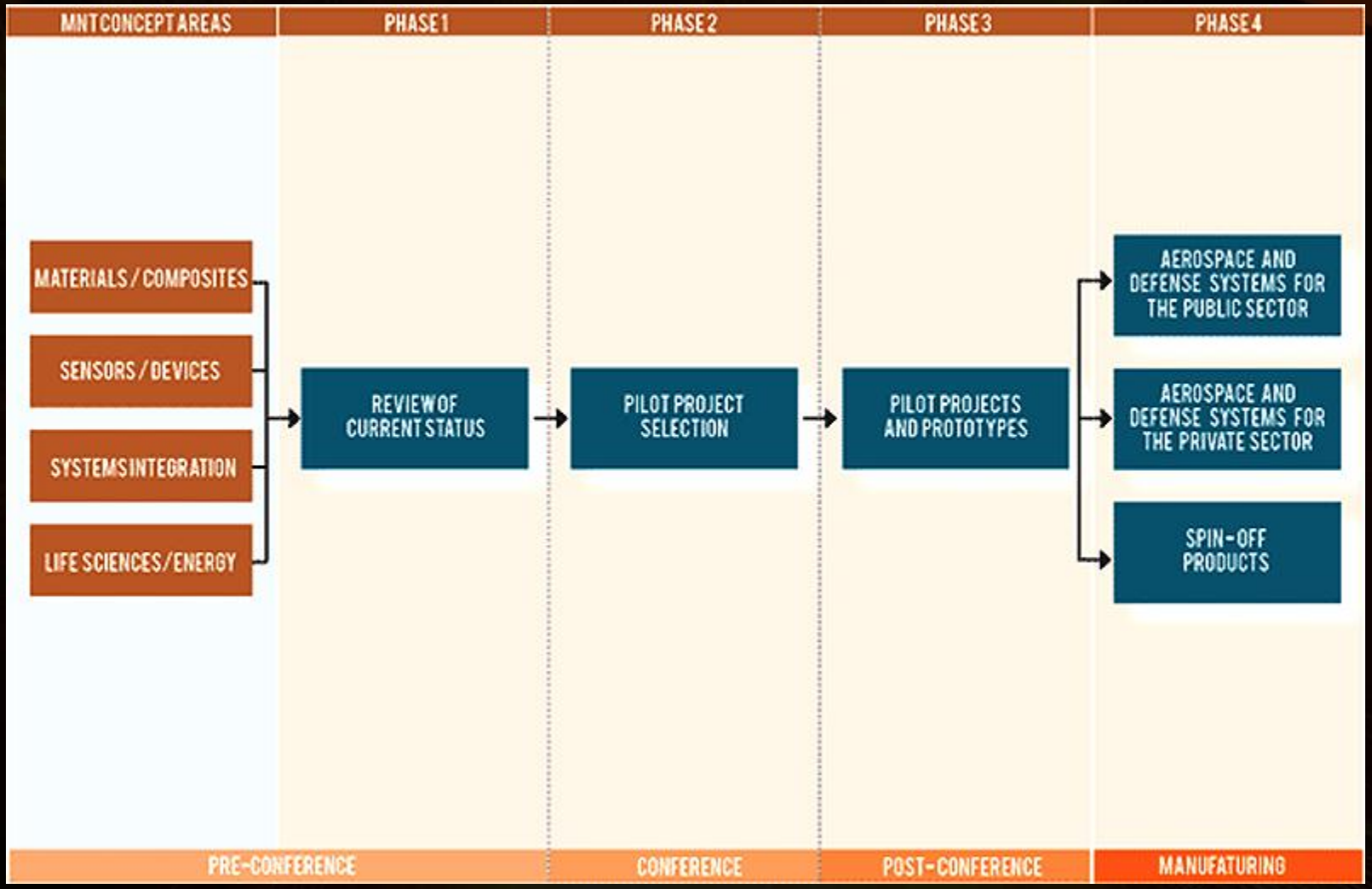
- compress the S-Curve
- coordinated, end-to-end technology development
- aerospace application pull



