Developing and Managing Large Integrated Grants

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Outline

- Background

- Act 1: Finding a Fit with SCRI
- Act 2: Writing a Winning Proposal
- Act 3: Managing the project

Background: Robotics Institute, CMU

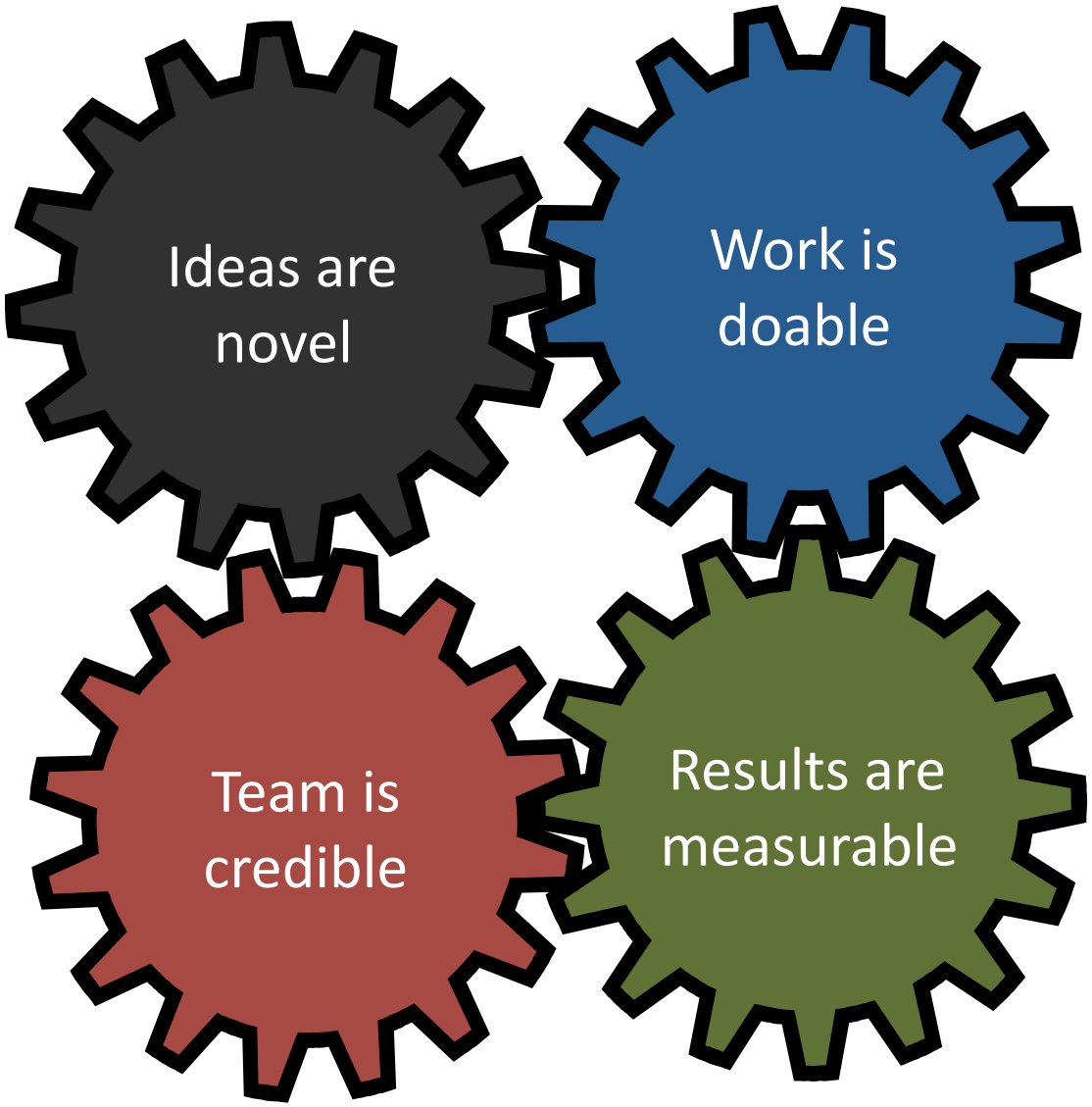
- Created in 1983
- ~500 people working on broad range of technologies
- Growing 10%/year; doubling in size every 6 years
- Approx. $60M/year budget. Department brought in its Billionth dollar in Sep 2010.
- Largest department at Carnegie Mellon
- Majority of faculty in “soft money” positions
- Funding from DOD, NSF, NASA, corporations
- Long history of collaboration between researchers, universities, users and corporations
- Commonly put together large proposals (> $1M/year)

