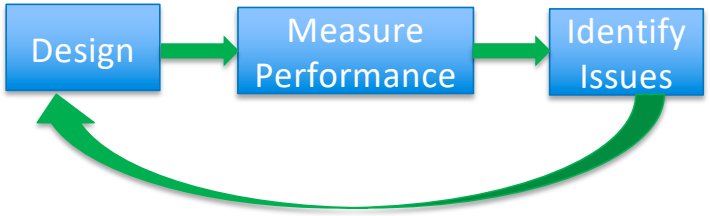
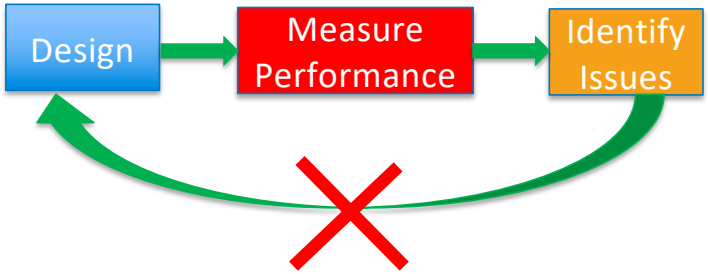
Metrology and Standards

- A Typical product development cycle



- Metrology and standards are largely missing for heliostats in CSP
  - Over 10,000 heliostats in a field
  - Optical precision ~ 2 mrad
    - An additional 2 mrad may result into 20% energy reduction



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Metrology and Standards

What Are We Missing?

- Resource characterization
  - Solar irradiation
  - Weather conditions (operational/survival)
- Definition of optical errors
  - Specular reflectance (soiling characterization
  - Slope error (Distribution, RMS, one-dimensional, two-dimensional…)
  - Tracking error
  - Pointing error
  - Canting error
- Measurement of optical errors
- Durability
  - Material
  - Structural
- Then, how to best
  - Assess performance
  - Operate a solar field
  - Design new products

How Do We Fill this Gap?

- First all, do we all (most of us) agree its importance?
- Whose responsibility?
  - Research institutes?
  - Industry?
  - Professional society?
- Who should lead the effort?
- What approach?
  - Research
  - Guideline development
  - Review
  - Standards (National and international)
- Where is the support?
- Priority?
- How to apply them to the existing industry?
- How to use them to increase future competitivity of heliostat or CSP technologies?