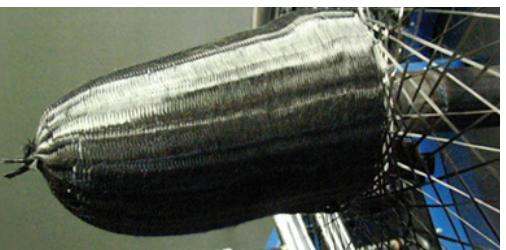
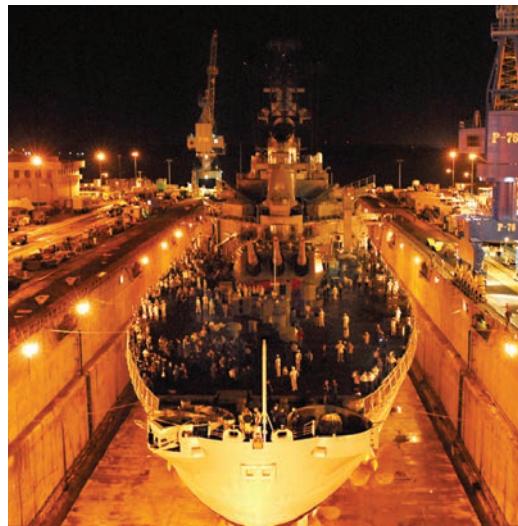


# SCRA

## 30 YEARS

of Applied Technologies  
and Economic Development





## SCRA leads the development of a Navy-funded just-in-time manufacturing system

that is deployed in depots in the 1990s and used to make its one millionth part in 2006.

1983



## SCRA helps the US Navy and shipbuilding industry craft and execute a technology roadmap,

improving manufacturing processes across an entire US industry.



## SCRA is chosen to lead a team that develops product data standards

that are now used in hundreds of thousands of products worldwide.

## SCRA is formed by the state of South Carolina

with a one-time founding grant of \$500,000 and 1,400 acres of undeveloped land. Since inception, SCRA has generated more than 1,390 times the dollar amount of its founding grant in cumulative economic output in the state.



## The Defense Logistics Agency turns to SCRA to lead teams

of metal part manufacturers that bring innovations to the industry, saving money, time and energy. They're still doing just that.



## SC Launch is formed. Phenomenal economic success follows.

Since 2006, SC Launch has helped form or land over 280 startup enterprises. SC Launch Portfolio Companies have captured more than \$250 million in follow-on capital.



## The US Navy hires SCRA again

to apply composites to defense components in order to improve product performance, reduce component weight and cut manufacturing costs.



## **SCRA delivers info sharing technology in several public safety domains**

and learns how to build a situational awareness tool that builds the bridge to Nextgen 911.



## **The Department of Defense turns to SCRA to increase the pace of prototype development.**

The delivery cycle is dramatically reduced from 90 to 30 days.



In 2013, SCRA won a Gold Stevie Award from the American Business Awards for Technology Innovation.



## **SCRA builds three Innovation Centers**

where early-stage companies can grow and prosper.



## **SCRA's cumulative economic output**

to the local knowledge-based economy reaches \$15.3 billion.

**From revenues to active contracts to new clients, SCRA continues to grow and receive national and international recognition.**

Impressive backlog and an aggressive strategic plan indicate still better things to come.

**The most effective method of business development  
is delivering consistently exceptional results.**



## **SCRA's first consortium was funded by the US Navy.**

The result was a just-in-time manufacturing approach using product data standards and rapidly configurable manufacturing cells. This new system replaced the expensive, inefficient traditional method of producing and warehousing large quantities of parts in case they were needed in the future.

## **SCRA's work on behalf of the Navy has expanded.**

SCRA now leads collaborative research teams focused on shipbuilding enterprise technologies, composite applications and shipboard movement, the ways in which materials are stowed and retrieved aboard ships.

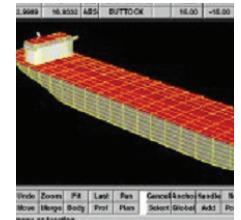
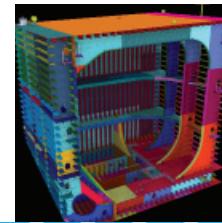
## **The Navy recently became the largest customer of an SCRA-managed rapid prototyping program**

that quickly delivers and fields critically needed defense technologies.

## **The Navy continues to be SCRA's largest client**

because we continue to consistently deliver needed technologies, better products and more efficient processes.

# SCRA's expanding work for the US Navy has produced a large portfolio of valuable new technologies.



1998

## Robotic welding at Electric Boat

saved nearly \$9 million per Virginia Class submarine hull.

Based on initial success, the project expanded to include three General Dynamics-owned shipyards and three Northrop Grumman-owned shipyards and four US Navy ship classes.

## Digital radiography of piping, plate welds and castings

developed at Northrop Grumman Newport News led to industry-wide use of computed radiography to replace more costly traditional film-based methods.

## Shipyard internal supply chain/material delivery

using 'lean manufacturing' techniques results in significant efficiency improvements.

