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The Materials Genome Initiative: Opportunities for Materials Research to Accelerate Discovery

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http://www.whitehouse.gov/sites/default/files/microsites/ostp/materials_genome_initiative-final.pdf

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To help businesses discover, develop, and deploy new materials twice as fast, we're launching what we call ***the Materials Genome Initiative****. The invention of silicon circuits and lithium ion batteries made computers and iPods and iPads possible, but it took years to get those technologies from the drawing board to the market place. We can do it faster.*

-President Obama
Carnegie Mellon University, June 2011

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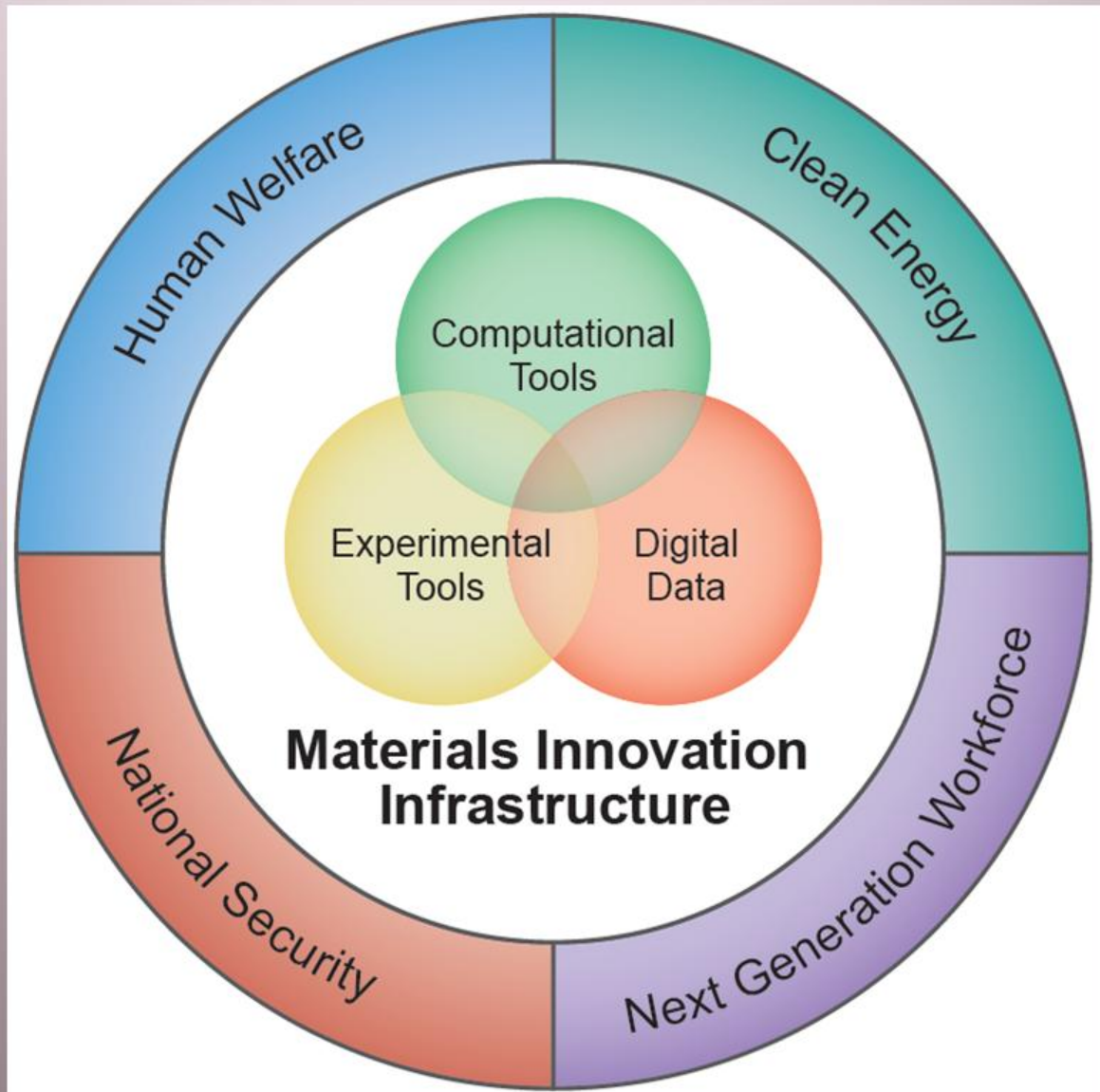
The Materials Innovation Infrastructure

Goal: *decrease the time-to-market by over 50%*



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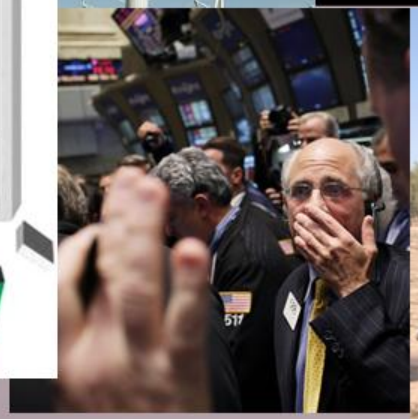
We live in interesting times …