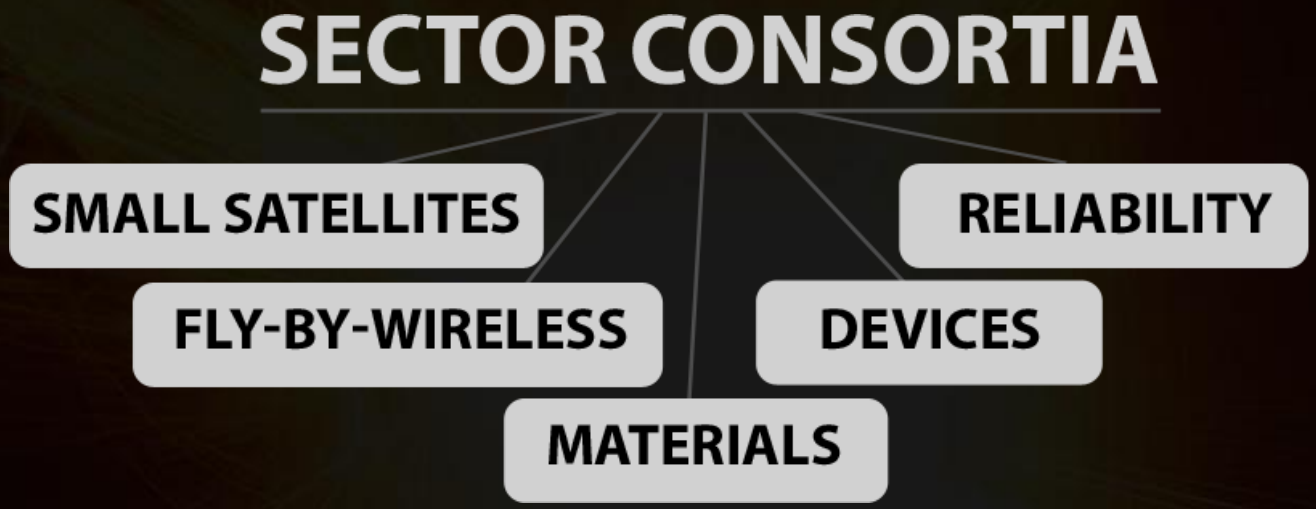
CANEUS is...

- A new kind of professional society
- A non-profit global organization that is gaining a lot of traction in the aerospace , defense, energy community
- An enabler of synergistic, collaborative, innovative, open environments to initiate, support, and accelerate international public / private partnerships
- A platform to focus on end-user needs
- A virtual bridge across the mid TRL “Valley of Death” and other obstacles for rapid global applications of micro-nano technologies that are both relevant and right

CANEUS Implements its technology transition strategy through International Consortia



CANEUS has created Five Consortia addressing key technology areas of relevance to the Aerospace sector



Small Satellites Sector Consortium

- This Consortium spearheads
  - New missions/technology development
  - Standards development
  - Low cost launch services
  - Soup-to-Nuts stakeholder liaisons
  - Intellectual property generation and management
  - Education/Outreach

The Small Satellite competitive advantage comes from making satellites a commodity

- Currently, satellites are akin to luxury automobiles in that they are custom-made, expensive machines that few can afford.
- a “Henry Ford” approach to making space accessible and affordable.

CANEUS Small Satellite Consortium

A bold, paradigm-busting vision of making space truly affordable and "on demand" via a revolutionary class of Nano and Pico satellites that will drastically lower the cost of space missions and increase the frequency of the launches.

- Inject emerging Micro-Nano- technology

Target Costs for Satellite Classes Show 100x improvement!

Satellite Group	Mass (including fuel)	Target Costs ($ million)			Total Cost
		Manufacturing	Launch	Insurance	
Large Sat	>10,000 kg	$154.0 M	$100.0M	$62.0 M	$316 M
Nano Sat	**1-10 kg**	**$3.0M**	**$0.2M**	**$0.8M**	**$4.0M**
Pico Sat	**0.1-1 kg**	**$1.5M**	**$0.1M**	**$0.4M**	**$2.0M**

How would CANEUS SSTDM initiative be of benefit to the Small Satellite and Sensors Technology Developers to Address the Needs of Disaster Management Stakeholders

