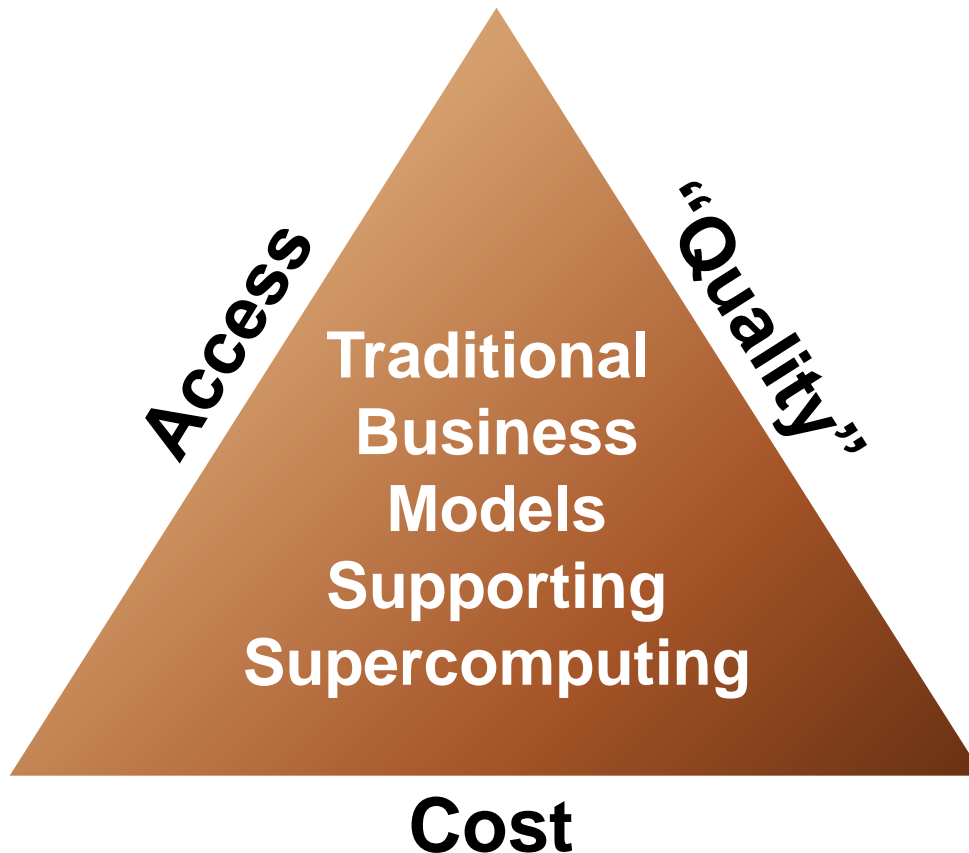




The Missing Middle: RMSC's Approach to Adoption & Outreach of HPC for Regional Economic Development

Earl J. Dodd
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The Problem: Iron Triangle