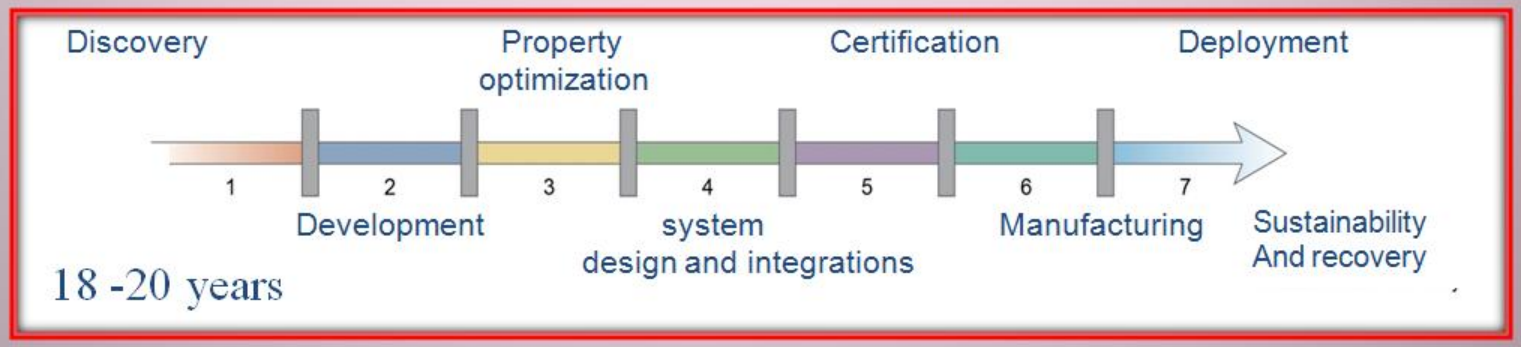


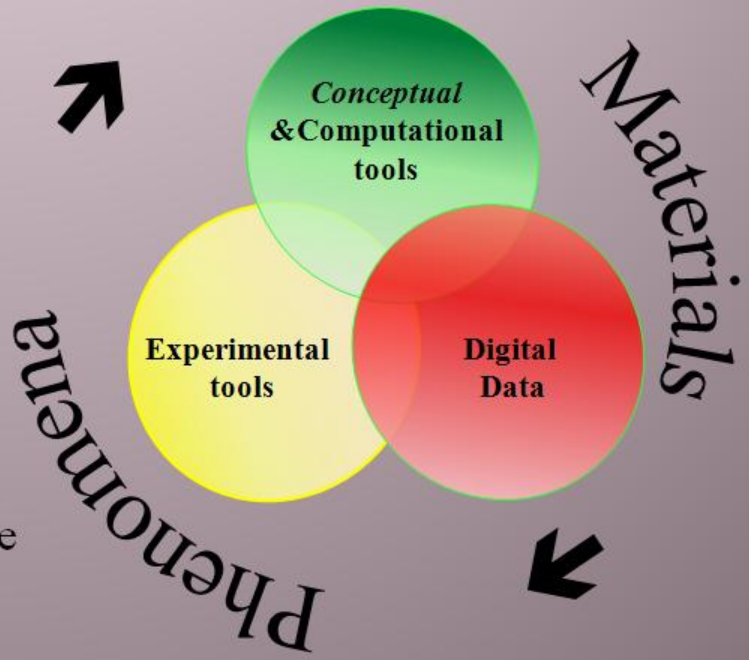





Sustainable Energy Pathways NSF 11-590 Deadline 1 Feb 2012
Teams of 3; address 2 main issues; $0.5M/yr for 4 years & More
http://www.nsf.gov/sees

Materials Genome Initiative New paradigm: "twice as fast, at a fraction of the cost"





Material Genome Infrastructure

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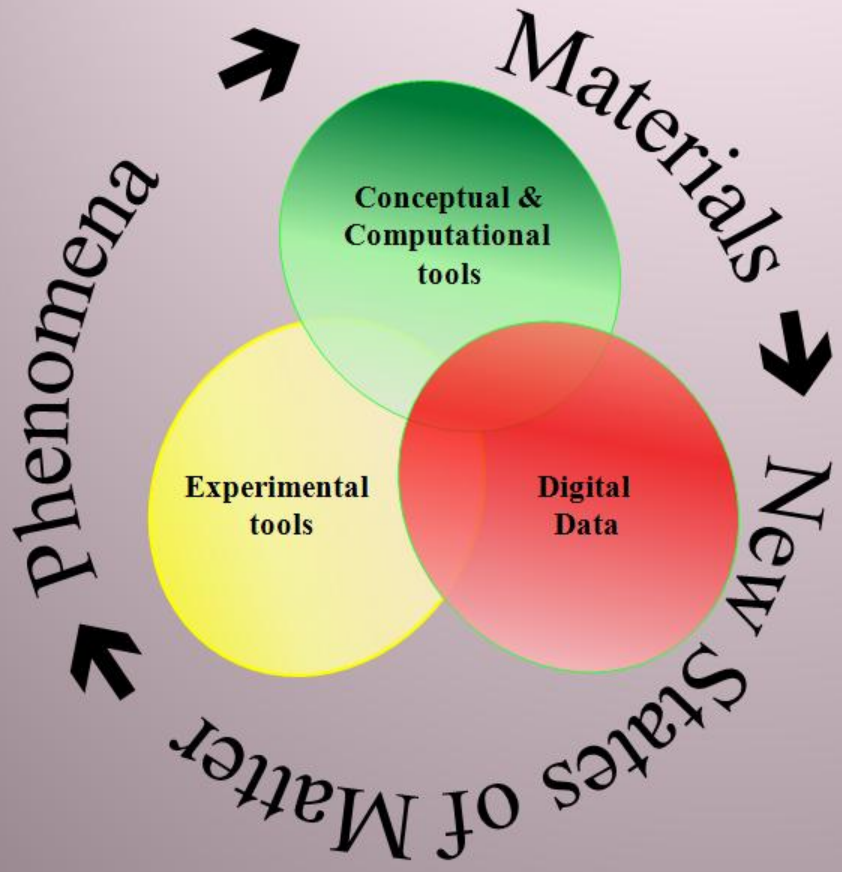

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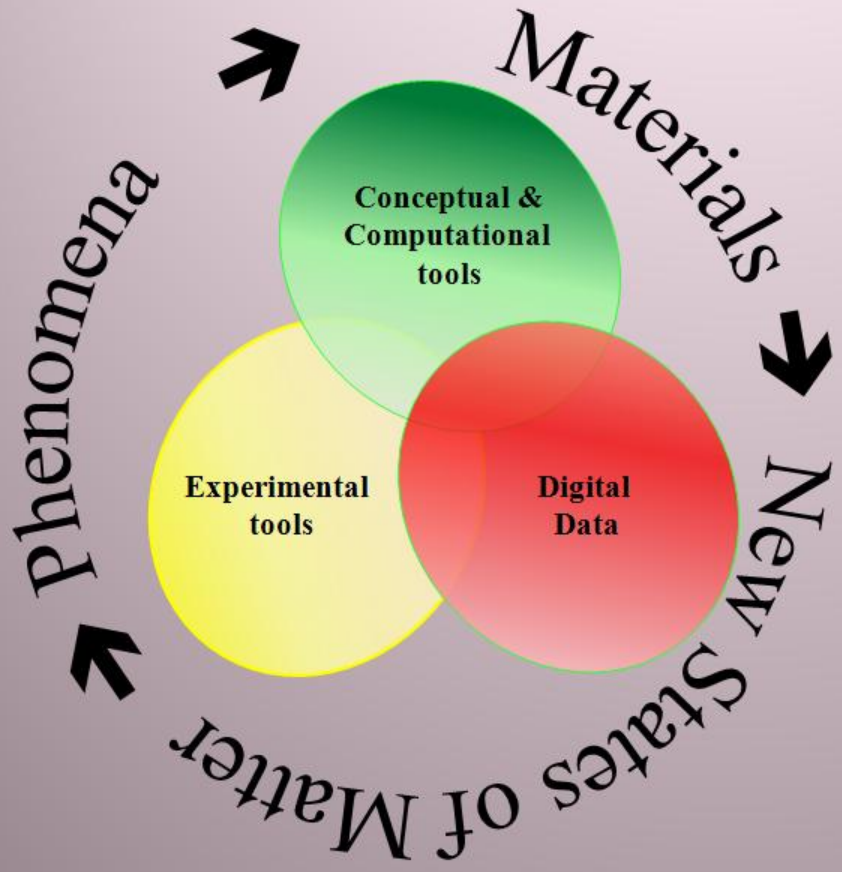