1. Cost and risk mitigation: Access to jointly developed pre-competitive technology and proprietary product development

2. Participation in a collaborative technology, product and business development environments

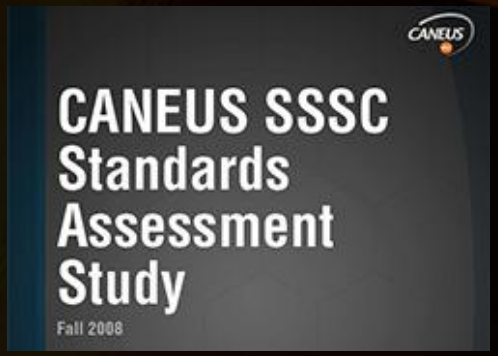
How would CANEUS SSTDM initiative be of benefit to the Small Satellite and Sensors Technology Developers to Address the Needs of Disaster Management Stakeholders

3. Leveraging the resources

4. Reduced time-to-market and rapid system-level product deployment through supply chain collaboration

How would CANEUS and SSTDM Initiative be of benefit to the Small Satellite and Sensors Technology Developers to Address the Needs of Disaster Management Stakeholders

5. Coordinate the development of global small satellite standards in cooperation with leading space corporations and agencies

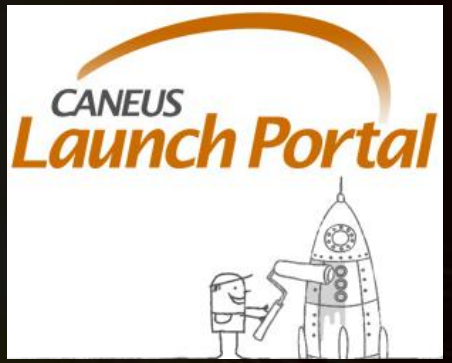


6. CANEUS helps "harmonize" various National Policies (ITAR) controlling collaborative international technology development and frequency band allocations

How would CANEUS and SSTDM Initiative be of benefit to the Small Satellite and Sensors Technology Developers to Address the Needs of Disaster Management Stakeholders

7. Access to CANEUS forums/conferences as key networking platforms for collaborative project partners to address the relevant issues