## Compact/Agile Material Mover

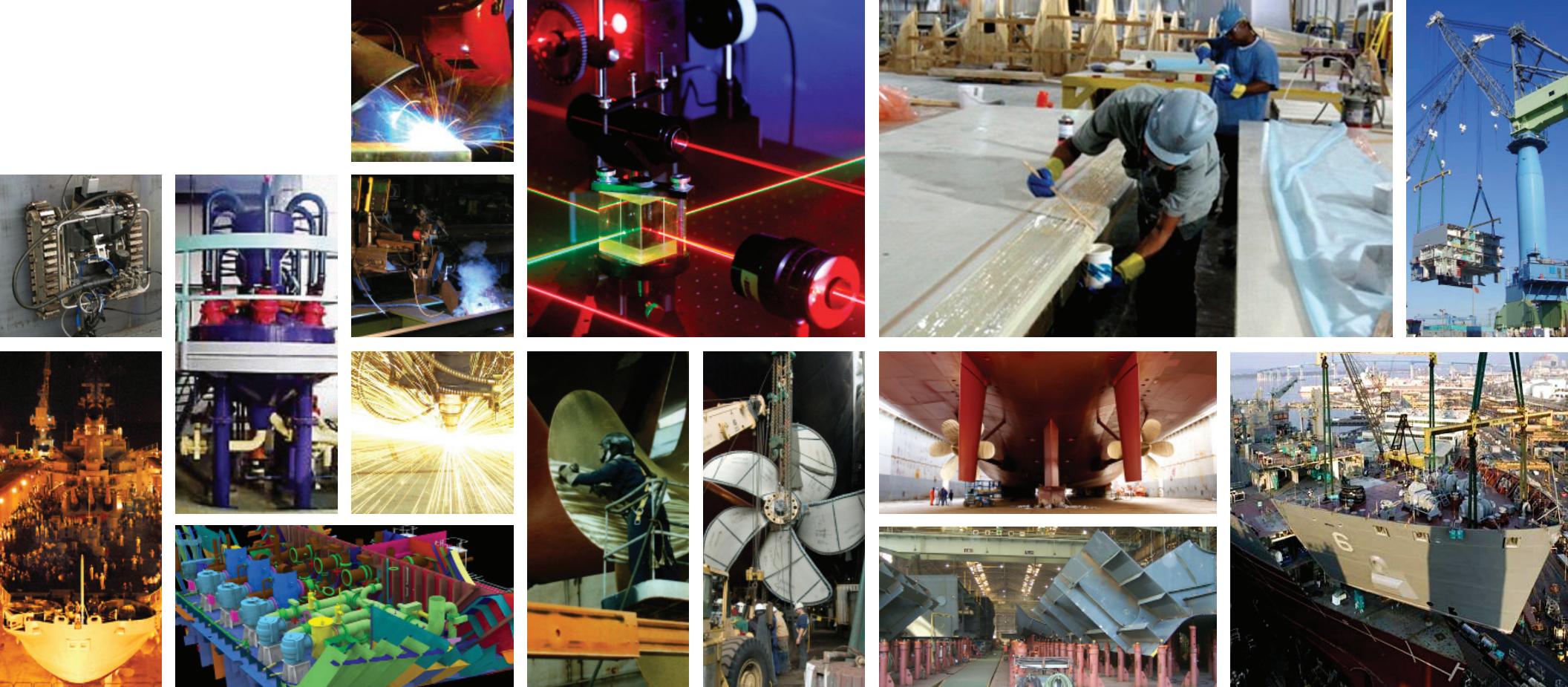
handles 10,000 pounds of cargo using human strength amplification.

## 'Design for Production'

cost savings expected to exceed \$3.65 million per submarine hull in addition to lifecycle support cost reduction.

## Predictive weld distortion models

reduce the need for time and labor intensive flame straightening of steel distortions caused by welding.



2013

## Computational analysis models for shock and stress simulation

have replaced expensive and environmentally unfriendly trials. This project resulted in a 50% reduction in the time to generate a full-ship analysis model and reduced by 25-95% the time required to perform engineering analyses.

## Human Augmentation Study

assesses the use of strength amplification technologies in shipbuilding.

## 3-D scanning

replaces expensive manual measurements and results in highly accurate 3-D ship models used to make fabrication decisions.

## Shipyard material flow system efficiencies

save over \$5.4 million per Virginia Class submarine hull.

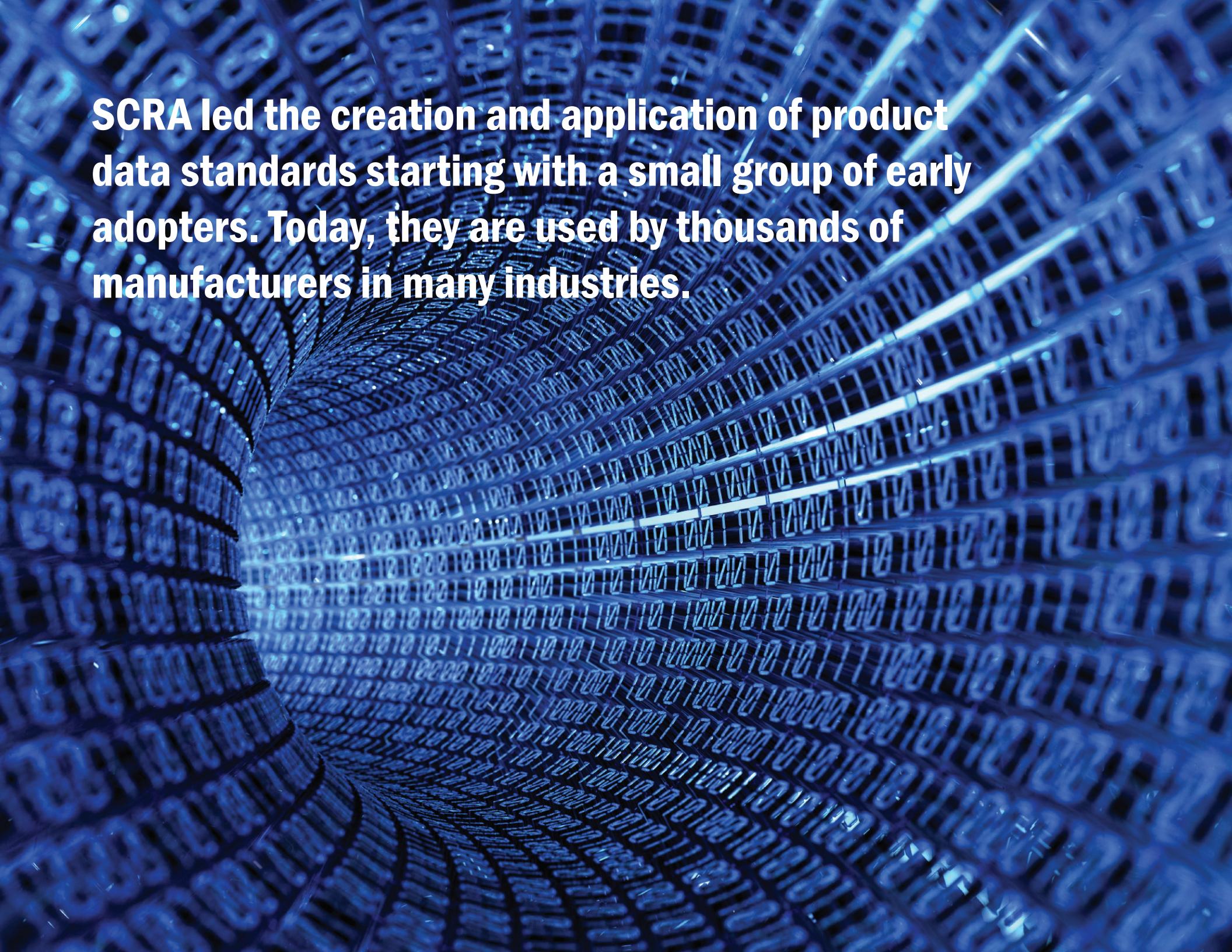
## SCRA-led projects save \$24 million per Virginia Class submarine hull