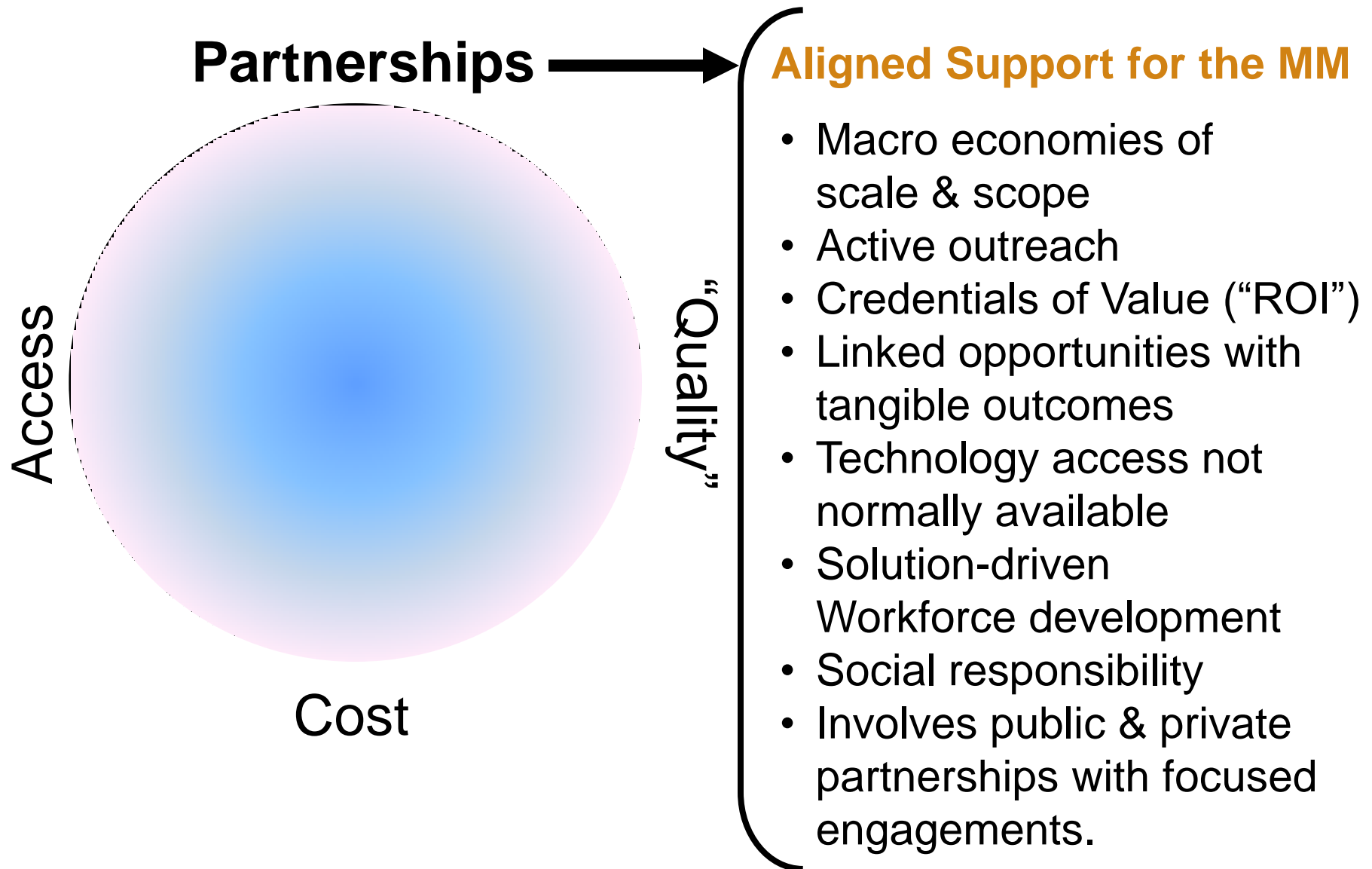


Outmoded Business Model

- Assumption is that quality, exclusivity and expense correlate an outcome.
- It is futile to think that current business models can ever extend beyond the elite, the Labs. and those with means.
- Fuels endless debates, government involvement, funding, standards, etc.

Access = On demand, ISV-enabled or Licensable Applications, Network Capacity, Security
Quality = Expertise, Cultural Inertia, Politics, Client's Time Availability, Trust, ...

The Solution: Breaking Free



The RMSC Approach: *MORE Opportunity*

(Maximizing and Optimizing Research and Educational Opportunity)

Agility

(The “New Capability”)

Wide Scalability

RMSC is breaking free from Academia’s Iron Triangle by applying a new business model as an active, working Public-Private Partnership.