Personal Motivation

- SCRI represents a sea change: provides resources to develop a critical mass
- Opportunity to “raise all ships”:
  - Improve quality of life for agricultural workers
  - Keep the US agriculture competitive
  - Resurrect Agricultural Engineering as a discipline
  - Fuel a market for high tech Agricultural tools
  - Lower environmental footprint
- Payback for investing in a non-traditional organization

Act I:
Finding a fit with SCRI

Make up of ANY successful proposal



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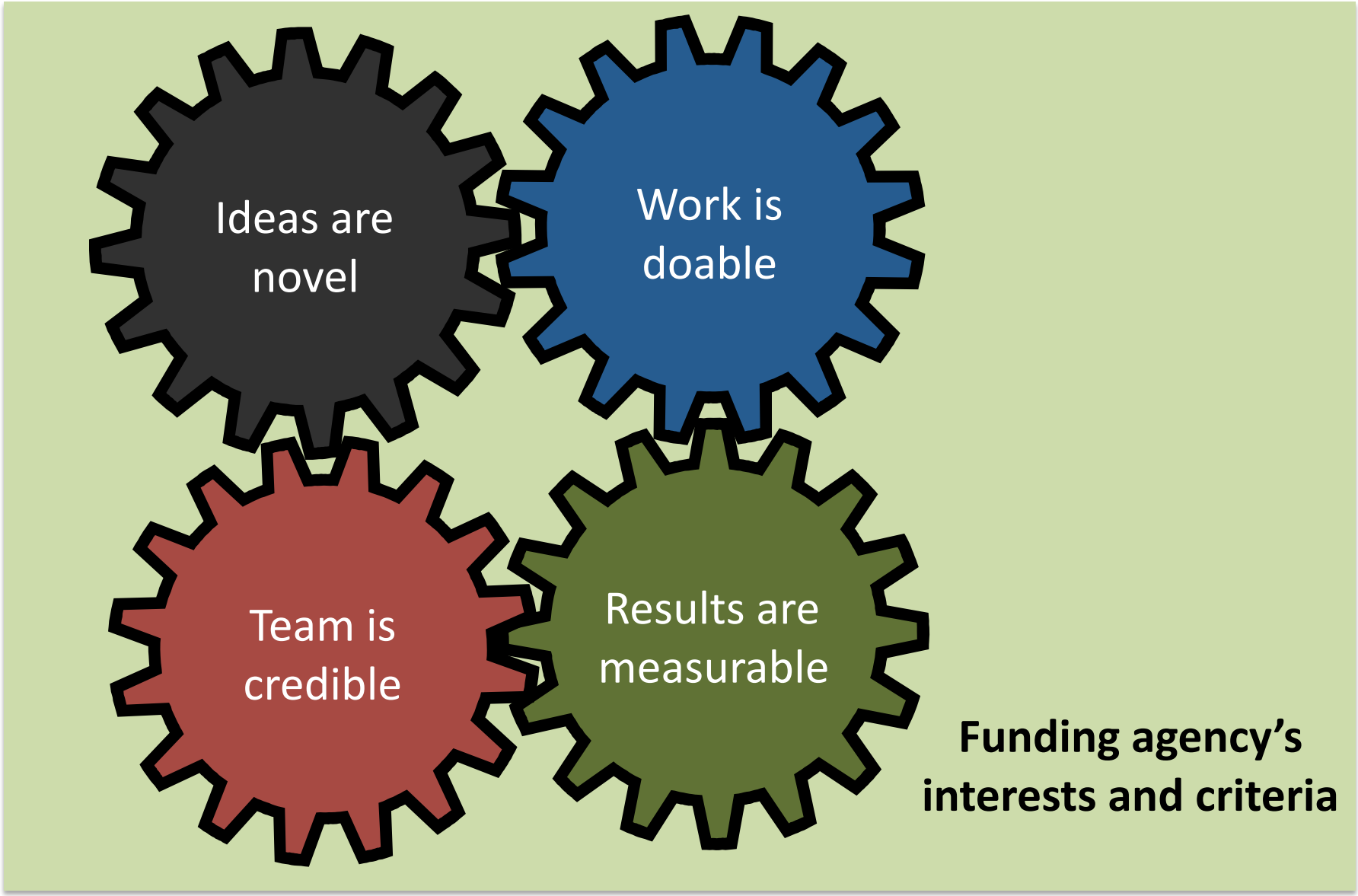