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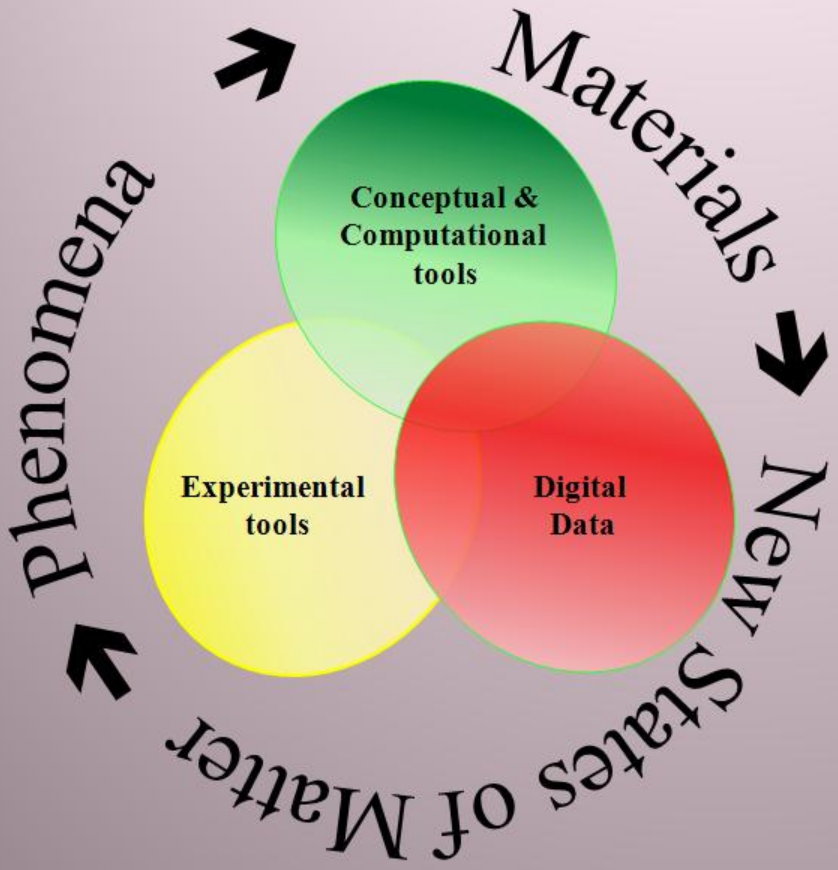
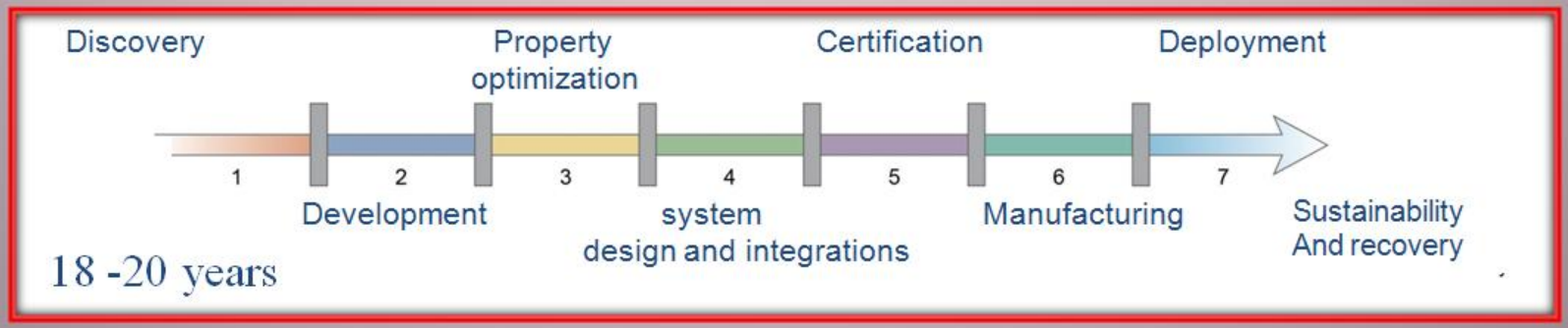


Can we accelerate and amplify discovery?