Affordability

Focus on Underserved

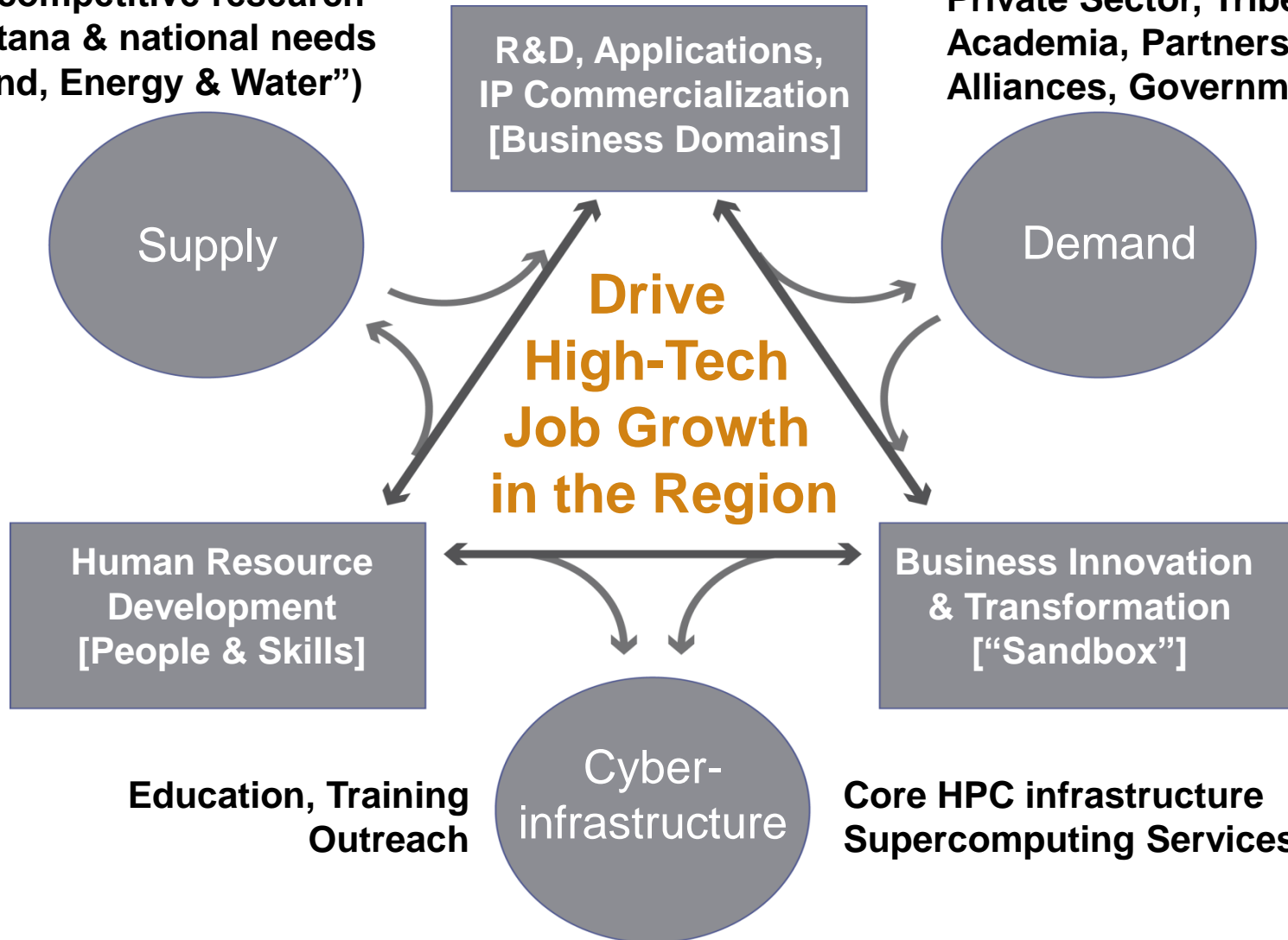
Mission: STEM Education

- Give underserved Montana students & groups access to HPC
- Team with educational institutions, tribal groups, businesses & communities in research projects
- Solve real-world problems while teaching 21st Century technical skills building & securing the *Workforce of the Future.*

RMSC in a Nutshell...

