Meet the Middle:

Changing the Way America Builds

Jon Riley
Vice President, Digital Manufacturing
National Center for Manufacturing Sciences
The Ultimate Collaborative Network
Collaborate
(make it possible)

Innovate
(make it happen)

Commercialize
(make it to market)
WHY COLLABORATE?

[Logos of GE, Sandia National Laboratories, Ford, and Kodak]

WHY DO COMPANIES JOIN NCMS?
WHY COLLABORATE?
NCMS KEY INITIATIVES

CROSS-INDUSTRY COLLABORATION

PUBLIC/PRIVATE PARTNERSHIPS

SUSTAINABLE MANUFACTURING

ADVANCED ROBOTICS

DIGITAL MANUFACTURING
HELLO, MR. CHIPS

Procter & Gamble saved millions by digitally redesigning Pringles™ to reduce waste and improve processing, without changing the chip’s iconic shape.
Let’s Meet

The Missing Middle
WHAT IS THE MISSING MIDDLE?

IT’S EVERYWHERE
300,000 manufacturers in the U.S. alone have fewer than 500 employees.

IT’S OUR LIVELIHOOD
These companies are responsible for about 12,000,000 direct jobs, and about 18,000,000 indirect jobs.

IT’S ESSENTIAL
That’s more than twice the total employment of all larger manufacturers combined.
IN 1982,
Manufacturers with more than 500 employees conducted about 72% of all R&D in the manufacturing sector.

BY 2010,
The situation was reversed. Large manufacturers pushed all but 28% of R&D down onto the Missing Middle.
IT’S ALL ABOUT THE TOOLS

DO IT IN DIGITAL

To stay competitive, the Missing Middle needs digital manufacturing.

HPC

High Performance Computing to dominate data.

MS & A

Modeling, Simulation, and Analysis to predict, optimize, and excel.
ANOTHER “MISSING MIDDLE”

Desktop computing can only get you so far. The Missing Middle really needs more advanced capabilities to drive tomorrow’s innovations.

<table>
<thead>
<tr>
<th>Basic</th>
<th>Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users</td>
<td></td>
</tr>
</tbody>
</table>

High Performance Computing
- Modeling & simulation
- Design/process optimization
- Predictive analytics

Supercomputing
- Hard science
- Ultra-complex simulations
- Brute force math

Desktop Computing
- Home and office use
- Multimedia tasks
- Basic CAD and design
In 2010, NCMS surveyed Missing Middle companies about their level of access to digital manufacturing capabilities. Their responses were not encouraging.

- 84% None at all
- 12% Basic only
- 4% Advanced
IN 2010, NCMS surveyed Missing Middle companies about their level of access to digital manufacturing capabilities.

The 4% that do have access to MS&A often enjoy enormous competitive advantages and return on investment.

Their responses were not encouraging.

84% NONE AT ALL 12% BASIC ONLY 4% ADVANCED

THE FOUR-PERCENTERS
DOUBLED DOWN

L&L Products invested in a modest HPC cluster in 2001. A decade later, it had **doubled in size, revenue and profits.** It’s not even in the Missing Middle any more!
PLASTIC MAKES PERFECT

Jeco Plastics improved FEA and cut development time, landing a multi-million dollar annual contract to produce new plastic pallets for an automaker.
Aerospace company ACE Clearwater slashed prototyping time by 50% when it piloted digital manufacturing tools. Now, the story doesn’t end there...
THE CHALLENGES

**TECHNICAL**
Hardware and software can be expensive and is often inadequate

**BUSINESS**
ROI has been proven, but specifics remain poorly defined

**PERCEPTION**
Misconceptions about the high cost of HPC and MS&A remain

**ADOPTION**
Early adopters have seen major success, but invested heavily up front

Smaller manufacturers lack expertise in digital manufacturing tools

Decision makers have to be convinced of the technology’s promise

Many still believe the technology has no real use in manufacturing

There is no easy way for the Missing Middle to adopt the tools
REACHING THE MISSING MIDDLE

Many organizations in the Missing Middle are not very visible. Finding them and exposing them to the tools is a crucial driver for success.
THE SOLUTION

COLLABORATION
Build a cross-industry coalition to identify and break down barriers
Collectively establish a plan and best practices for nationwide adoption

INFRASTRUCTURE
A national innovation network that provides secure access to all
Leverage existing HPC infrastructure and build new web-based portals

OUTREACH
Educate the Missing Middle on the benefits of digital manufacturing
Create a new online community for adopters to collaborate and learn

ACCESS
A secure online portal acts as a national digital manufacturing hub
Continuously improve tools and develop new solutions over time
PREDICTIVE INNOVATION CENTERS

A new national infrastructure to empower the Missing Middle. PICs will provide secure access to digital manufacturing tools, along with the training and community to support them.
CHANGING THE WAY AMERICA BUILDS

Bringing Digital Manufacturing Tools to the Missing Middle
THE APPROACH

EDUCATE

ENTICE

ENGAGE

ELEVATE
Thank You

Meet the Middle:  
*Changing the Way America Builds*

Jon Riley  
Vice President, Digital Manufacturing – NCMS  
jonr@ncms.org