



BOULDER
ENGINEERING
STUDIO

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BSME, CU Boulder 2008

Co-Founder, COO

Weird Stuff I've DONE

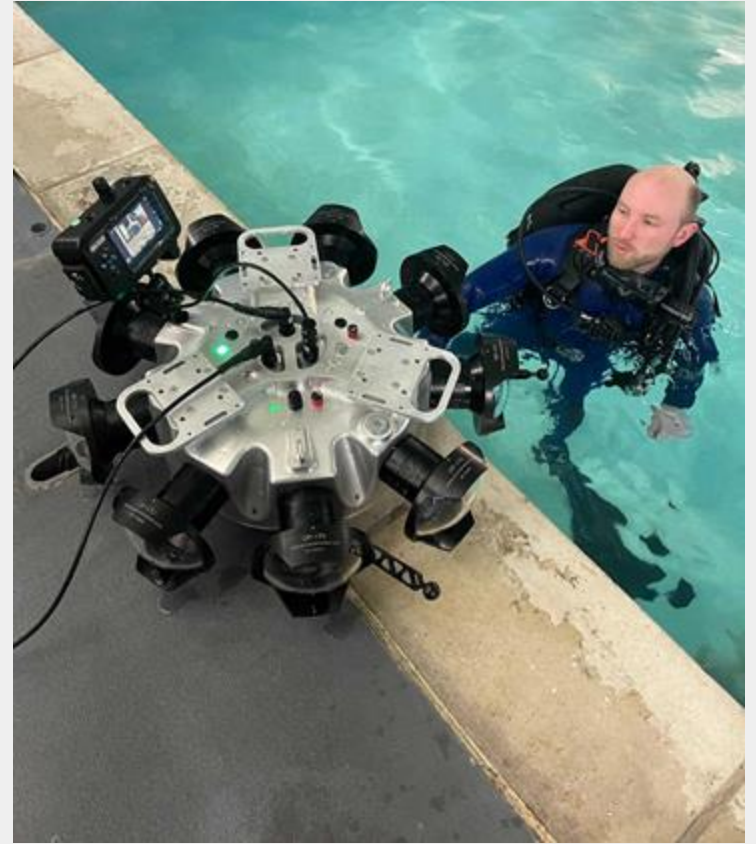
WIRED

TE

A

The Atlantic

Forbes



BES Core Competencies

Engineering and Design Services

- High-reliability Custom Electronics
- Full-stack Custom Firmware
- Design for Extreme Environments
- Multi-Physics Modeling & Simulation

Research & Development

- Foundational research
- Patent advising, research, & figure preparation
- Instrumentation development for National labs

Manufacturing

- Design for manufacture and manufacturing components
- Supply Chain Management including local and overseas mfg.

Strategic Advising

**Integrated Full-Service
Engineering Teams**

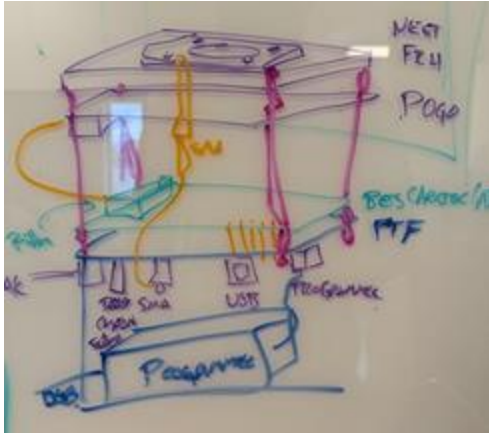
Systems & Analysis
Mechanical
Electrical
Software



Fixture Platform

Frame 01 Gen 2 (BT201)
CORE Test Runner Software Framework
Configuration & Customization Services

- Lowering the barriers to manufacturing
- Providing Industry Leading Reliability
- Rapidly Configured solutions save time