accounting for nearly 70% of total acquisition savings generated by an Office of Naval Research manufacturing program.

## SCRA-led maritime research delivers 80% technology transition

rates. These are much higher than the average transition rates generated by federally-funded research.

Putting new technologies into wide-spread use means high return on investments for our Navy client.



**SCRA led the creation and application of product data standards starting with a small group of early adopters. Today, they are used by thousands of manufacturers in many industries.**

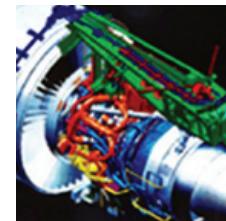
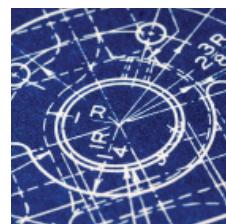
## **SCRA collaborations generate new technologies and processes.**

We leverage technology transition to share innovations with multiple partners across entire industries. Members of SCRA-led collaborations gain maximum benefit by sharing technology breakthroughs.

## **An SCRA-led team pioneered the development of product data standards and transitioned use of the standards across multiple industries.**

It seems unthinkable now that products were once manufactured without data standards that clearly define their properties along the supply chain. SCRA led - and continues to lead - a team that developed this transformative technology. SCRA played a key role in initiating use among a small group of first adopters, then a larger group of early adopters. Today, the approach has achieved global acceptance across many industries.

# SCRA leads a team that develops and applies product data standards across multiple companies, disciplines and industries.



1992

## A consortium is formed

by McDonnell Douglas, Grumman, General Dynamics, Boeing, Northrop and Lockheed Martin to collaborate on the development and deployment of product data standards. SCRA wins a competition to lead the team.

## The first international standard is established

for configuration controlled 3-D design of mechanical parts.

## The first production use of 3-D product standards

enables McDonnell Douglas to exchange C-17 configuration management data between Long Beach and Saint Louis facilities.

## Boeing uses standards

to exchange information among three engine manufacturers to

support digital pre-assembly of the engine/strut interface of its 777 aircraft.

## Rockwell Collins leads development of an International Standard

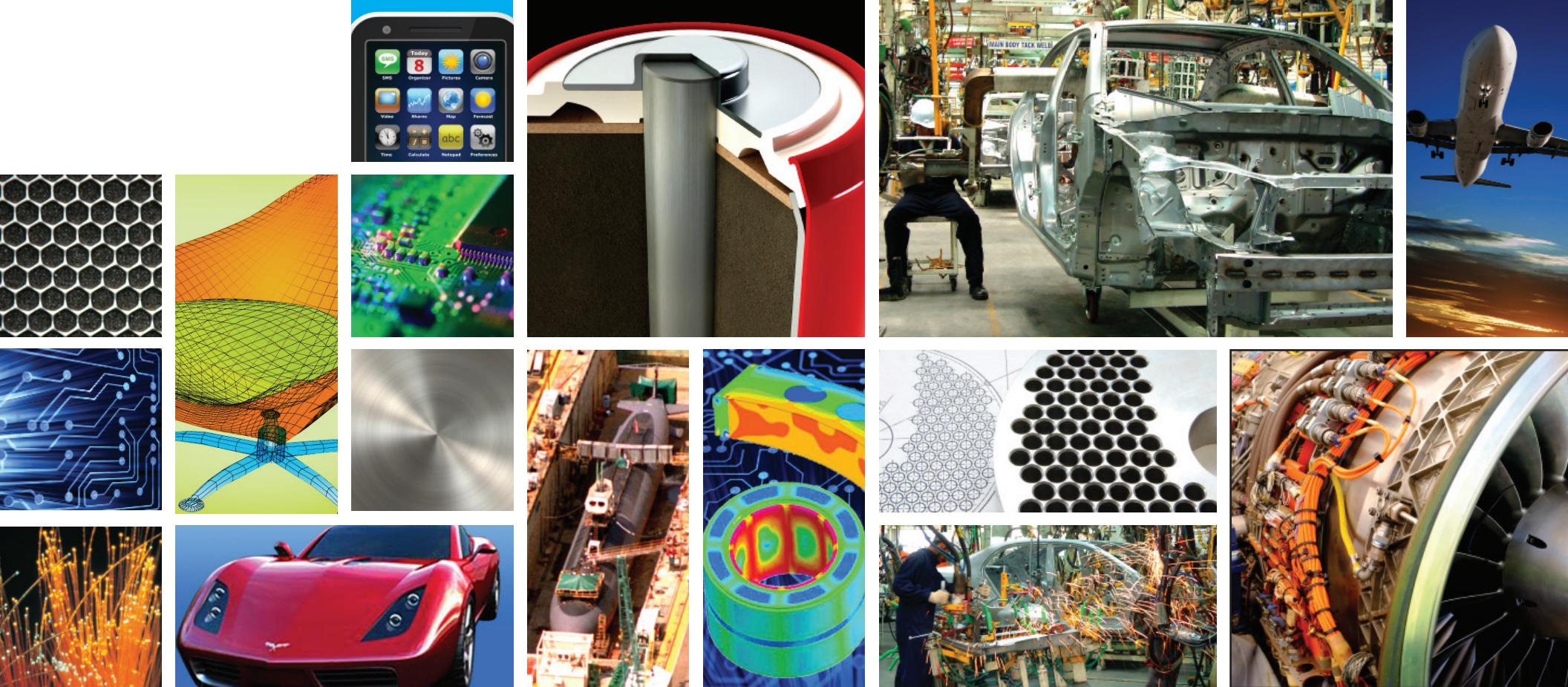
that allows exchange of electronic assembly, interconnect and packaging design data.