Examples of agencies' interests and criteria

- NSF
  - Intellectual merit
  - Social impact
  - Not big on systems
- DARPA
  - Paradigm shifting technology
  - Military relevance
  - Not big on social impact
- NASA
  - Technologies for extreme environments
  - Space relevance
  - Dual use

- USDA SCRI
  - Multi-disciplinary
  - Multi-state
  - Cross-cutting
  - Has significant stakeholder involvement
  - Gets out in the world (e.g. via ag extension)
  - Good chance that the enterprise will grow after USDA funding ends

Act 2:
Writing a Winning Proposal

Challenge of large proposals

- Scope can be so wide that no single person is a expert in all of the topics, BUT
- Proposal needs to show an integrated approach, can't be piece meal
- WHOLE MUST BE GREATER THAN THE SUM OF THE PARTS

Developing a large SCRI proposal

- Develop good links with industry being served
  - Months/years before CFP is issued
- Jointly define problems to be solved and prioritize them
  - Start with open problems that the stakeholders want solved
  - Not what can be done with your favorite approach
- Identify core team
  - Go for the “dream” team, not your friends team
  - Best partners are complementary, not the people who do more of what you do
  - Include plant scientists, engineers, extension personnel and companies
  - Recruit secondary players only as needed
  - Recruit strong advisory panel
- Identify thematic areas and themes
  - Each theme should have a clearly identified leader

Developing a large SCRI proposal (cont.)

- Find matching funds
  - Growers, industry consortia and equipment manufacturers
  - Make sure to verify match eligibility with USDA, especially for equipment
  - Match commitments must be firm
  - Always "overmatch" as some items may not be accepted at award time
- Develop storyboards for each theme
  - Circulated and revised frequently among/by team members
  - Don't write any text before storyboard is complete
- Core team produces proposals and carries it to finish line

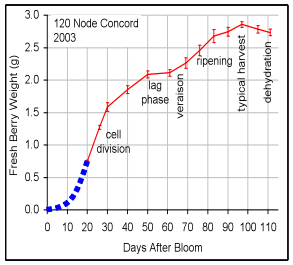
Storyboard structure

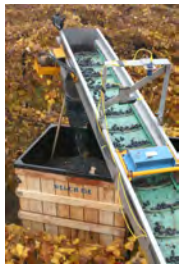
- Problem
  - Must be agnostic to solution
  - No jargon—something a grower would say
- Benefits
  - For the grower (improved quality, increased yield, reduced labor, lower environmental footprint, etc.)
- Approach
  - Key ideas: stress novelty of ideas
  - Rationale: Why the ideas are worth considering
- Team Expertise
  - List partners, especially outreach and commercialization
- Schedule over four years
  - Activities, milestones, success criteria
  - This turns into Statement of Work
- Each storyboard has compelling graphics

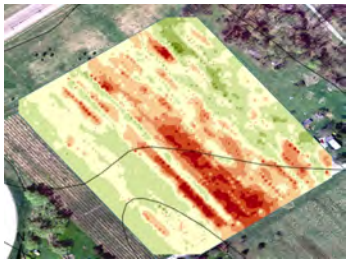
A picture is worth a thousand words!