MGI: "twice as fast, at a fraction of the cost



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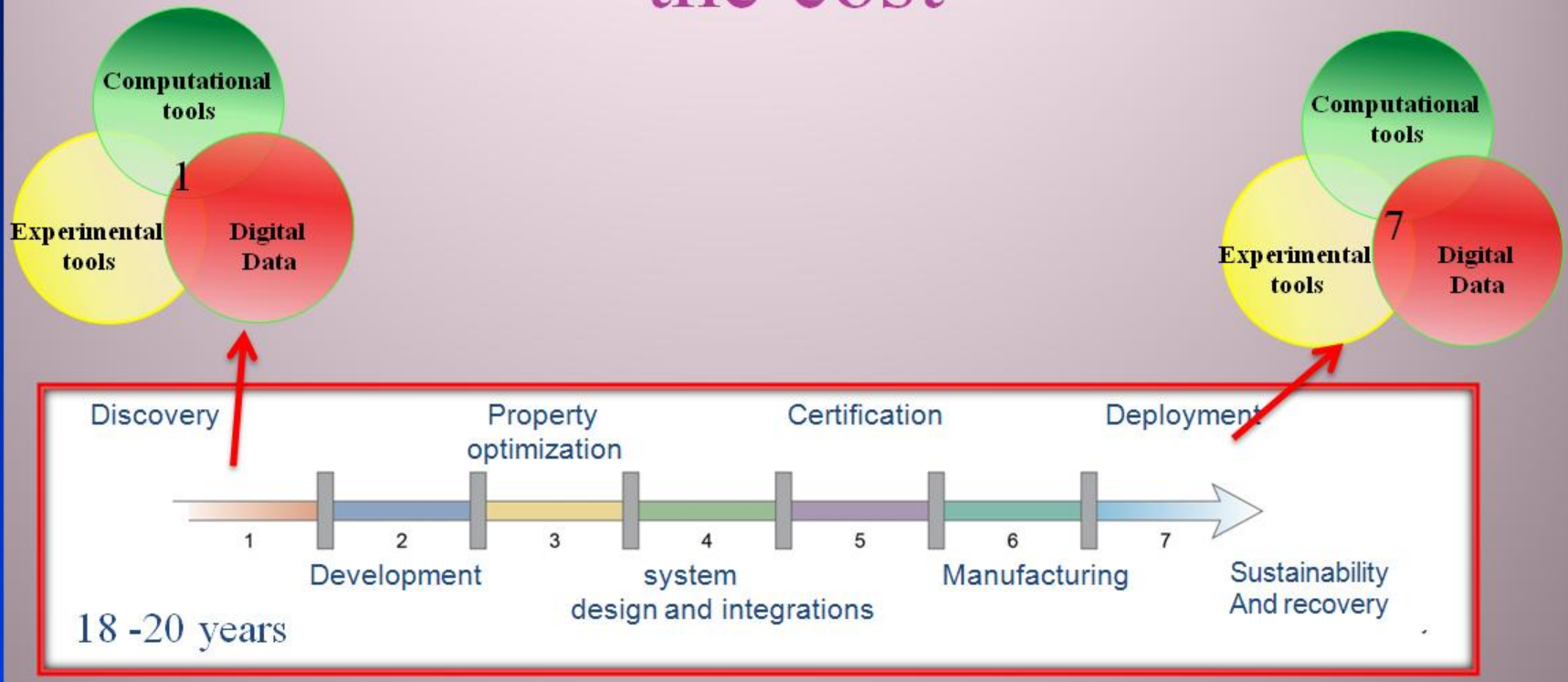

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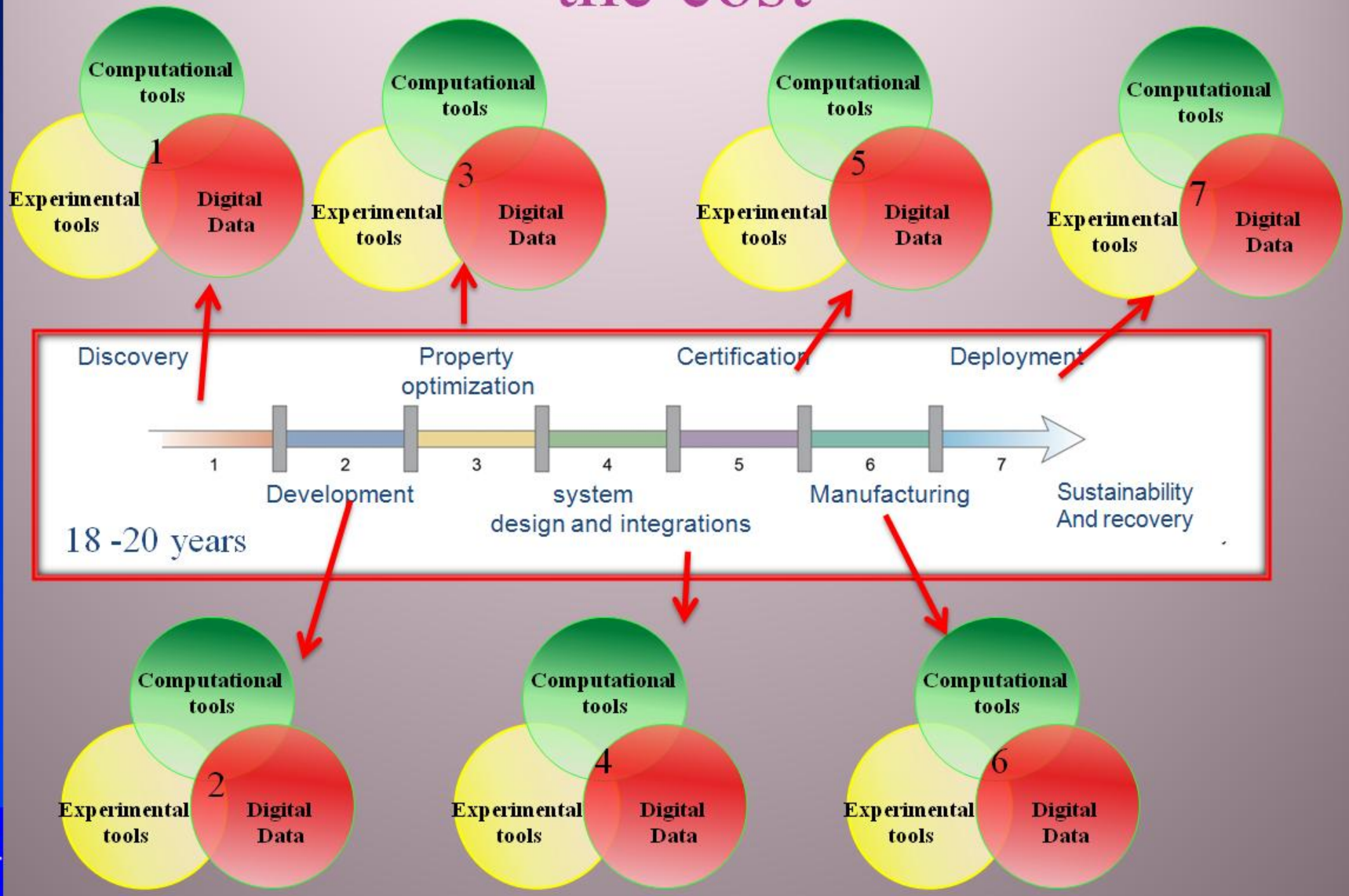

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MGI for Global Competitiveness