## The Eurofighter program uses 3-D standards

to share configuration management data among BAE Systems, EADS and Alenia.

## GM's STEP Translation Center is established

to communicate design information between GM divisions and suppliers.



2013

## The US Air Force and Lockheed Martin collaborate

to develop a standard used to describe and analyze metallic and composite structures.

## The National Institute of Standards & Technology (NIST)

estimates the impact of imperfect

interoperability in the U.S. automotive supply chain at over \$1 billion per year.

## Industry investment in standards reaches \$200,000,000,

a testament of the high ROI standardization achieves.

## The first modular Application Protocol

is developed featuring plug-and-play ability for easy integration with other APs.

## STEP is endorsed by Joint Commanders and the US Navy

as a proven method for the exchange of product data for critical weapons systems.

## Consortium membership reaches 25 member organizations

from France, Germany, Italy, Norway, Sweden, the United Kingdom and the United States.

## Product data standards

are now used in the manufacture of hundreds of thousands of products in many industries throughout the world.



**The best way to improve an entire industry is to engage the entire industry.**

## **SCRA engages entire industries and helps competitors work together for the good of all.**

SCRA leads two Defense Logistics Agency (DLA)-funded teams developing new technologies and approaches for the manufacture of metal components. DLA needs the industry to better support its mission to rapidly provide US warfighters with critical parts. Globalization has led to a diminished supply of domestic parts manufacturers, but the Department of Defense cannot depend on foreign sources for some parts. SCRA-led teams develop and apply technologies that increase the industry's ability to support national defense.

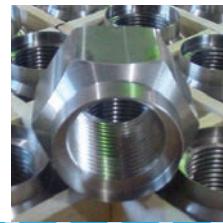
## **Research universities' involvement leads to novel technology approaches.**

SCRA engages research universities where many ground-breaking technologies begin. Industry benefits from innovations derived from the universities' intellectual property. University students learn about the industries they serve so that they have a better understanding of real-world challenges in the early stages of their careers.

## **Technology transition shares innovation, even among competing organizations.**

This ensures that the entire industry becomes more efficient and capable of delivering parts to the Defense Logistics Agency on-time. Timely delivery of metal components is critical for military readiness.

# Transforming the US metal component manufacturing industry with new technologies.



1994

## The Defense Logistics Agency (DLA) requires metal components

to fulfill its mission of supplying defense, construction and barrier equipment to the US military. Globalization and a diminished domestic supply base create challenges for DLA. SCRA-led teams of metalcasting and forging manufacturers and research universities develop solutions.

## Modification to melting and molding processes

in the production of seal rings for heavy vehicles cut scrap rates by 87% and increased on time delivery by 97%.

## Rapid tooling techniques

developed at Case Western Reserve University addressed frequent replacements due to excessive thermal fatigue cracking. Tooling replacements generally took 20-26 weeks, causing costly delays. The new dies outperform the old dies by 500%.

## Modeling and simulation tools

enable the prediction of the fatigue life of cast steel parts. Designers are able to accurately develop higher quality cast parts and reduce design iterations costs by up to 75%.



2013

## Procurement solutions

include databases to help locate existing tooling and casting suppliers, a toolkit that helps qualify foundries to supply castings to the government, and a system for matching Department of Defense solicitations to capable suppliers.

In 2013, 10,200 solicitations worth over \$150 million were matched to 93 companies.

The average leadtime reduction was 12 weeks. Part costs were reduced by 12%.

## A lean manufacturing process application

demonstrated a 16% cycle time reduction in forging die change-overs.

## A forum of forging process experts

has answered over 550 technical assistance requests.

## Over 500 personnel have received technology training

through an SCRA-led forging program.

## A web-based system for quickly evaluating the trade-offs between various forging alloys and manufacturing processes

was developed and deployed by research university teams.

**SCRA-led programs are distinguished  
by extreme process efficiency.**



**SCRA was chosen to manage the business operations of a Department of Defense and industry consortium that selects and develops prototypes to meet critical mission demands.**

The member organizations represented a strong mix of capabilities, but prototypes were not being delivered as quickly as they were required.

**Single Point Contracting was established.**

In 2007, SCRA played a key role in establishing a single point contracting approach that streamlined the prototype selection and development process. The 90-day cycle time from prototype project selection to contracted research was reduced to a 30-day process. SCRA continues to execute this model in support of our industry and government partners.

**Focus areas, active projects and participation have expanded.**

Proposal cycles and source selection have been dramatically reduced, and prototypes are now fielded much more quickly.

Industry participation has doubled to 248 active technology providers, and Department of Defense participation has also expanded. The collaboration was once used almost exclusively by the US Army. It now receives a large percentage of business from the US Navy.

The volume of projects has also increased. In 2013 alone 273 proposals for prototype development were submitted and evaluated, 71 initiatives were selected and \$244 million in applied research funds were awarded.

