

Grand Challenges

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NEW CUYAMA

Population

562

Ft. above sea level

2150

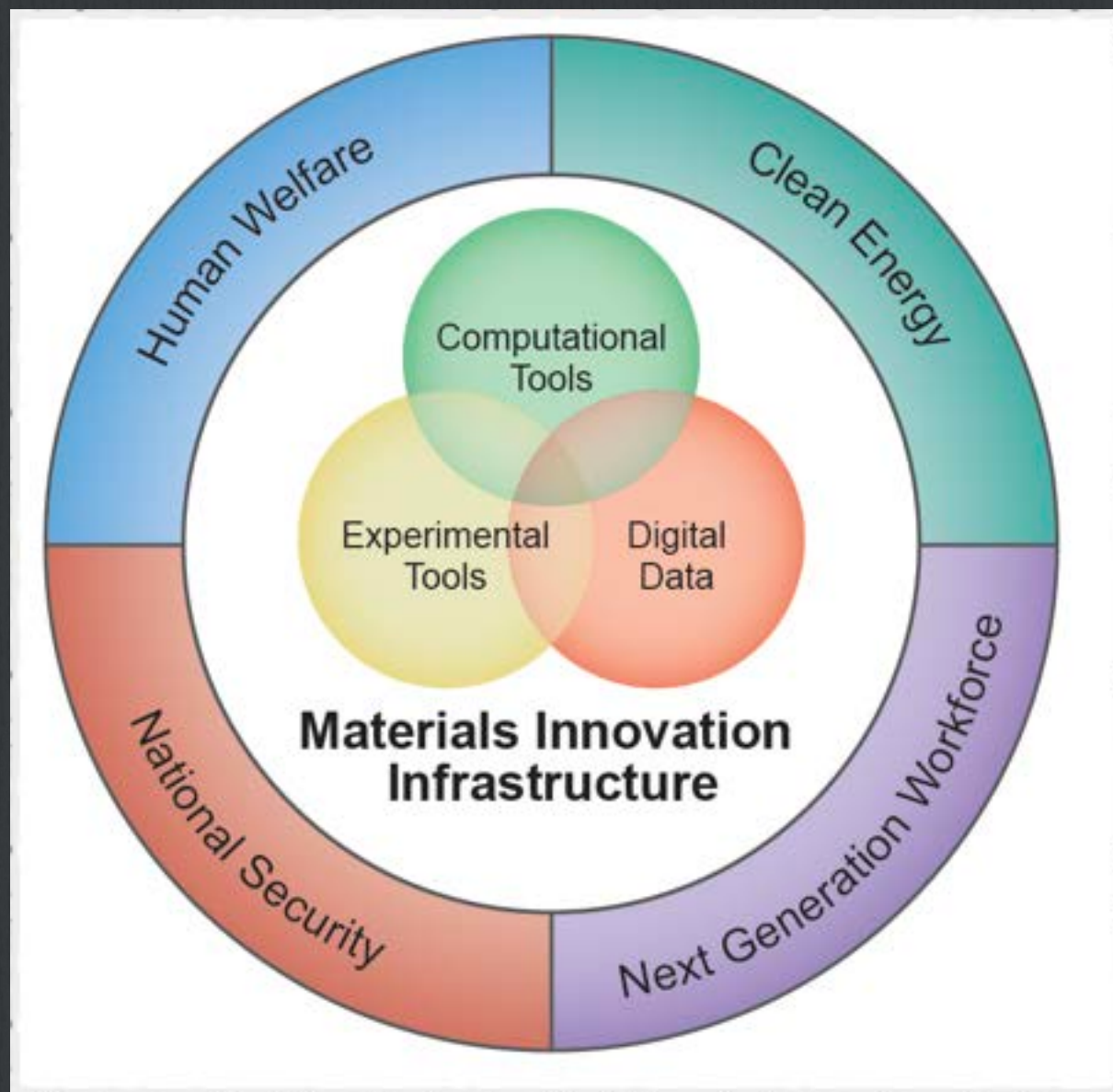
Established

1951