**Int'l competitive research
Montana & national needs
("Land, Energy & Water")**

**Private Sector, Tribes,
Academia, Partnerships &
Alliances, Government**



Building Tomorrow's Workforce Today™

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RMSC Workload or Transaction Taxonomy

■ Throughput Transactions

- Harness raw compute power of individual compute elements of the IBM 1350 – the Nodes – to provide higher-throughput for non-HPC transactions.

■ Parametric Transactions

- Usually modeling/simulation transactions that require lots of parameters that need to be adjusted over multiple “runs” to generate output that must be analyzed to “hone” solution.

■ Analytic Transactions

- Take large amount of input conditions, perform an evaluative process [Black Box] on these conditions and generate a result that says something meaningful or insightful about the input data.

■ COTS-based Transactions

- Commercial Off-The-Shelf software designed to run in cluster environment. Engineering applications; microbiology; genetic mapping; mathematical analysis; statistical analysis

■ HPC Transactions

- Typically “hard science” type problems requiring a decomposition of the problem to allow different elements of the cluster to work on the problem in tandem with the result typically resulting in large data sets that can need further analysis or visualization to make sense of the underlying “science” or insight.

RMSC Project Development Phases

Phase-I Development of Prototype of Project on HPC Environment

During this phase, the project is loaded onto the Big Sky HPC system and code is either directly developed on the system, or more commonly, the code is altered in some fashion to take advantage of and better match the specific architecture associated with the Big Sky HPC system. This phase can last for months, but would typically last no more than one (1) year at the most.

Phase-II Demonstration Project

During this phase, the project is usually tasked with exhibiting some “optimization” or “solution” to a specific problem from the target problem domain space. Generally, the problem to be solved, or optimization task, is related to the overall project, but in and of itself, is not the desired problem to be solved. This phase can last for up to two (2) years, but would more typically last approximately six (6) months to a year.