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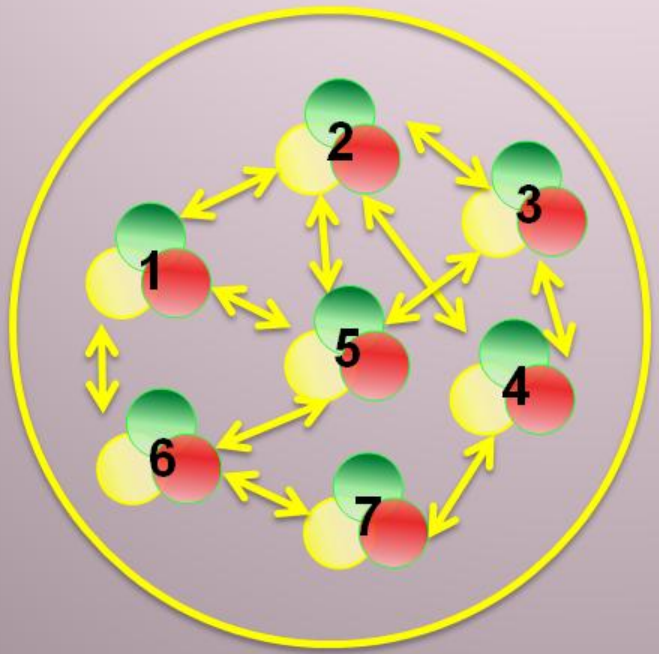
Materials Genome Initiative for Global Competitiveness



1. Discovery
2. Development
3. Property Optimization
4. System Design & Integration
5. Certification
6. Manufacturing
7. Deployment & Sustainment

Number of Materials "to Market"

1 2 3 4 5 6 7

3- 5 years

Time (yrs)

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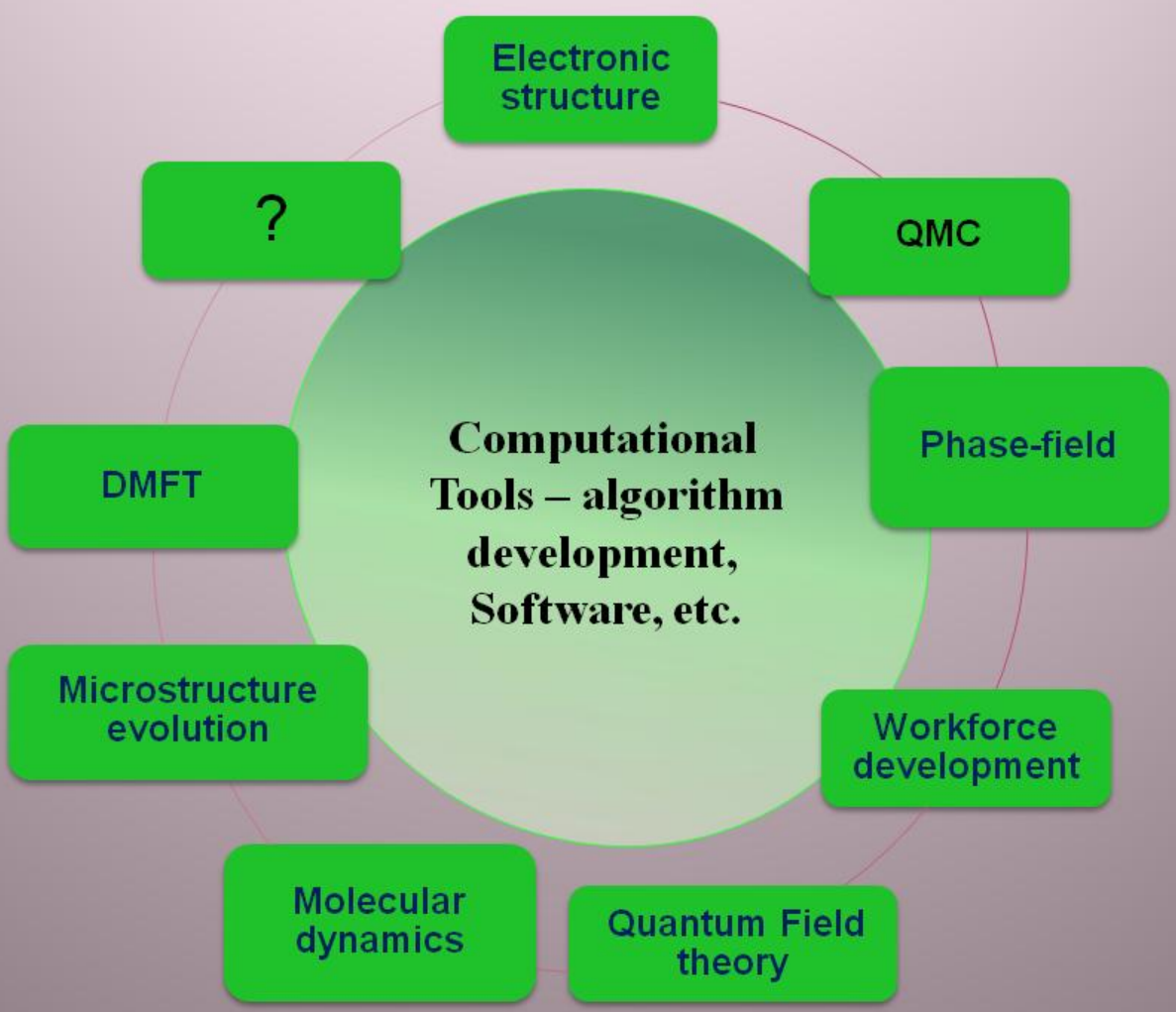
Software and algorithm development for acceleration at each stage of the continuum



Software and algorithm development

What will be in your 'toolbox'?