The value of contracted work within the program has surpassed \$510 million, and 190 active projects in ten technology focus areas are underway.

**SCRA has leveraged domain expertise in defense-related composites applications to expand into commercial markets in prosthetics and architectural components.**

**In 1998, SCRA was chosen to lead a consortium of leading US composite component manufacturers.**

This team applied advanced materials to improve the performance of Department of Defense weapon systems, helping our men and women on the battlefield.

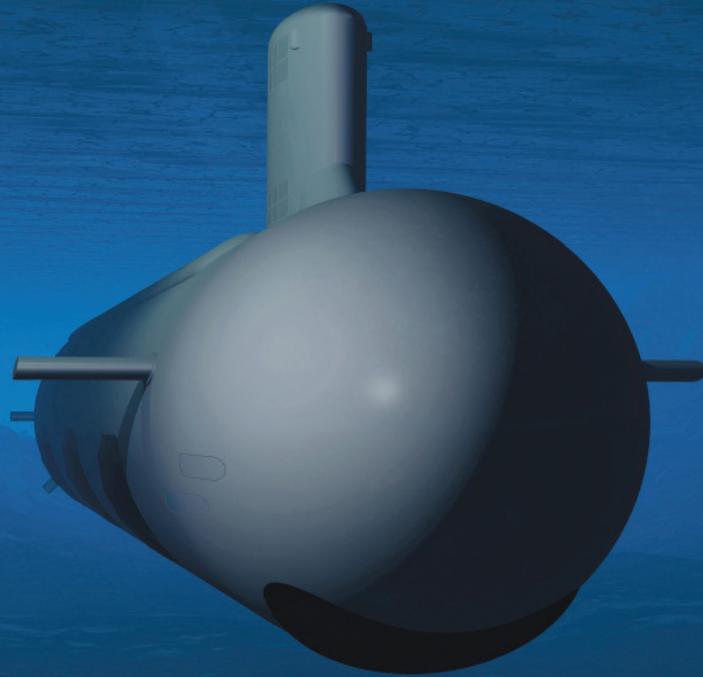
**Composites improve product performance in many ways.**

Product improvements include light-weighting, durability, extreme tensile strength, flexibility, non-disruption of radio and other signals and complex double curved surfaces.

**The same qualities required by defense parts are also useful for commercial applications, such as prosthetics and architecture.**

SCRA has expanded its composites focus to address design and manufacturing challenges in prosthetics and forward-thinking architectural designs.

# SCRA domain expertise in composites for defense applications led to commercial applications in prosthetics and architectural components.



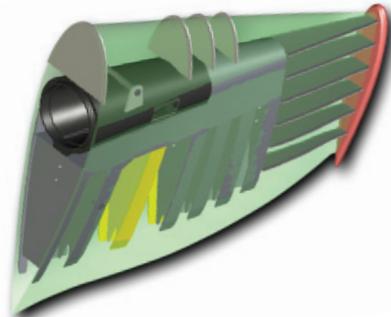
## An SCRA-led, Navy-funded composites manufacturing team develops solutions to critical defense challenges.

SCRA builds and leads teams of companies - even competitors - that work together for mutual benefit. One example is an Office of Naval Research Center of Excellence that applies composites to improve defense-related products.

The SCRA-led team has generated an impressive slate of outcomes, including advanced materials application on the Joint Strike Fighter that generated \$120 million in savings from a \$4 million Office of Naval Research investment.

## Composite material applications reduce costs and improve performance and durability.

The complex double curvature of submarine cusps allows for smooth flow of water over its surface. This composite material is a lightweight, low-maintenance alternative to steel that helps reduce the acquisition cost of submarines.



## Corrosion-Resistance

The extreme force of water had a highly corrosive effect on Rudders located directly behind the propellers of Navy ships, resulting in frequent and expensive dry dock repairs. Composite-based replacements withstood the force much better than traditional steel components.



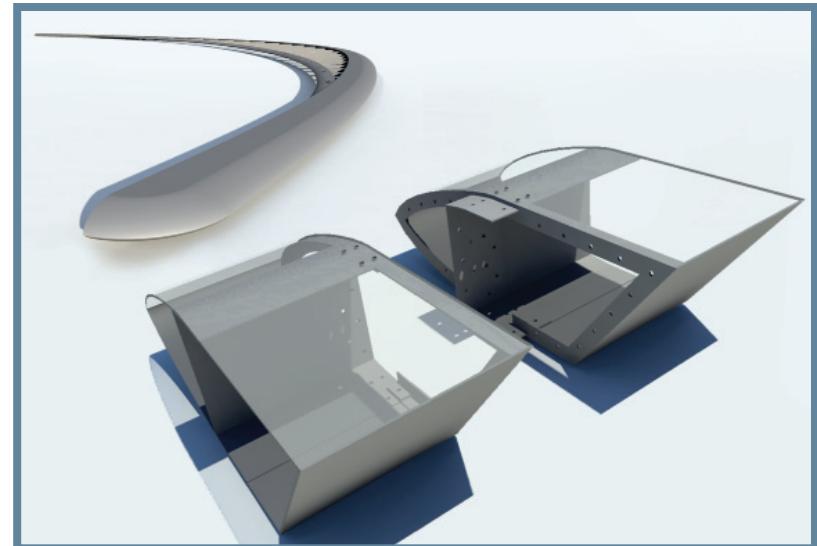
## High Strength, Light Weight

Composites blend the beneficial qualities of their constituent materials. One example is extreme strength combined with light weight. SCRA led a project to exploit this blend of attributes to improve helicopter rotor harness yokes.



## Composites for Prosthetics

SCRA led a project that generated a new automated carbon-braided socket manufacturing technology. This technology produces prosthetics sockets that are up to 50% lighter, cost 40% less to manufacture, are produced quicker, fit better and last longer than traditionally fabricated sockets.