TOTAL

4663

To decrease time-to-market by 50% while <\$\$

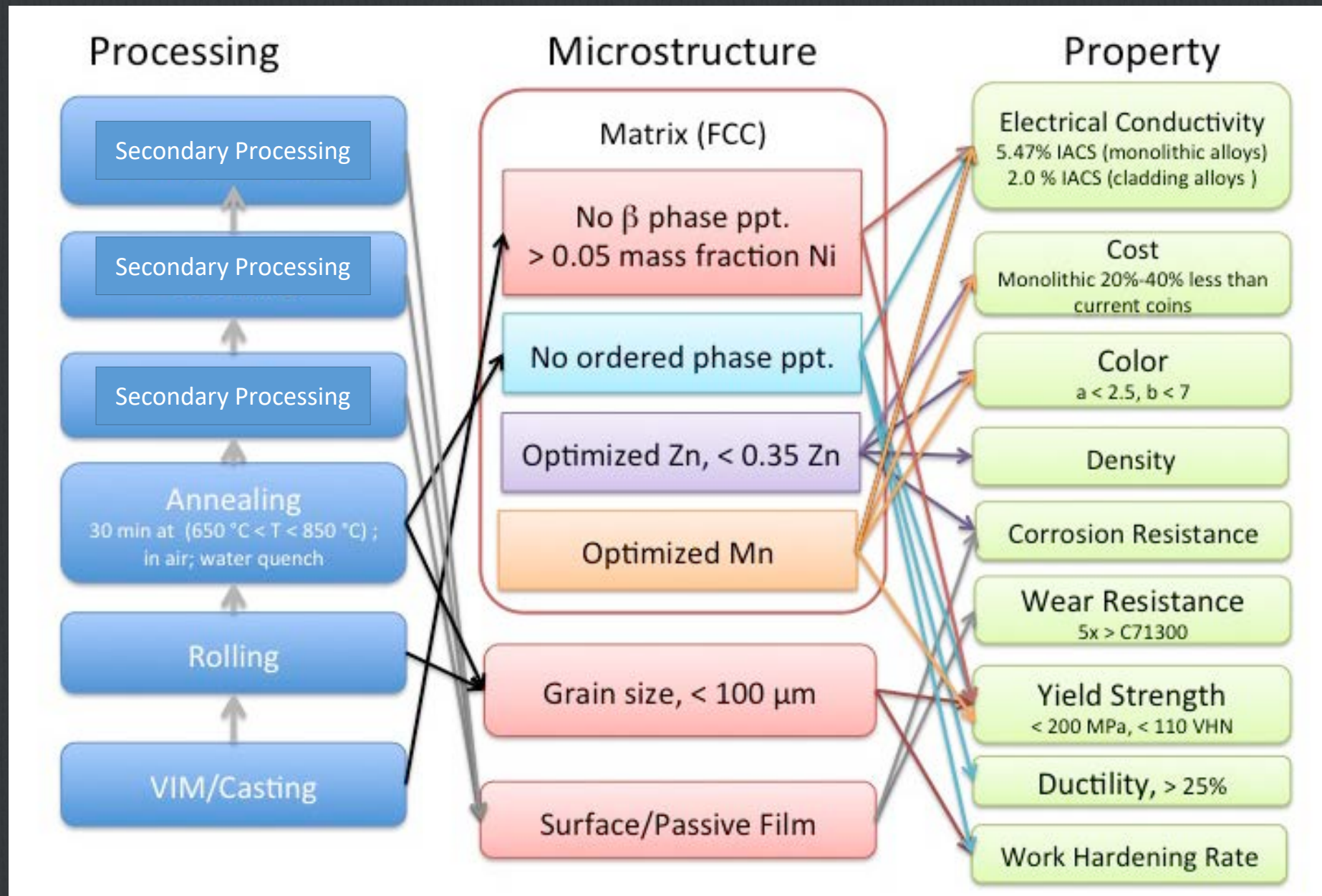


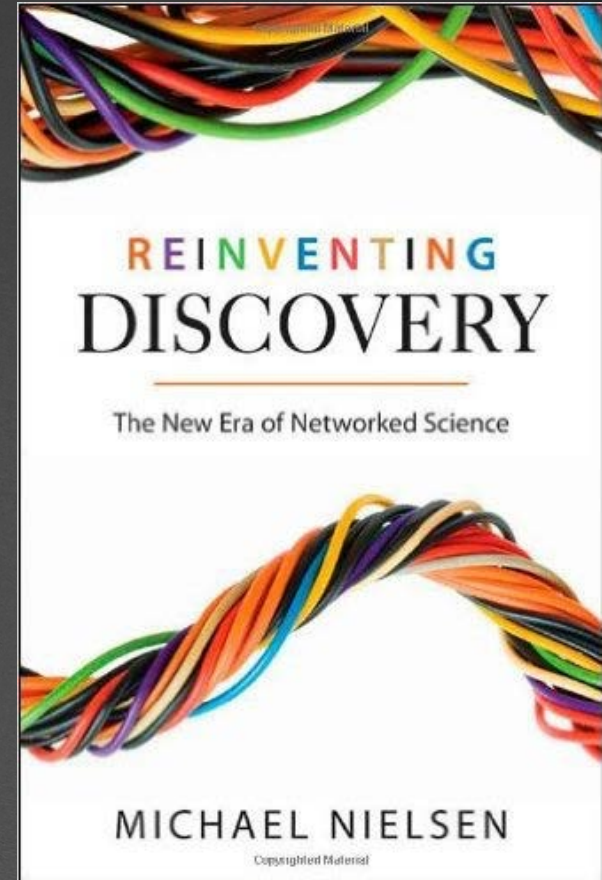
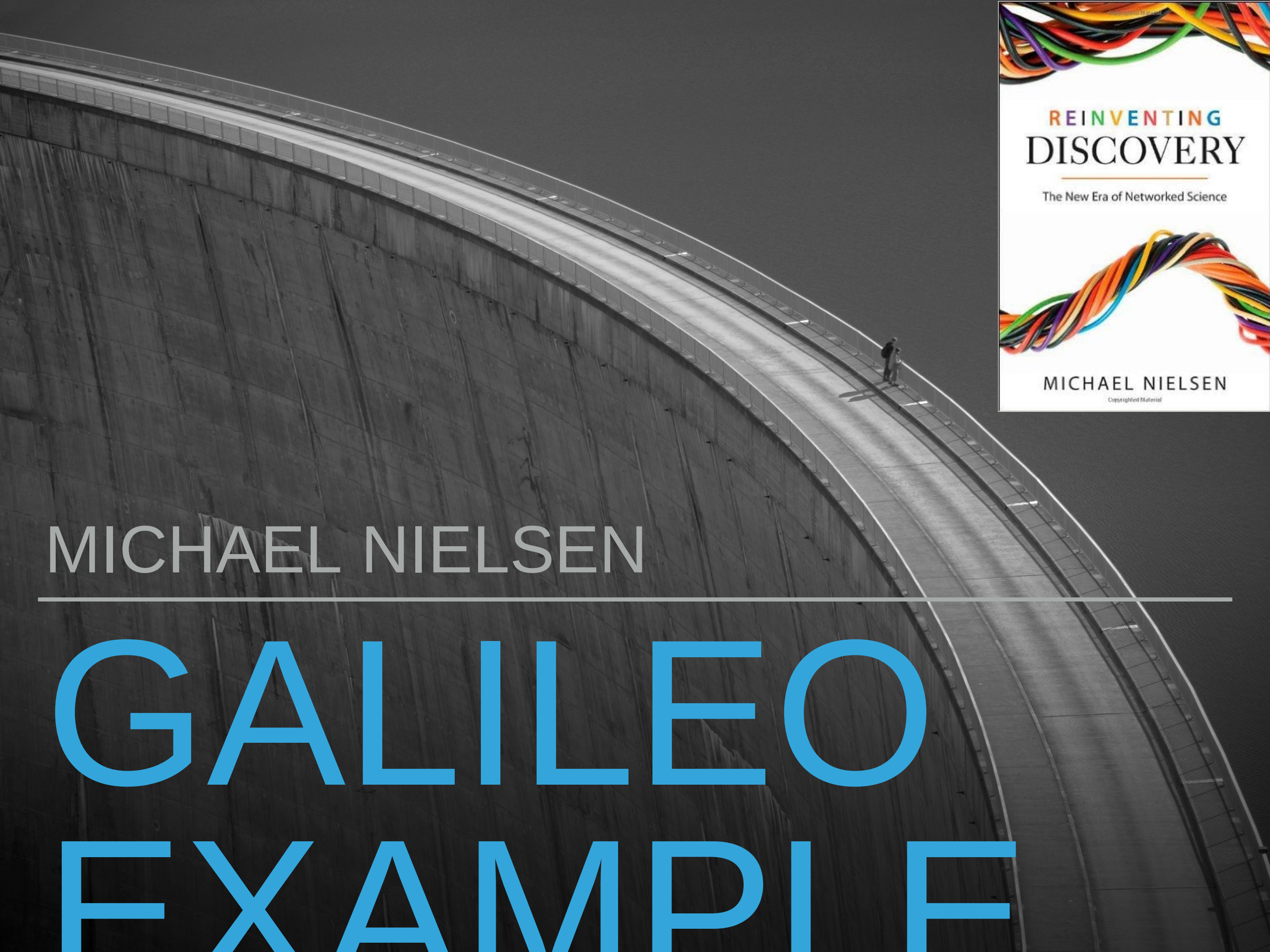
- Develop a Materials Innovation Infrastructure
- Achieve National goals in energy, security, and human welfare with advanced materials
- Equip the next generation materials workforce

