

Perspectives on Supply Chain Development for New Energy Generation Technologies

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Topics

▶ **Background and Experiences**

- Nuclear and Non-Nuclear Power Energy Generation Development Projects

▶ **Developer and Supply Chain Perspectives & Expectations**

- Challenge to Cross the Technology Development “Valley of Death”
- Development of a “New” Supply Chain

Teledyne Technologies Four Segments



Instrumentation

Digital Imaging

**Aerospace &
Defense Electronics**

Engineered Systems

Engineered Systems Quick Facts



Provide Radiological Testing for Nuclear Plants

346K
Square feet of manufacturing space



Design and build SWCS vehicles for Navy SEALs



Develop real-time threat testing software, EADSIM



Supplied power source for Curiosity Rover



Partnering in Space since the birth of the Space Program



Provide subsea power solutions for maritime applications



Responsible for operations on the International Space Station



Safely destroy chemical weapons for the government



Host hyperspectral and scientific payloads on the ISS

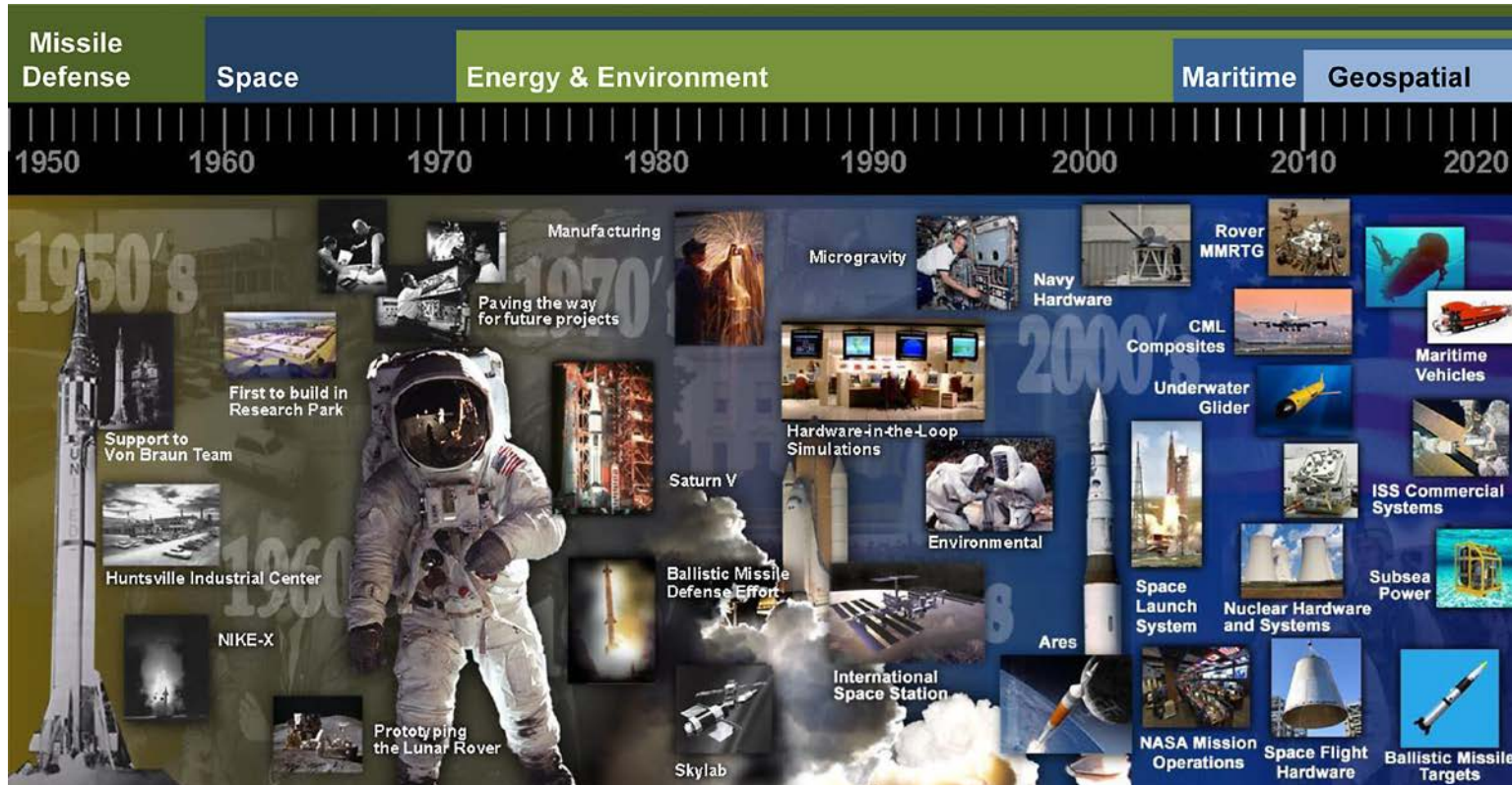


Provide composite parts for aviation

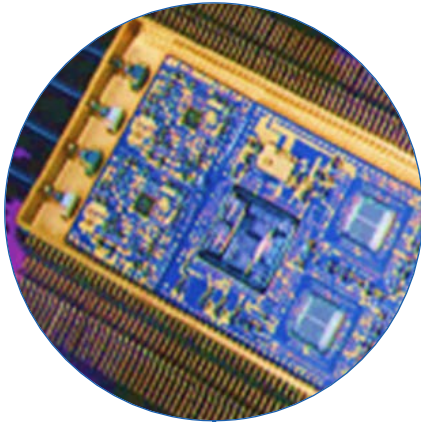


Participating in ITER international nuclear fusion project

Teledyne Engineered Systems Segment Adapting Technology & Capabilities in Advancing Markets



Teledyne Scientific's Central Research Laboratory



▶ Government, Customer, and Teledyne funded R&D

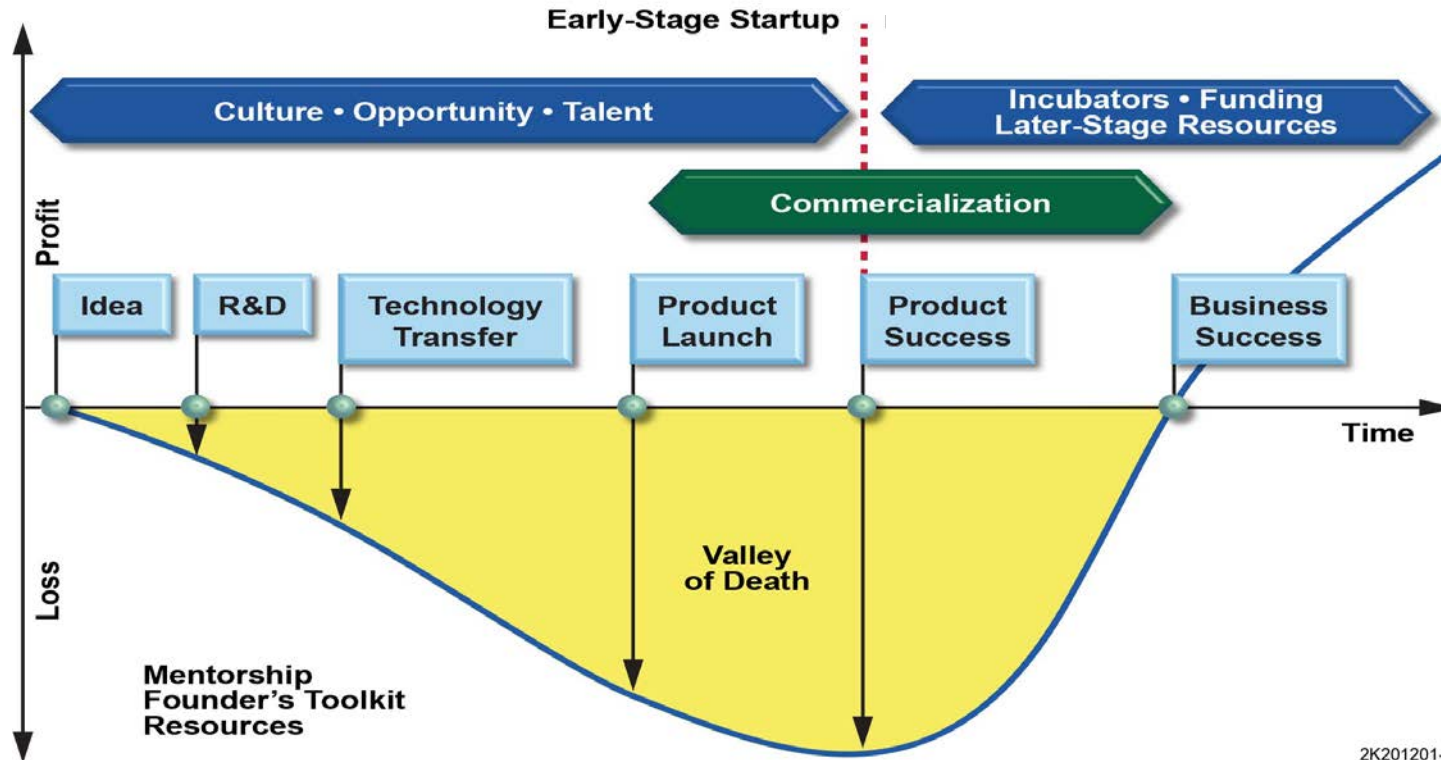
- Materials
 - Structural and functional
- Electronics
 - MEMS/III-V semiconductor fab
 - RF/mm Wave/Mixed-signal ICs
- Information Sciences: Technical Thrusts
 - Autonomous Systems
 - Sensor Exploitation
 - Neuroscience and Neurotechnology
 - Cyber Security & Anti-Tamper
- Optical Systems
 - Information science
 - Image processing
 - Neuroscience