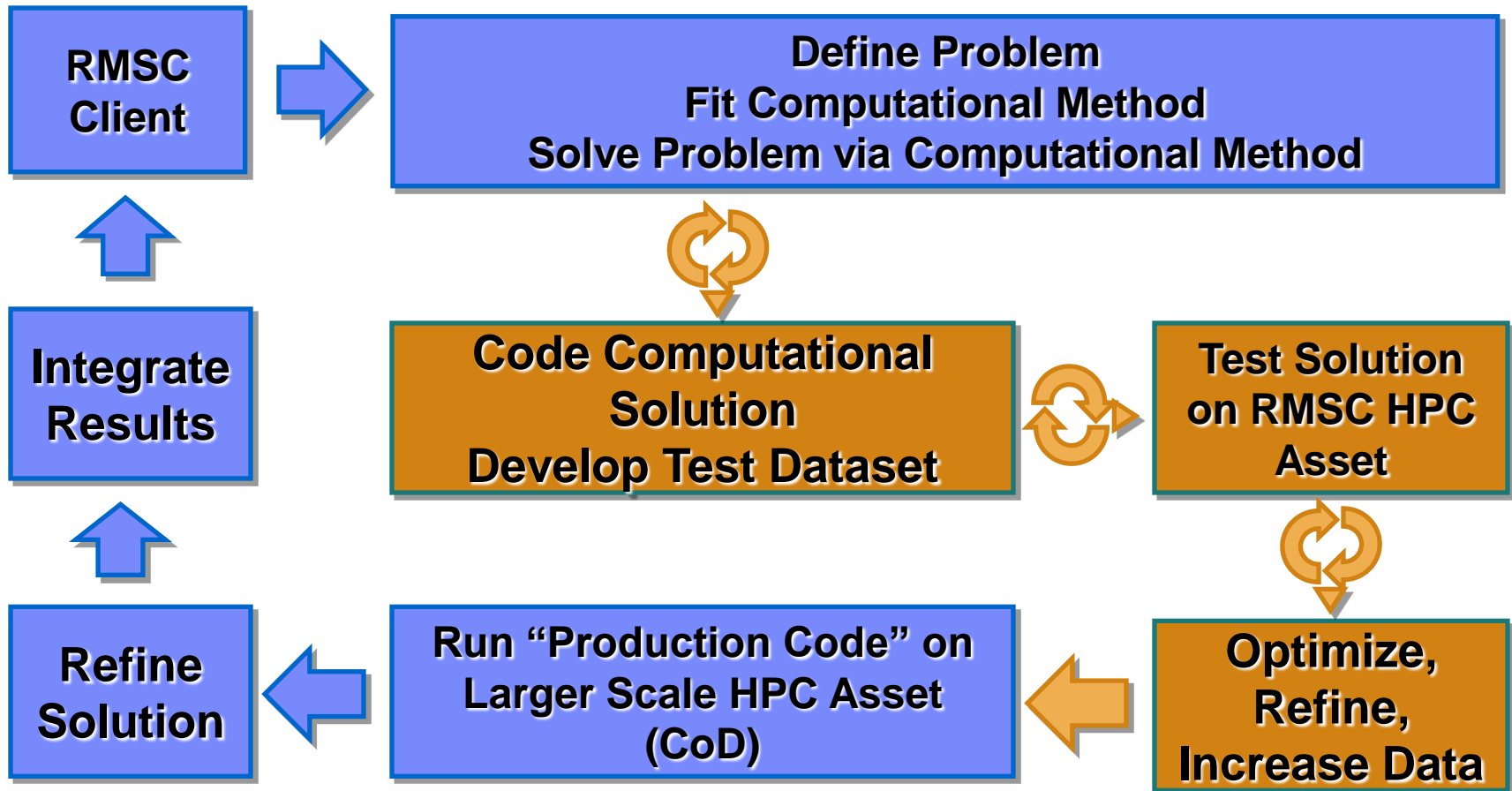
Phase-III Production Environment

During this phase, the project is usually tasked with exhibiting some “optimization” or “solution” to a specific problem from the target problem domain space. Generally, the problem to be solved, or optimization task, is related to the overall project, but in and of itself, is not the desired problem to be solved. This phase can last for up to two (2) years, but would more typically last approximately six (6) months to a year.

Phase-IV Higher Computational Power

This phase is related to those projects that have marched through all of the above three (3) phases above, but required additional computation power (scalability) to solve the problem under study in a reasonable time. This phase may also be reached as a result of testing a solution’s scalability under different constraints. One would expect this phase to last on the order of weeks or months as a demonstration of scalability or running a “fully scaled production” run of the solution. Most of the “readying” of the solution for this kind of scalable run would have taken place in Phase-III.

RMSC Development Model



RMSC Definitions of Engagements

■ Partnership

- A formal relationship with an HPC Vendor
- A formal relationship with an ISV (independent software vendor) or IHV (independent hardware vendor) Supplier

■ Collaboration

- A formal relationship with an entity that requires supercomputing resources, expertise or end-results
- A formal relationship with an entity that makes available a special tools or capability to solve a project need
- Can be a hybrid or complex relationship formed with a combination of partners, alliance, and/or collaborator members

■ Alliance

- Linkage to an existing or new HPC center, laboratory or institute
- Generally associated with another computing resource linked by a high-speed network into the “cloud”
- Can be seen as “Coopetition”

■ Project

- An officially defined and tracked opportunity or activity to generate revenue, business development, outreach, or marketing outcomes
- Generally associated with a COE but can be conducted directly via independent 3rd parties
- A partnership, collaboration or alliance must have at least one project.