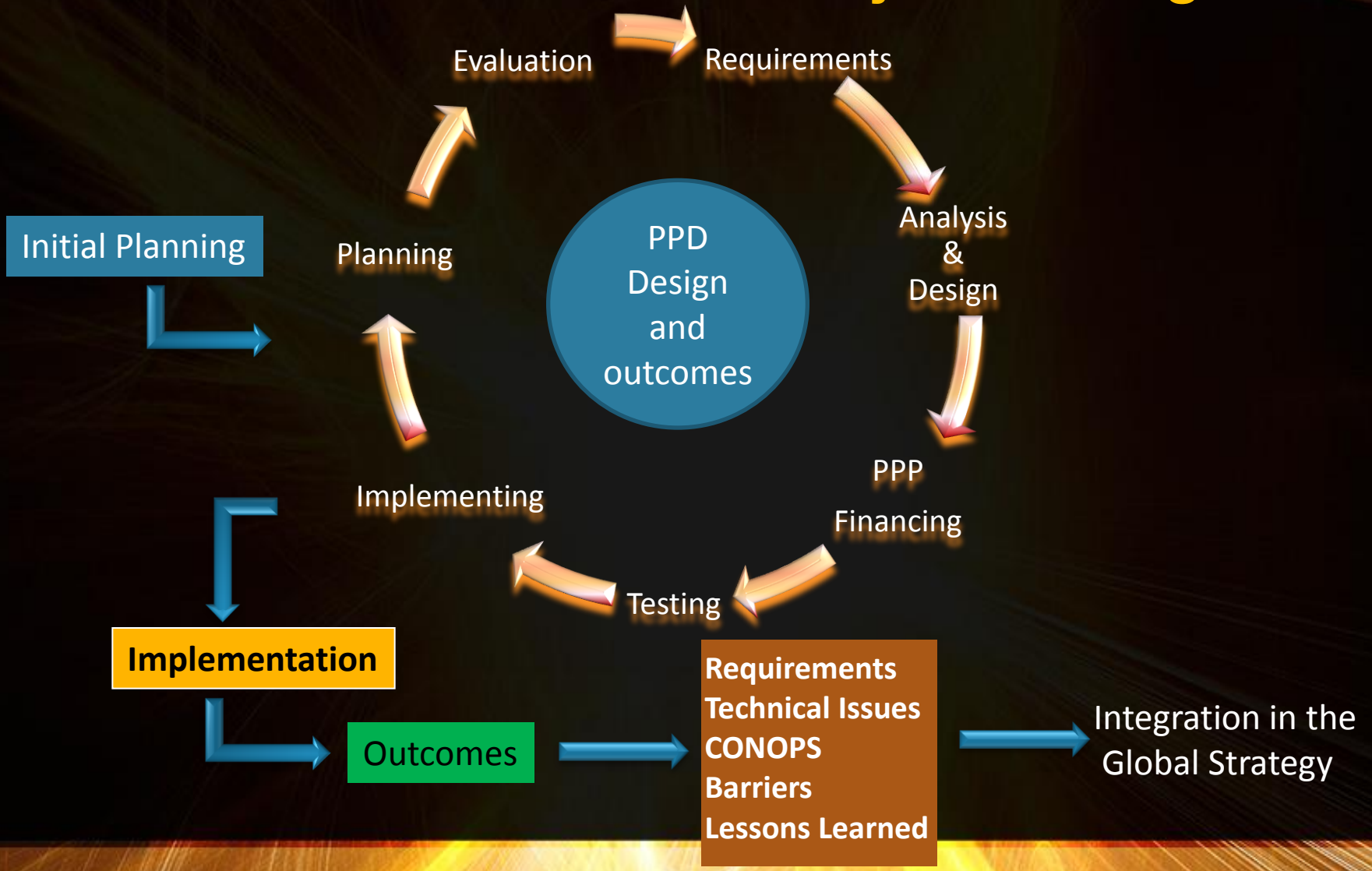
8. Access to CANEUS' global Small Satellite "Launch portal" that identifies launch opportunities and the small satellite technology developers and suppliers



Examples of Related CANEUS Projects / Initiatives

- UN-GP DRR
- Vietnam
- Chile, Argentina, Mexico
- Kenya, South Africa
- Arctic
- Singapore

Small Satellites for Disaster Management International Collaborative Projects Design



Contributing to Global Collaboration

Global Configuration with Application to Country / Region

Outcomes
- Needs analysis
- Technical issues
- Financials
- ConOps
- Barriers

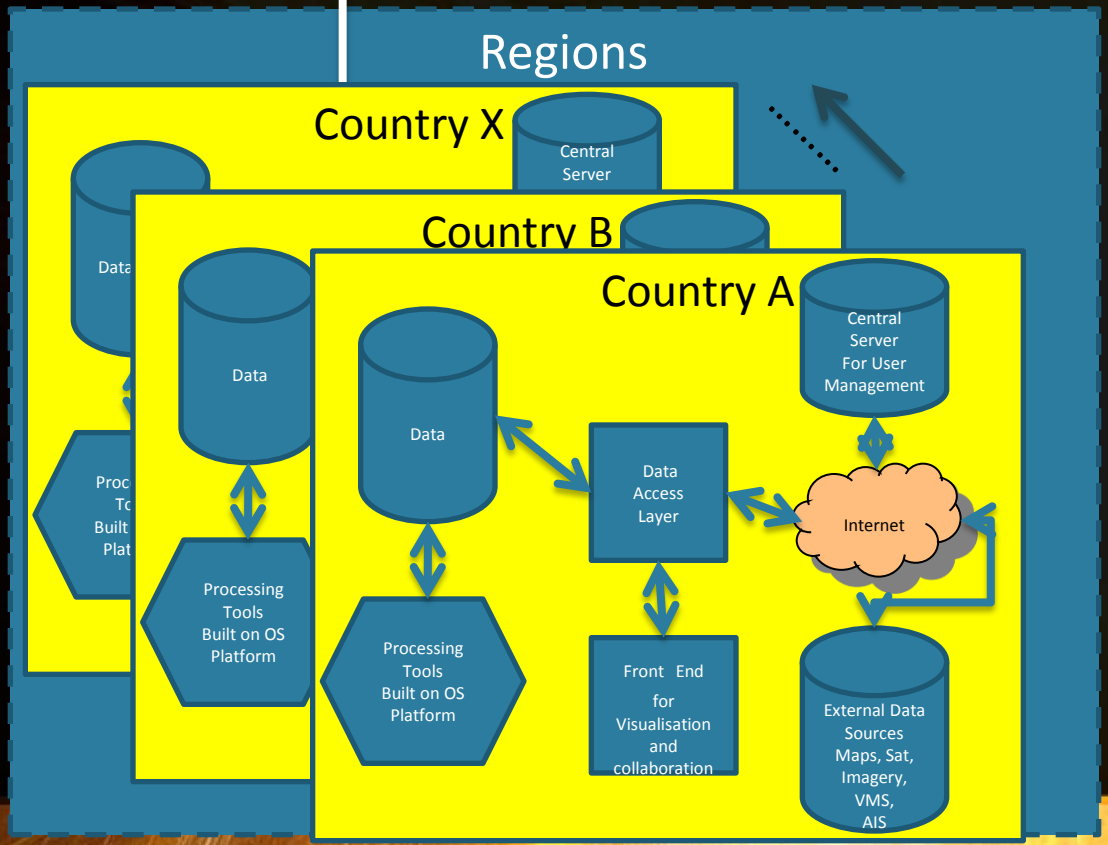
Level 1: Cross Issues, Disaster Monitoring Data acquisition and sharing
Level 2: Requirements
- Region Level
- Country Level