Teledyne Brown Engineering Experience

- ▶ **Nuclear as Well as Non-Nuclear Power Projects/Pursuits**
- ▶ **Both Commercial and Government Experiences**
 - Many Advanced Reactor Projects are Government Supported
 - Brings Additional Criteria into the Supply Chain Mix
 - For Example Cost Share Requirements for Government Awards
- ▶ **Concept Design to Prototyping to Manufacture**
- ▶ **2019 R&D 100 Award Winner and 2019 Federal Laboratory Consortium for Technology Transfer Award Winner**

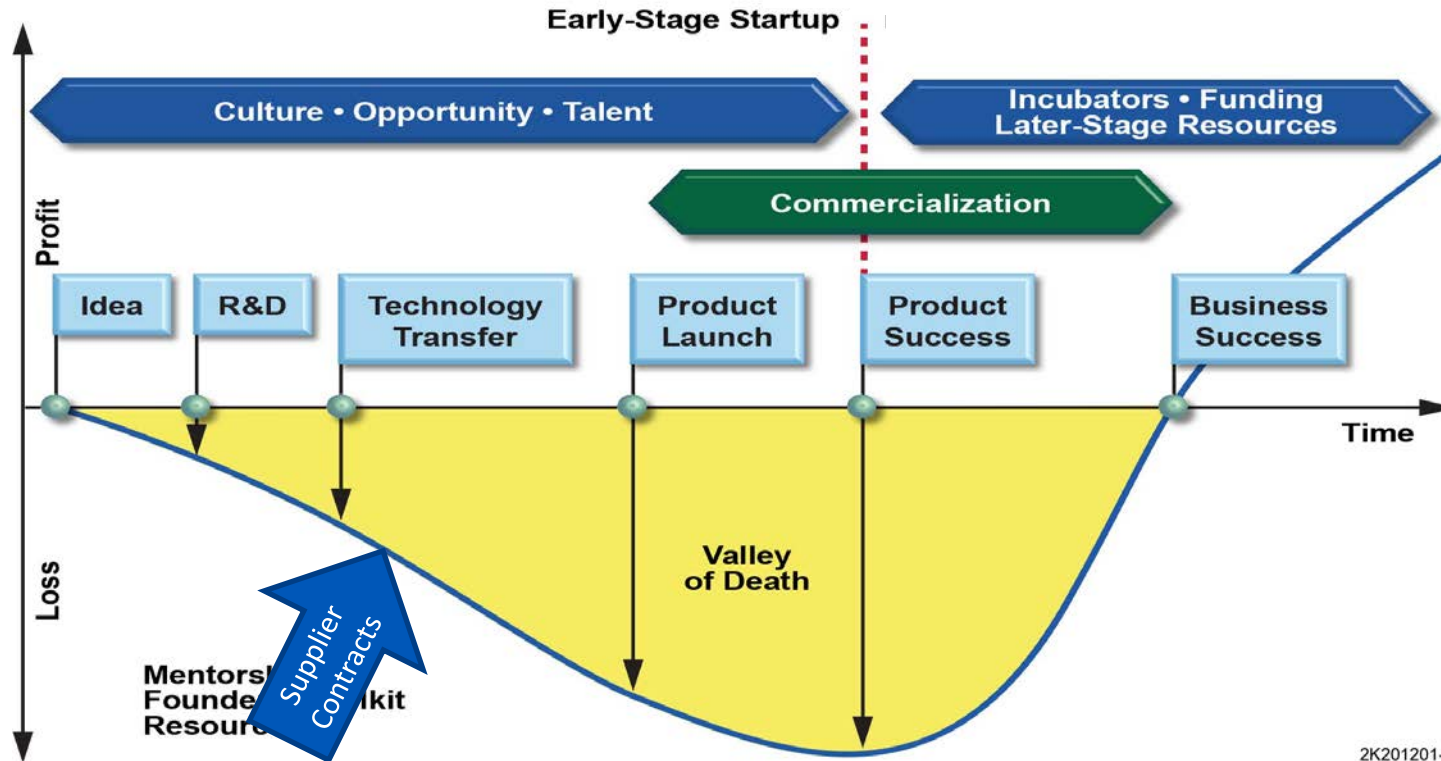
New Technology Development

▶ Crossing the Valley of Death and Supply Chain Implications



New Technology Development

▶ Crossing the Valley of Death and Supply Chain Implications

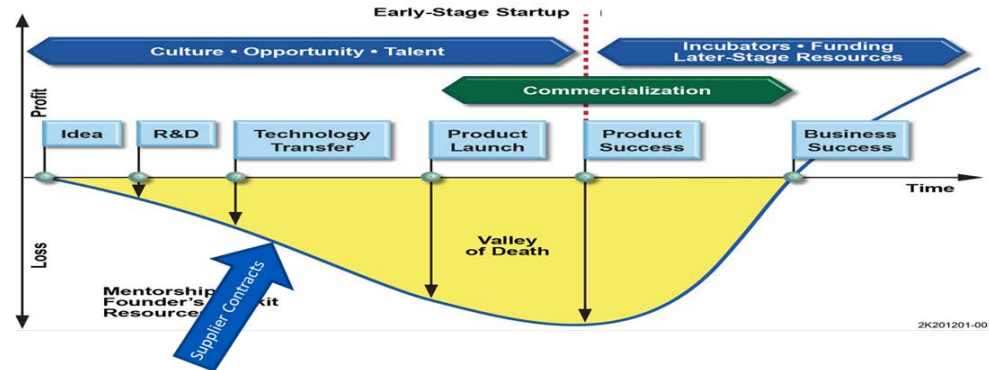


Supply Chain Readiness to Support

- ▶ **Concern with Reduction/Capacity in Nuclear Support Supply Chain Providers**
 - “The *World Nuclear Supply Chain: Outlook 2040* notes that the number of suppliers maintaining a nuclear quality assurance accreditation is declining, with the number of companies worldwide holding an N-Type Certificate or Quality System Certificate from ASME falling from 395 in 2013 to 270 in 2019.” [*world nuclear news*, 25 Sep 2020]
 - Perhaps more applicable to Advanced Fission Reactors, however the exacting supplier standards needed to maintain high level quality certifications required are cross cutting.

- ▶ **Building a Supply Chain for the Fusion Industry**
 - New Relationships, New Suppliers, New Technology

Supply Chain Support New Technology Development



► Need for Increased Supply Chain Capability and Involvement Occurs Coincident to the “Valley of Death”

- Funding Available and Funding Sources Change from those Available at the Research through Proof-of-Concept Phase
 - Applicable to both Government and Private Funding/Investment
- Type and Scope of Development Changes from Research/Experiment to Prototyping to Full Scale Prototype/Product
 - Type of Suppliers Needed Changes with Scale

Developer and Supplier Needs & Perspectives

- ▶ **Early Engagement and Interaction is Extremely Valuable**
 - Routinely Years not Months for this Type Technology
 - Awareness of What Will be Required and When
 - Building a Team with Necessary Expertise
 - Beyond the Development Team

- ▶ **Mutual Understanding of Perspectives**

Final Thoughts

Relationships and Expectations



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