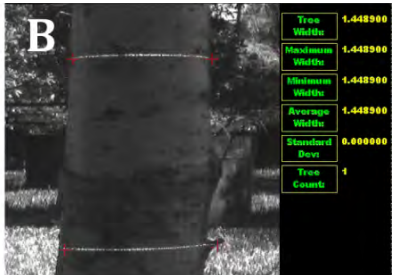
occluded fruit

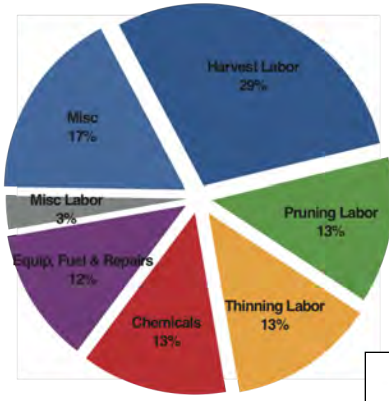
exposed fruit

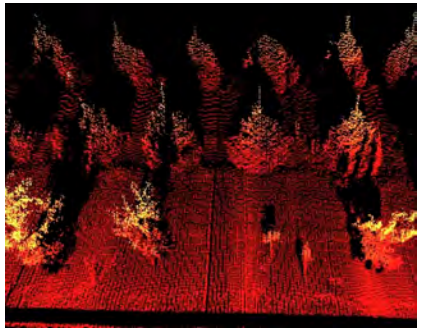


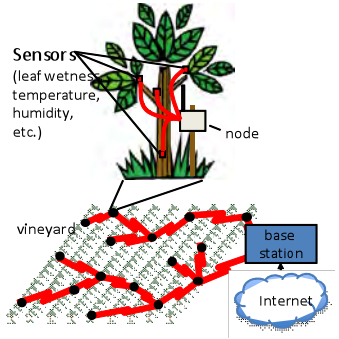


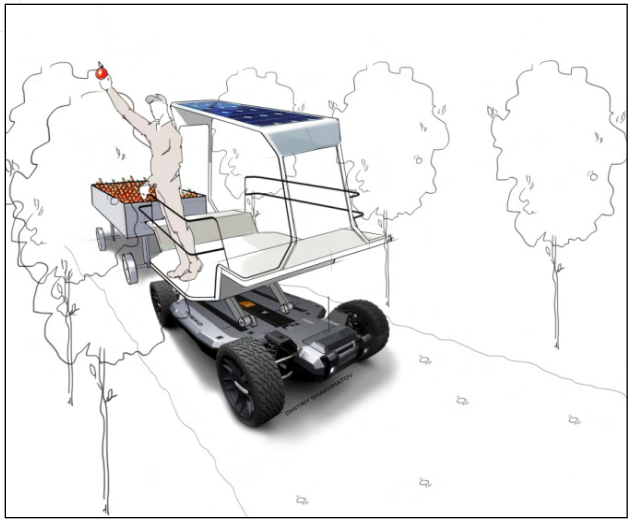












People involved

- Project director
  - Sets overall strategy, parallelizes tasks
  - Selects collaborators and negotiates their budget allocation
  - Sets proposal outline and page budgets
  - Has final word on conflicts
- Proposal manager
  - Integrates contributions from team
  - Makes sure all requirements from solicitation are met
- Review (“red”) team
  - Not the researchers who write the proposal
  - Performed sufficiently early so comments can be incorporated
- Get university behind project
  - Will need to sign off on match
  - Will need to cooperate on submission

How CASC was put together

- Started discussions with Penn State/apple growers 9 months before proposal deadline
- Identified movers and shakers in the industry, attracted them
- Started and stayed with a single project lead
- Created an outline of the proposal
- Refused to accept text already written
  - No writing until outline accepted
- Each leader required to articulate (max. three slides)
  - Problem: agnostic to solution (e.g. need to count fruit)
  - Approach: how the problem is solved (e.g. use computer vision)
  - Milestones: concrete results (e.g. build a mobile sensor)
  - Criteria for success: quantitative (e.g. count 95% of visible fruit)

How CASC was put together (cont.)