## Composite Architectural Components

SCRA's long history of successfully sourcing and delivering components for defense systems makes us uniquely capable of bringing advanced material solutions to architectural projects.

Defense-related components have extremely exacting demands. Some of the attributes we have applied in defense components are applicable to architectural projects. Examples include:

- Lightweighting
- Complex curvature
- Fire retardance
- Extreme strength in thin-walled surfaces
- Non-interference with radio and cellular signals

2004

2010

2013

# SCRA develops and applies technologies that break down organizational and jurisdictional barriers to teaming.



## **SCRA delivers technology tools that allow for more effective collaboration.**

This is especially critical in the areas of public safety and emergency management. We have a long track record of delivering collaboration tools that make public safety officials, first responders and emergency managers more effective.

## **SCRA was the lead technology integrator for SeaHawk, a national model for multi-agency port security.**

This work led to the Coast Guard-funded Watchkeeper program. Watchkeeper is transforming Sector Command Centers into Interagency Operations Centers by improving facilities, information management and sensor capabilities. It is implemented in ports across the nation and improves collaboration among regional, state and national public safety organizations.

## **The latest example of SCRA public safety technology is Alastar, a commercially-available situational awareness product.**

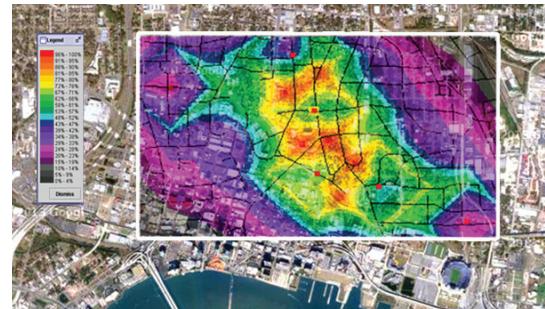
SCRA leveraged the knowledge we gained in public safety and multi-agency collaboration systems to produce a commercially available information-sharing product. Alastar collects data from agencies, sensors and cameras to deliver the comprehensive situational awareness that public safety personnel need to respond most effectively to incidents. Alastar saves time, money and lives.

# SCRA's long history of developing public safety technology...



## SC Info Exchange

SCRA leads the development of a statewide data warehouse for 115 law enforcement agencies and 915 individual users. It is used to improve response to emergency situations.



## GeoProfiling Software

SCRA delivers a system that analyzes event data to estimate the likeliness and location of future events. One application is crime analysis.



## SeaHawk Port Security

SCRA is the lead technology integrator for a national model for port security. Technologies include advanced communications, information sharing and a multi-agency Operations Center.



## LEADR Law Enforcement Tool

SCRA delivers a system that fuses and shares information to catch criminals and prevent crimes. It is used by over 250 law enforcement agencies.

1998

2004

2006



## ...led to the development of a situational awareness product.

SCRA's Alastar software utilizes Esri Geographic Information Systems (GIS) technology and adds layers of information to provide all-inclusive, real-time situational awareness. From local 9-1-1 centers to the US Department of Homeland Security, Alastar offers wide-area situational awareness information that can dramatically improve response times and coordination. Alastar makes available the information that responders need, when and where they need it.

Alastar ties multiple information sources into one picture that is accessible to watch standers in interagency operation centers, command cadre on the go and first responders on the street. By extending access to a tailororable view of the "big picture" to all responders on their laptops or other mobile devices, a fully integrated response can be coordinated that promotes fast, safe security response.



# SCRA's SC Launch program advances South Carolina's Knowledge Economy.



## **SCRA Technology Ventures' SC Launch program helps early stage, start-up businesses grow through investment and support.**

SC Launch provides qualified companies with investments, grant matching, business and support services and access to a partnership of commercialization experts. This innovative economic development program grows and attracts technology-based companies to advance South Carolina's Knowledge Economy.

### **It's working.**

SC Launch Portfolio Companies have secured over \$250 million in add-on private investments since SCRA started the program in 2006. This indicates two things: we diligently choose companies with strong potential, and their participation in the SC Launch program builds the credibility they need to attract industrial grade follow-on funding.

### **Economic development experts are taking note.**

SC Launch has received numerous awards and recognition for excellence in technology-based economic development and entrepreneurial support from the likes of *Forbes*, the International Economic Development Council and The American Business Awards.

# SCRA grows early-stage companies and creates jobs.



## SC Launch invests in a chemical analysis device maker. Larger private investments follow.

Spectra Analysis Instruments, LLC delivers next generation molecular analysis products. The company won the prestigious R&D100 Award for a device that quickly and efficiently identifies each compound in complex chemical mixtures.

SC Launch provided Spectra Analysis Instruments, Inc. with seed-funding and assisted with the development and execution of the early-stage company's business plan.

Spectra has since garnered private investments from Nexus MP, LLC, UCAN and Broad Oak Fund, LLC.



## An SCRA-supported bioscience start-up company enjoys rapid commercial success.

SC Launch supported the creation of Immunologix, an early-stage bioscience company. Based on its early success, Immunologix was purchased by industry leader Intrexon.



## SCRA helps hybrid bus company relocate to SC.

SCRA provided funding to Proterra, a maker of clean energy-driven, composite-body buses, to help with their relocation to SC. Proterra recently procured over \$30 million in private venture capital investments.



## **SC Launch supported the growth of an advanced material surface company with seed funding and federal research grant matching funds.**

The SC Launch board determined that Hoowaki's water repellent surface feature technology had commercial viability and a Portfolio Investment was approved. When Hoowaki received an SBIR grant, SC Launch matched the federal funding to maximize its impact.



## **SCRA Applied R&D invested in a carbon-fiber recycling company that uses carbon fibers to build high-performance parts.**

This first-of-its kind technology produces parts with exceptional strength and durability, and solves a pressing problem in the aerospace industry - the difficulty of recycling carbon-based parts.



## **SCRA promotes industrial collaborations between companies from South Carolina and from Israel.**

SCRA executes a bi-national collaborative research and development initiative to generate new or significantly improved products or processes for commercialization in global markets.