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Software and algorithm development

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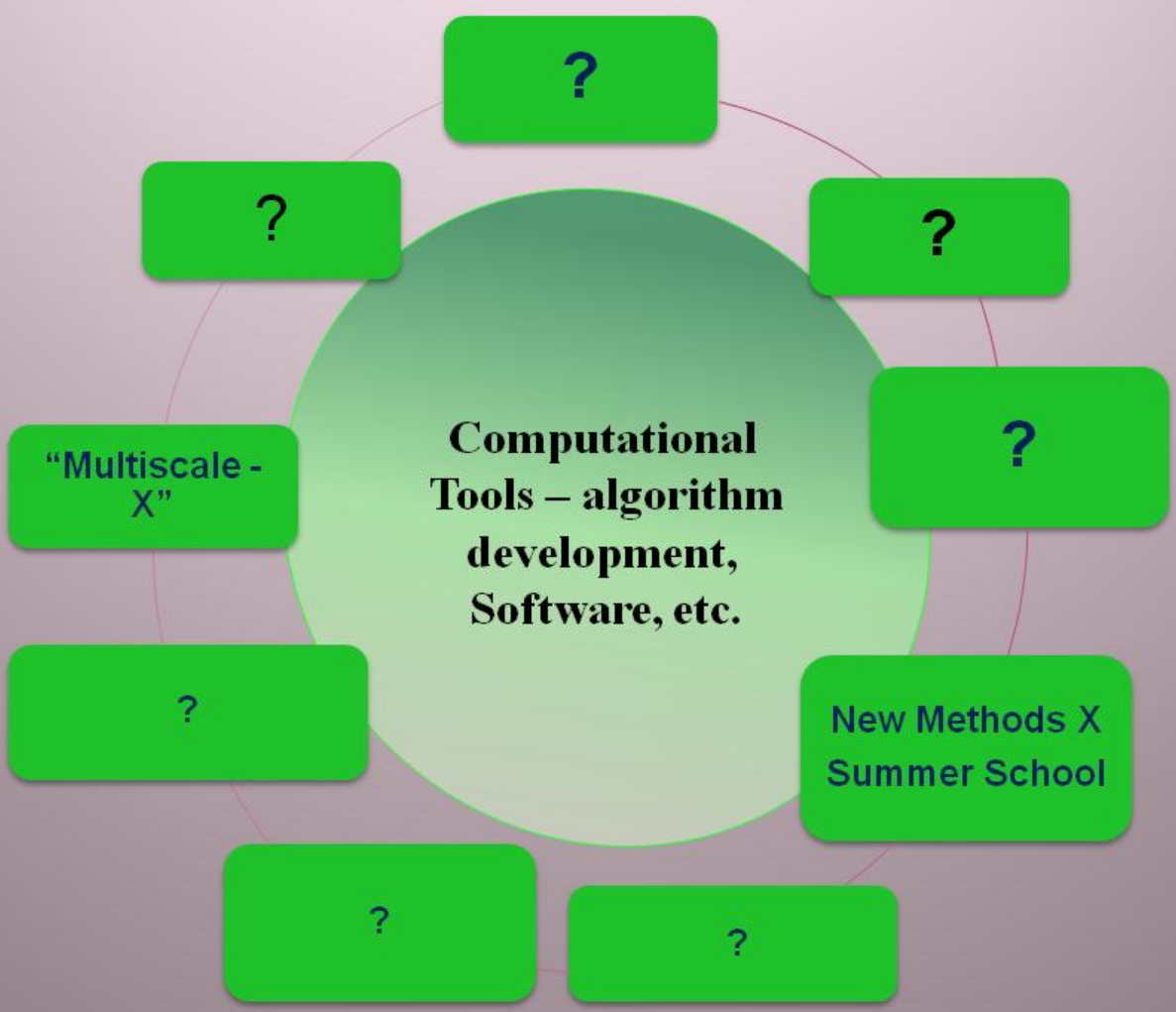

Data for accelerated discovery of new materials and phenomena – new paradigms?

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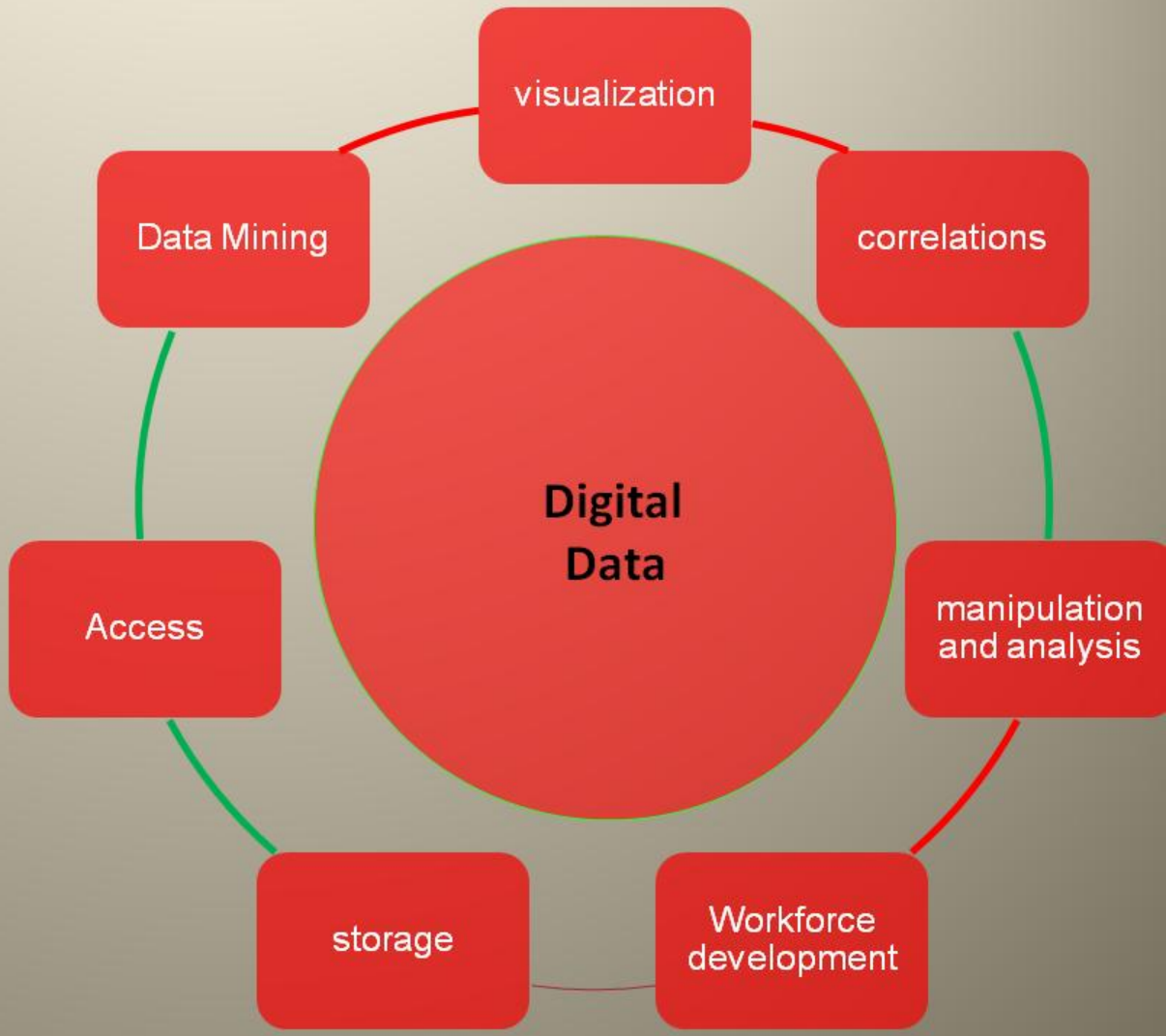