Available at
DigiKey

DUT Interface

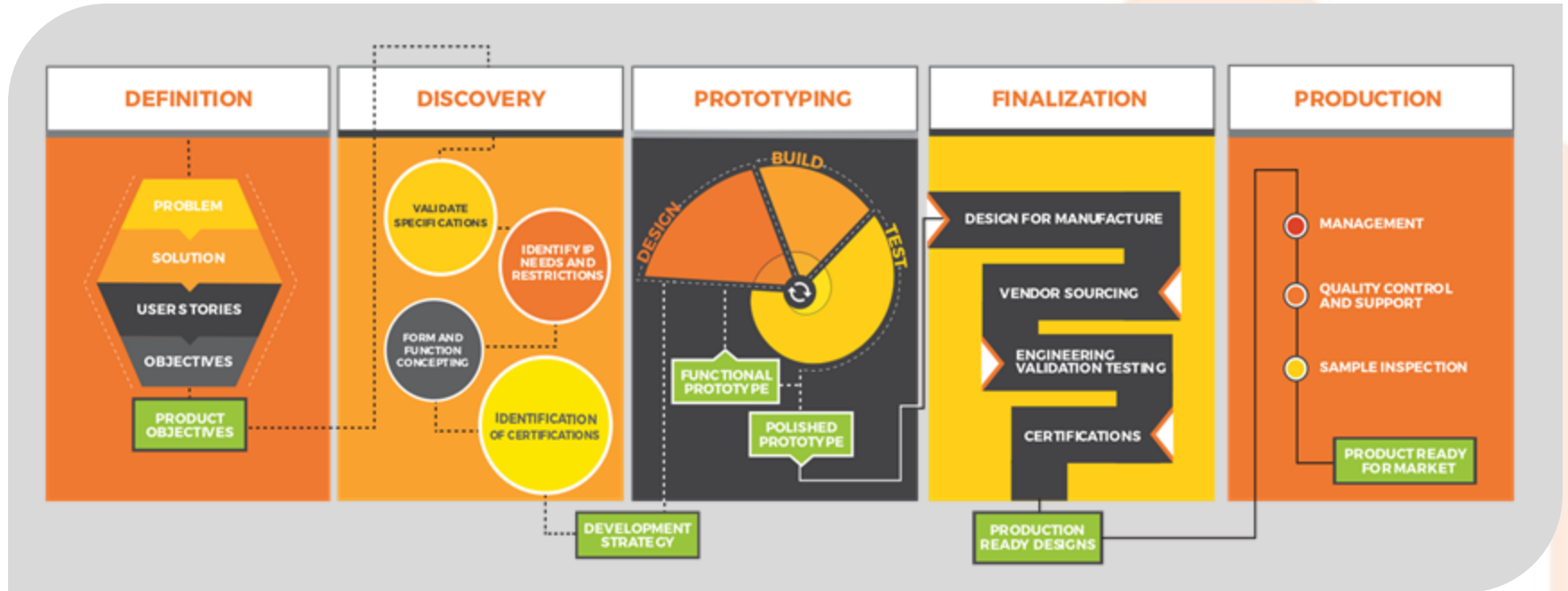
Control Interface

Test Runner Suite

eLink SDK Provisioning
(future)



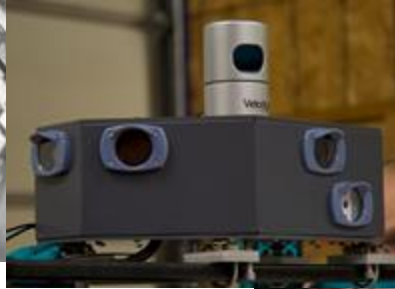
BES PROCESS



Rule #1	When making a requirement, do your best to make it quantifiable. If it is not quantifiable then it may be impossible to measure whether the requirement has been met or not.
Rule #2	Be as detailed as possible. The more detail in the requirement the less ambiguous it becomes and thus provides a more defined path for development.
Rule #3	Individualize the requirements. Do not try to pack multiple features into a single requirement even if they appear to be dependant on each other; keep them seperate. Assumptions can unnecessarily limit options.

Category	Definition/Examples
Economic	Requirements pertaining to the financial and business side of the product. <ul style="list-style-type: none"> - Cost of Goods (CoG's) - Production scale and throughput - product life cycle
Functional	Requirements pertaining to the product performance as a whole. <ul style="list-style-type: none"> - Size, shape, styling and weight - User interface
Mechanical	Requirements pertaining to the physical operation of the product. <ul style="list-style-type: none"> - Rotation speeds - Applied Loads - Material requirements

Prefixes	Definition
"MUST", "REQUIRED" or "SHALL"	These words mean that the definition is an absolute requirement of the specification and critical to the product as a whole
"SHOULD", "RECOMMENDED" or "MAY"	These words mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
"SHOULD NOT", "NOT RECOMMENDED" or "MAY NOT"	These phrases mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
"MUST NOT" or "SHALL NOT"	These phrases mean that the definition is an absolute prohibition of the specification.



De-risk through MILESTONES

Match Manufacturing
Processes to phase & needs

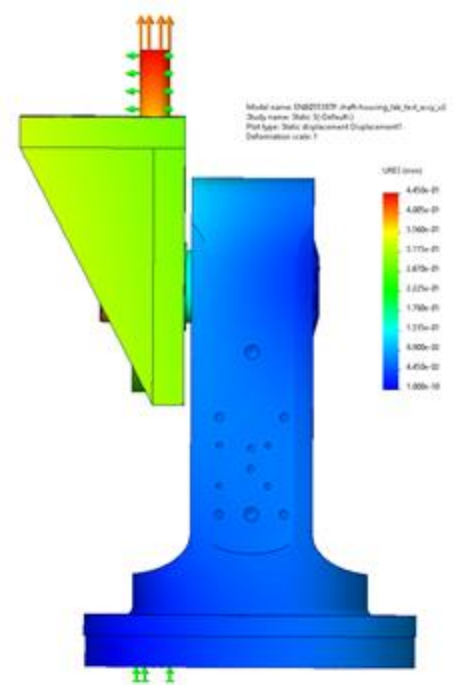
Design for [realistic] volumes

Iterative Design

TEST, TEST, and TEST

SOME MORE

If you aren't verifying your assumptions somehow,
you're probably wrong.