## **SCRA's SC Launch program has made a large impact on South Carolina's Knowledge Economy in a short time.**

The companies listed here are a representative sample of the 288 companies that have received support from the program. Investments primarily support the growth of emerging technology clusters in SC: aerospace, automotive, life sciences, advanced materials and information technology.

The SC Launch budget is relatively small, but because of efficient execution, program operation costs are low, impact on the economy is large and recognition by economic development experts has been gratifying.



## SCRA Innovation Centers - where innovations go to market.

SCRA Innovation Centers help commercialize intellectual property from research universities, government labs and private industry. The SCRA MUSC Innovation Center is focused on bioscience and is equipped with state-of-the-art wet labs. The SCRA USC Innovation Center was designed and built to support advanced manufacturing. The Duke Innovation Center is focused on advanced material applications. All were built in close alignment with the focus areas of SC's research universities and growing technology clusters within the state.





## Innovation Center wet labs and shared equipment enable rapid success for bioscience start-up.

SCRA Innovation Centers act as stepping stones from research university benches to commercial markets. Immunologix, an early-stage bioscience company emerging from the Medical University of South Carolina chose to locate in an SCRA Innovation Center in part to take advantage of shared, state-of-the-art equipment typically not available or affordable to early-stage companies.

Based on early success, Immunologix was acquired by industry leader Intrexon and expanded operations at the Innovation Center.



## University research-generated patents commercialized at the SCRA USC Innovation Center.

Microvide commercializes technology based on research discoveries made at the Medical University of South Carolina. The technology uses microdialysis and microfluidics to continuously monitor reactions and effects of therapeutics with the goal of individualized delivery of antifibrinolytic (blood loss) therapy.

Based on early results, Microvide received "Fast-Track" funding from the National Institute of Health and matching funds from SC Launch. Product development is underway at the SCRA USC Innovation Center in Columbia, SC.



## Ultraviolet light-emitting diodes are produced in SCRA USC Innovation Center's clean room.

Nitek, Inc. manufactures diodes for water and air purification in an 8000 square-foot clean room within the SCRA USC Innovation Center.

Nitek has received grants from the Missile Defense Agency, DARPA and the US Army. SC Launch recently matched a Small Business Innovation Research grant from the National Science Foundation.

## SCRA quickly delivers a lab for federally-funded nano-tech research.

Clemson University was awarded approximately \$6 million from the federal government to conduct research to develop carbon nanotube-based high-energy storage devices, superconducting wires and composites.

Clemson turned to SCRA to provide new world-class laboratory facilities specifically designed to support the research.

The new lab's location adjacent to SCRA's own advanced material laboratory will give researchers an opportunity to enjoy synergy and share ideas.



# SCRA has earned acclaim for commercializing new technologies and advancing economic development.



## International Economic Development Council

IEDC recognized SCRA and its SC Launch program for creating companies and jobs, regional partnering for job creation and innovative reuse of public space.

## SCRA CEO Named Executive of the Year

CEO Bill Mahoney was named the Executive of the Year, Non-Profit Organization, earning a Gold Stevie® Award at the 10th Annual American Business Awards.

Since joining SCRA as its CEO in 2005, Bill Mahoney has helped SCRA achieve record revenues, which more than doubled in six years. In keeping with that growth, the company's economic contributions in South Carolina also doubled in that time.

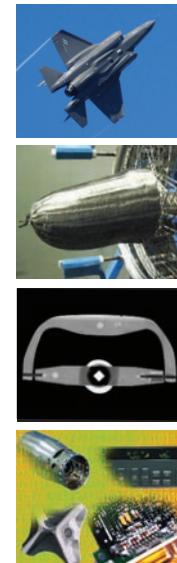


## Manufacturing Technology Awards

In 2011, an SCRA-led composite manufacturing team won a Defense Manufacturing Conference (DMC) Award for technology used to produce Joint Strike Fighter composite wings and engine housings. The approach resulted in a 50% improvement in production time and cost savings exceeding \$100 million. The team also won an award for improving the durability and comfort of prosthetics and orthotics for wounded men and women in uniform.

An SCRA-led metalcasting team won for digital radiographic standards for the inspection of aerospace castings.

In 2012, an SCRA-led product data standards team won a DMC award for interoperability solutions that improve technical data exchanges in defense supply chains.



# WALL STREET JOURNAL



**SCRA Applied R&D was recognized by the *Wall Street Journal* as one of the Top 15 Small US Workplaces.**

SCRA Applied R&D was selected by *The Wall Street Journal* and Winning Workplaces as one of the 15 Top Small Workplaces in the United States.

We were chosen from over 625 nominated companies based on criteria that included opportunities for employees to learn and grow, flexible work schedules, hiring from within, teamwork, values and performance-based compensation.



## SCRA's SC Launch program

was recognized by *Forbes* as one of the top performing economic development programs in the nation in its *States that Work* list.



**SCRA continues to gain national and international acclaim.**

SCRA earned a Gold Stevie® Award at the 10th Annual American Business Awards. This national award recognizes the achievements and contributions of businesses worldwide.

Also in 2013, the SC Launch program won a Gold International Economic Development Council Award for economic development.