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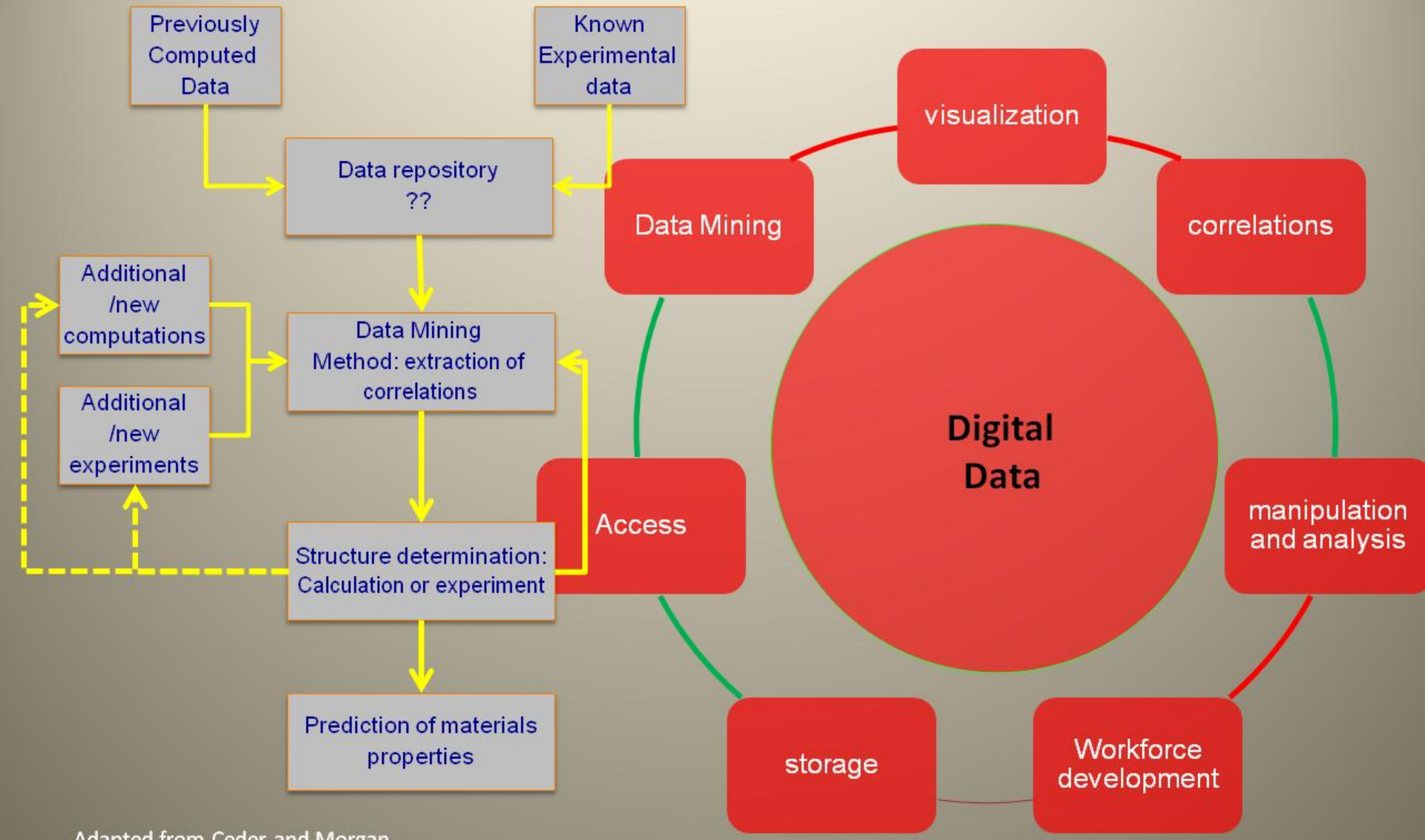

Adapted from Ceder and Morgan

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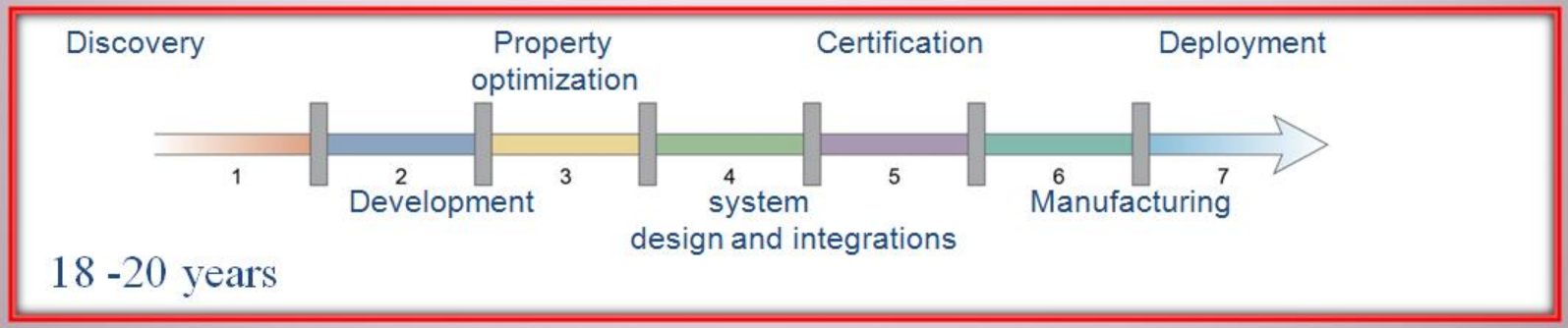
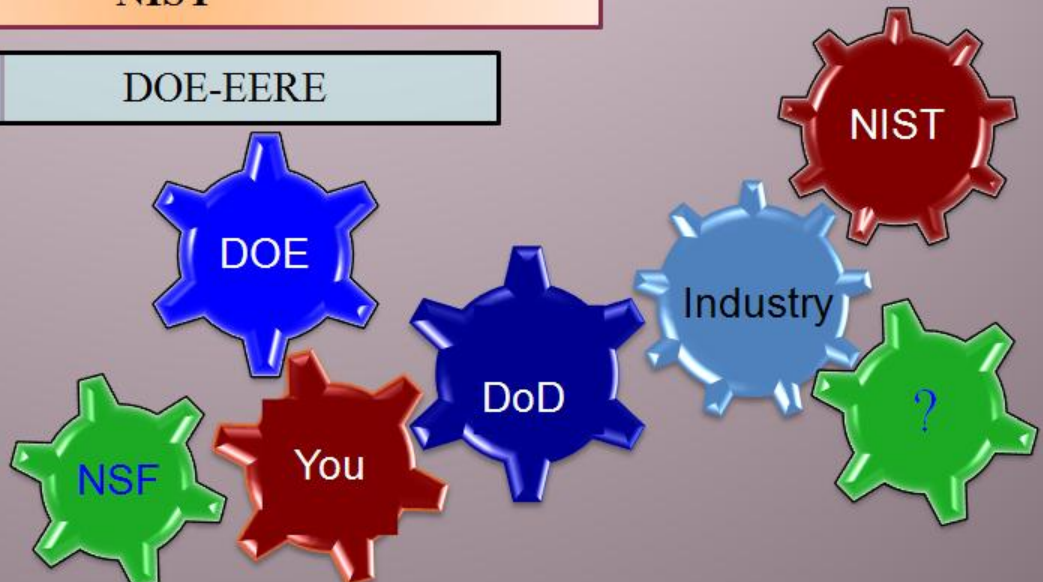
A multi-agency partnership