Level 3: Identification of Barriers

Horizontal issues:
- Data Access, Data Sharing, Data Distribution

Cross requirements [Harvest the results of the LOD's]

Program Management:
- PPD Program
- [Specific countries, Representatives of the global requirements for the sharing of disaster data]
- Technical Issues
- Operational Issues (data)
- CONOPS (Country)



Project Demonstration support PPP

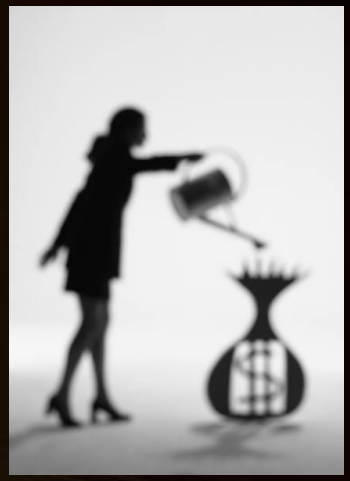
CANEUS Collaborative Project Step 1: Technology Concept Proposals solicited from stakeholders (Prior to Workshop)

The Concept proposals submitted by technology developers make the case for development of small satellite / sensors concepts leading to collaborative projects by addressing:

- Key technology elements that need to be developed
- Organizations that can provide the necessary expertise and Infrastructural support
- Potential sources of funding from governmental, industrial, and other sources
- Challenges related to intellectual property management
- Relevant I IP issues

Step 2: Concept Proposals are shepherded to become Collaborative Projects Plans (During the Workshop)

- **Recommendations** and Implications to end-users and customers
- **Justification** for a collaborative project aimed at augmenting small satellite and sensors solution
- **Step-by-step approach** to advancing the maturity of promising concepts



Step 3: Formulation and implementation of the Collaborative Projects (After the Workshop)

- Define the scope, opportunities and priorities for the proposed collaborative activities.
- Teaming arrangements and complementary expertise and infrastructure
- Framework for implementation and progress evaluation
- Funding from governmental and industries
- Strategy for Intellectual Property management
- Plan for the project leading to commercialization

SSTDM Evolution and Vision Ahead

- The SSTDM initiative began with the VICAS (VTU-CANEUS-NDRF) 2013 Symposium held at VTU on April 19-20, 2013
- We hope to achieve the SSTDM vision together with the support of all Workshop Participants, Organizers and Stakeholders
- The outcome from this workshop will be fed to the UNISDR proposed strategy space based tools and techniques for disaster management needs of world community.

Look forward to your participation at

SSTDM 2015 in India

Thank you!

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