2013

# SCRA completes our milestone 30th year with the best financial performance in our history.

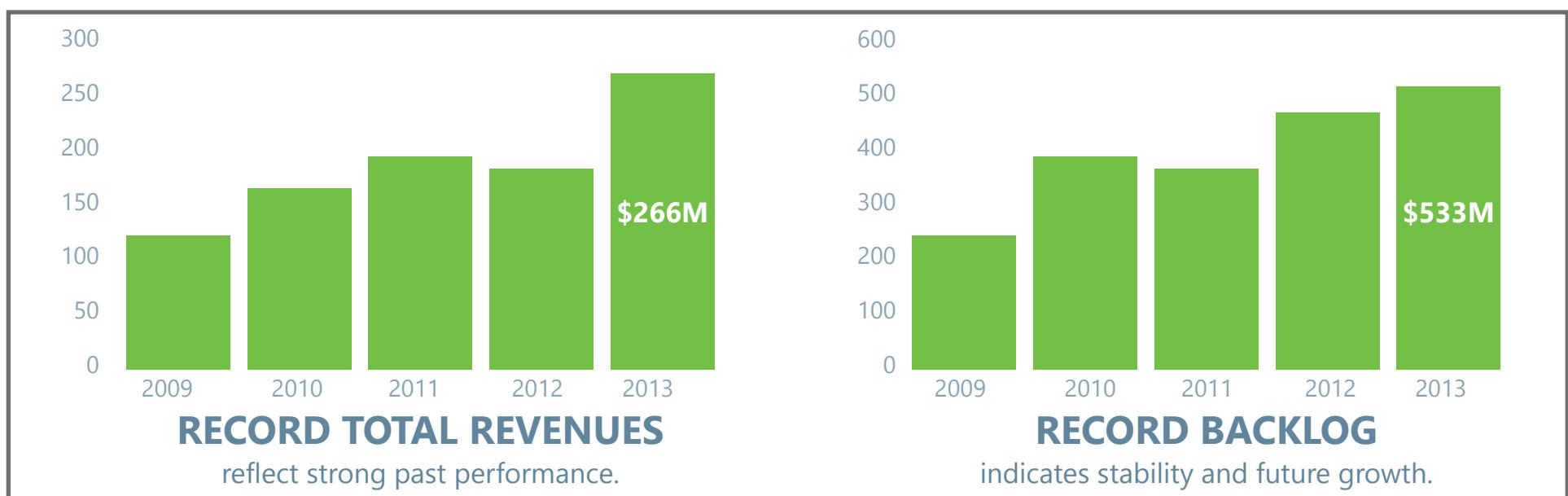
## SCRA revenues and backlog reached record high levels in 2013.

- SCRA core operating revenues: \$243 million
- The sale of SCRA's North Charleston property to Boeing generated an addition \$23 million in proceeds
- Net earnings: just over \$21 million; adjusted net earnings excluding property transactions: \$1 million
- Total backlog: \$533 million

## Year-to-year comparisons

- Normalized revenues: up 25% compared to 2012; Normalized operating earnings: up 15%
- Total assets: up 9%; Total net assets: up 40%
- Backlog: up 11%

SCRA's 2013 financial performance reflects the commitment, expertise and tenacity of our people in Applied R&D services.



# As we grow by delivering exceptional results to our clients, we are better able to fulfill our economic development mission.

## SCRA's financial success enables the ongoing execution of our economic development mission.

- SCRA's Technology Ventures programs made 21 investments in SC-based technology startups in FY13.

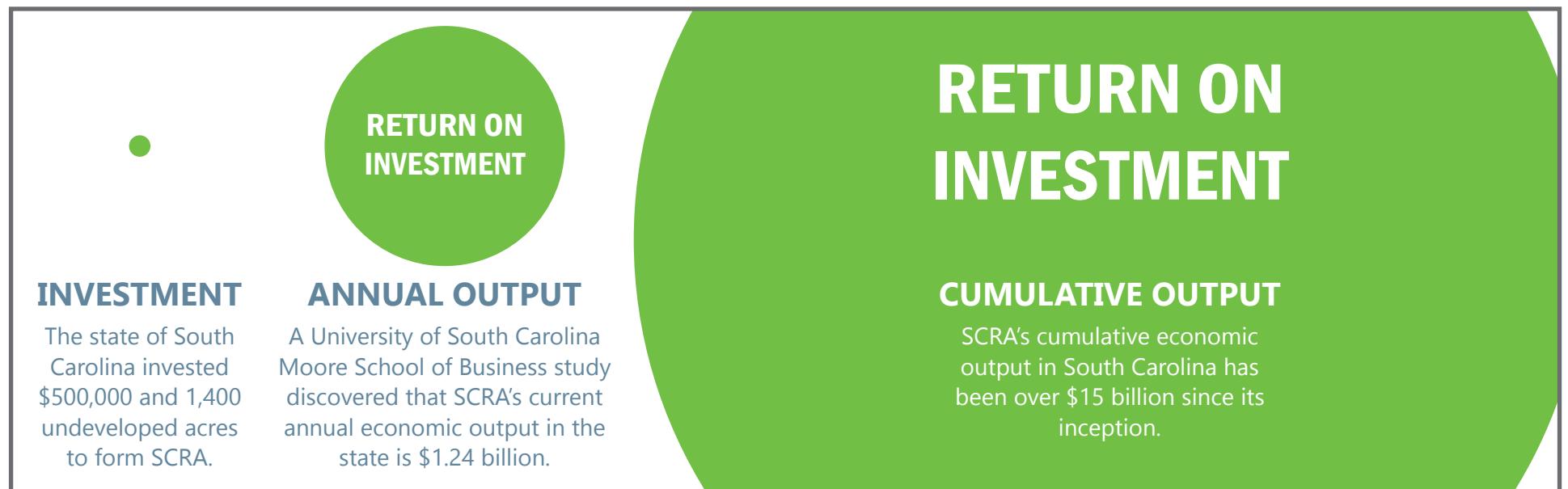
Since 2006, SCRA has

- Helped form or land over 280 startup enterprises in SC
- Deployed over \$69 million in company investments, Innovation Centers and program support to advance South Carolina's Knowledge Economy

## The results have been impressive and the impact continues to grow.

The top 63 startups, accounting for about \$15 million in SCRA's SC Launch portfolio investments, had by fiscal year end 2013 captured over \$217 million in add-on private capital.

Since 2006, SCRA has had eight exits from its Technology Ventures investments, generating an average IRR of 27%. All realizations from those exits, as well as overall SCRA operations results, have and will continue to be re-invested in the Company's Public Mission.



scra.org