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Dear Colleague Letter – Submission Window: January 15 - February 15

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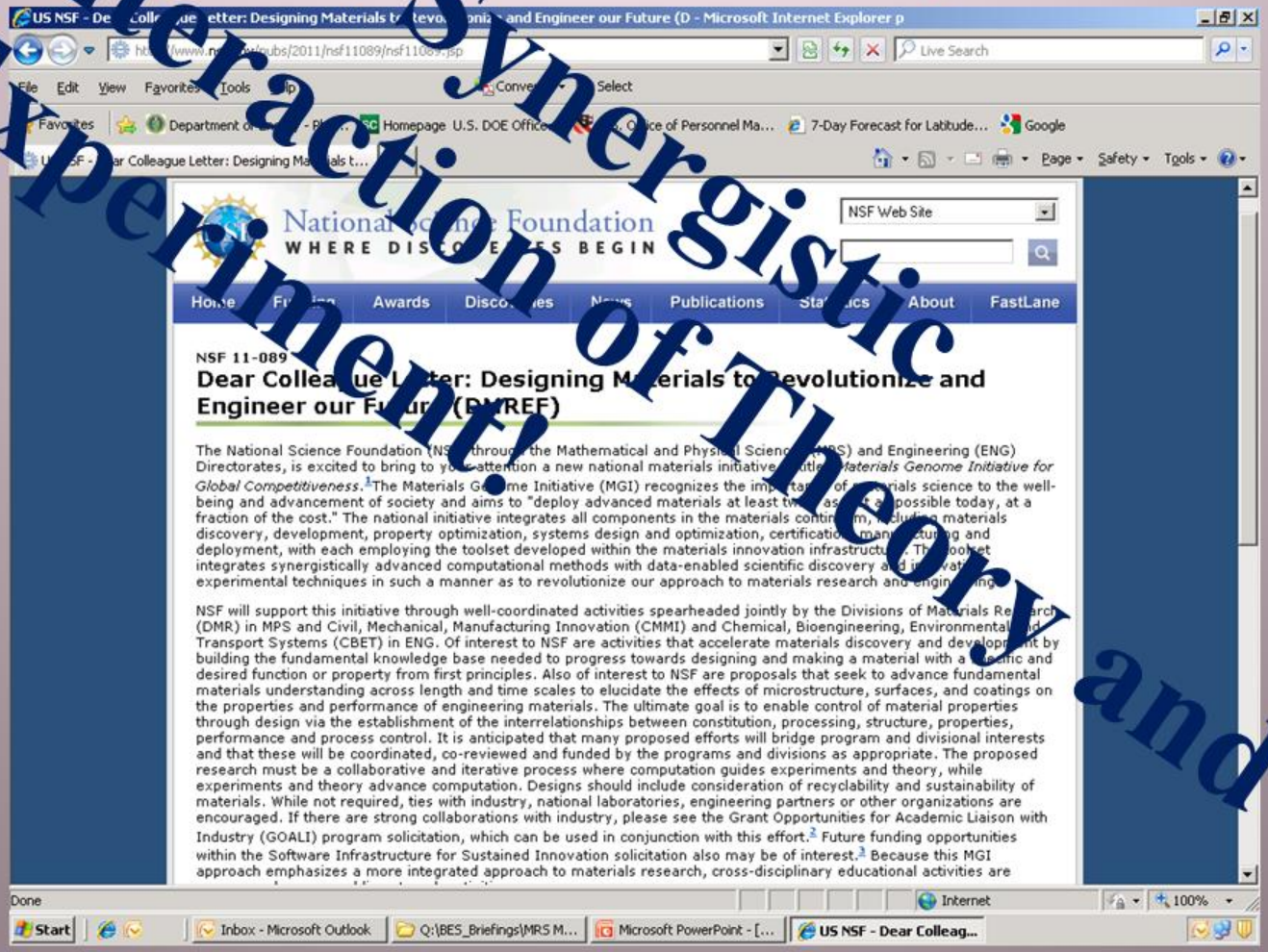
FRG: Synergistic Interaction of Theory and Experiment!



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Some Questions for Discussion

What will the MGI 'materials discovery' environment/infrastructure look like?

- What are the scientific opportunities?
  - How do we find the next: TI? HTSC? ***Surprise!***?
  - What are the conceptual gaps?
- How do we bridge the gaps in the discovery process?
  - *Concept → Cyber-realization → 'I can hold it my hand!'*
- How can we build on what we know / have done?
  - *The role of data: What do we need? How do we access it? …*
- What 'tools' are needed?
  - **Formal & computational methods, data repositories, materials discovery collaboration networks, …**
- How do we give this to the next generation? ***Progress …***

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Some Questions for Discussion

What will the MGI 'materials discovery' environment/infrastructure look like?

- How will we use it?
- What will we do?
- What will we discover?
- …

It is up to You!