Some Reflections

- Importance of Models in general
 - AI is a method for creating a model (descriptors and predictions)
 - AI might be viewed as a method for “coarse graining”
 - Physics is a model creation machine
- Correlation versus causation & Notions of induction
- THIS IS WHAT MAKES AI+SCIENCE SPECIAL (versus recommendations for what to buy with your socks)
- In other words, we can be DATA POOR (and we often are) because we (often) have good models

Lass et al (ICME and AI thoughts)



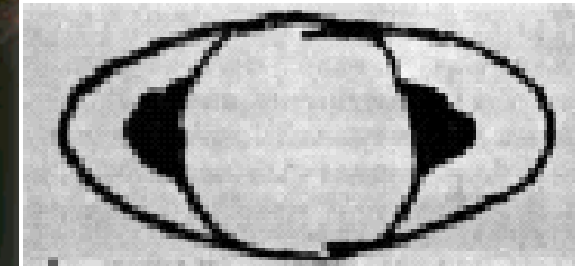
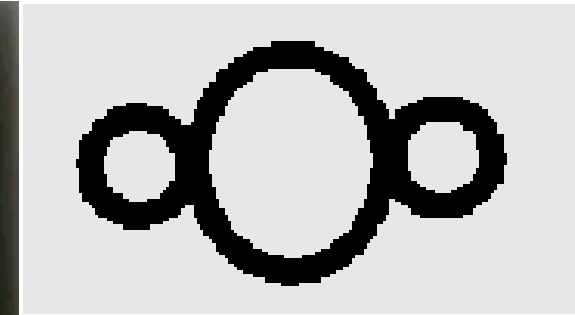
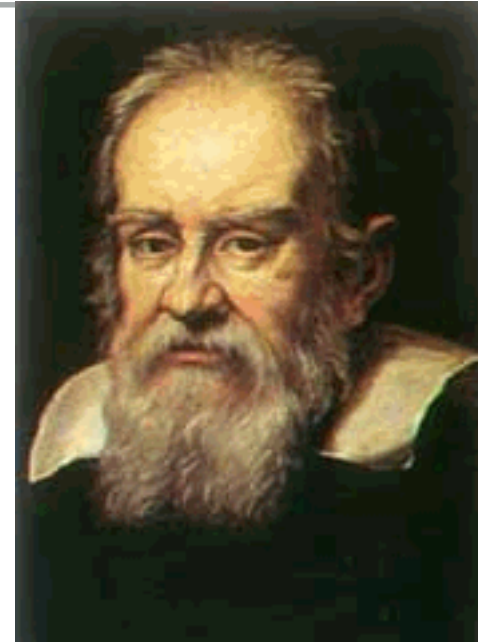


MICHAEL NIELSEN

GALILEO EXAMPLE

THE MOONS OF SATURN

Galileo no doubt planned to publish this new discovery in his next book, but in the meantime, how could he preserve his priority and prevent others from claiming the discovery as their own? His solution was to circulate an anagram, *s m a i s m r m i l m e p o e t a l e u m i b u n e n u g t t a u i r a s*. Others would know that he had discovered something and when he had discovered it, but they would not know what the discovery was. The number of letters in the anagram, 37, was too small to allow him later to fudge and change the solution to describe a discovery made by someone else in the meantime. **Before the days of scientific papers (invented in the 1660s) this was an effective (if not always foolproof) method of claiming priority.**



We need to both **change the rules** and **give people tools** to make that easier

State of the Art

- High Throughput Experiment
- Somewhat Autonomous Labs
- Disjoint data infrastructure (policy)

Future

- Deeply integrated data infrastructure (policy)
- Ever more autonomy
- Direct incorporation of physics
- More interpretable AI or the opposite (both)