Prototyping the Manufacturing Process



Apply the Process to other elements

Assembly

Customer & Market Fit

Sales Channel/Distribution

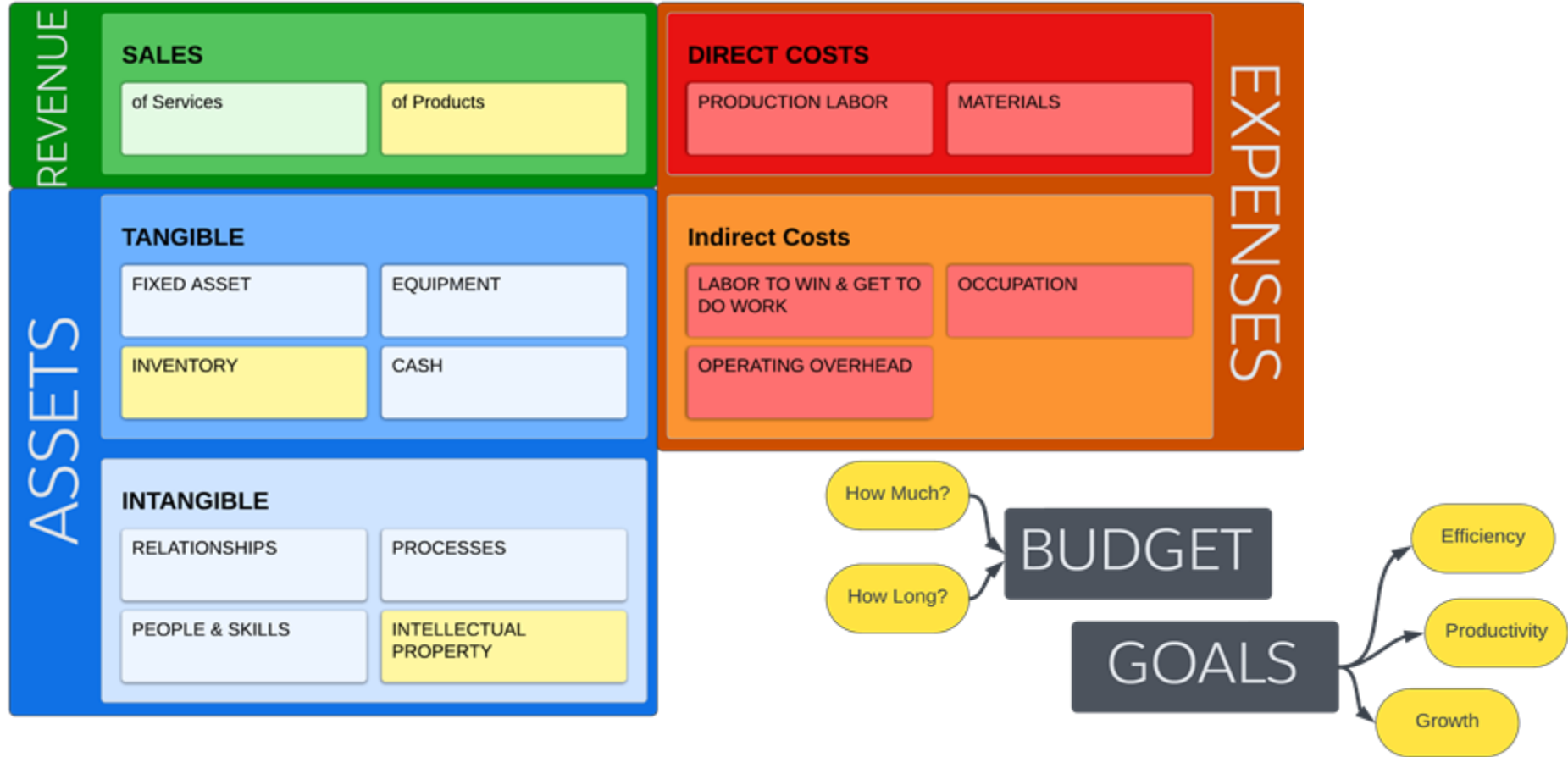
Tools:

Ideas Matrices, PDR/CDRs,
Task Trackers, Gantt Charts,
Design Journals, Patents,
Report Templates, Regulatory
Certifications

Product Development is **Holistic**:
without all the pieces, the product
still **fails**



COMPONENTS OF A BUSINESS:



Questions?

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