- Once picture clear, leaders wrote in a structured way with fixed page limits
- Core group of people wrote front end and back end
- Conducted “Red Team” review by others who have written large proposals and run large projects
- Sections turned into statements of work for subcontractors
- Got much help from budget offices at PSU, OSU and WSU

Act 3:
Managing the Project

Typical Elements of a Large SCRI Project

- Participants have different cultures
  - Work moves at a different pace at each institution
  - Motivation/criteria for success varies
  - Integration between groups is difficult
- Many threads
  - Not all will be successful
- No one person understands all technical details
- Reporting structure is distributed
- Validation comes from a combination of third parties

CASC model

- A federation of research groups
  - Manage results, not methods
- Clear definition of yearly and interim goals
  - Year 1: straight from proposal
  - Years 2-4: small reassessments based on prior year's findings
- Regular progress assessment
  - Progress report meetings alternate with showcase meetings
  - Two interim reports per year
  - Annual report -- Not a collation of interim reports
  - Annual *in loco* visit to all groups
- Clear integration path
  - Semi-annual and yearly field experiments
- Budget for subgroups reviewed yearly
- Cut efforts that fail even after a lot of feedback
- Look to extension studies and industry consortia to validate problems and success

Yearly and interim goals

- Ideally, already in the proposal
- Goals must be
  - relevant (to the client!)
  - challenging
  - realistic/achievable
- Goals must include at a minimum
  - activities (verb)
    - develop system, execute field test, test algorithm, etc.
  - deliverable (substantive)
    - software, hardware, field test, database, report, etc.
  - success criteria (numeral)
    - quantitative measure of success

Example: Reconfigurable Mobility

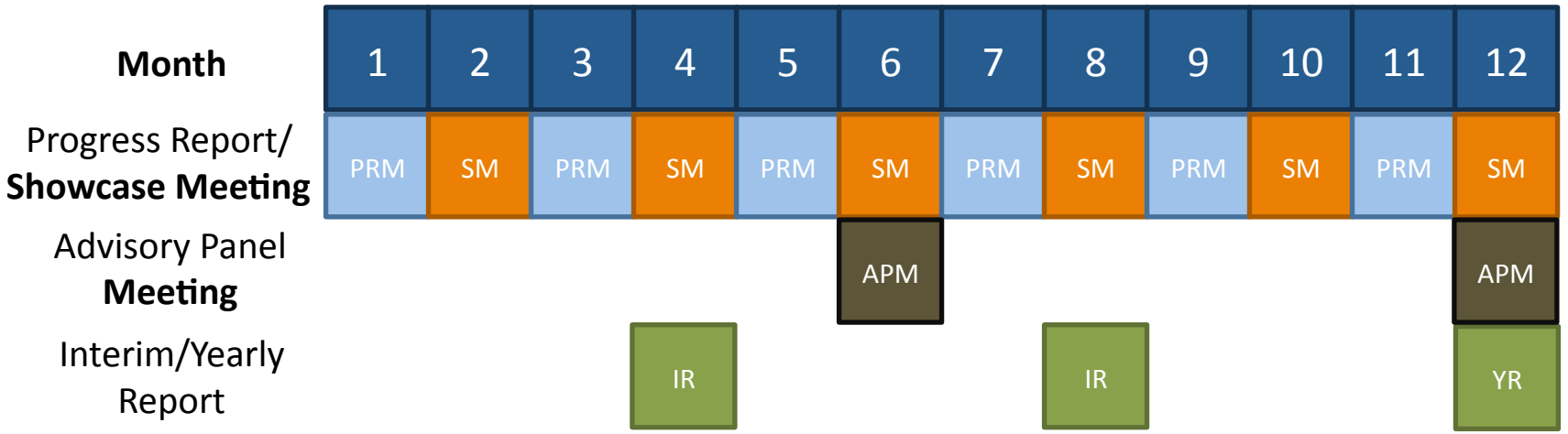
Year 2 goals

Activities	Deliverables	Success Criteria
1. Integrate payload for assessment and treatment tasks. 2. Integrate low-cost localization. 3. Perform field tests in WA and OR. 4. Extend APM automation to one more platform.	1. APM integrated with GIS and crop load assessment. 2. APM integrated with precision spraying. 3. APM automation package installed and tested on N. Blosi platform.	1. 100 km low-cost APM scout safe operation with a MDBF of 10 km. 2. 10 km of autonomous row following with the N. Blosi platform.

Year 1 goals by quarter

Quarter	Goals	Deliverable
1	1. Demonstrate autonomous mobility in orchard (1 km) using existing APM	1. Demonstration
2	1. Complete design of first APM; test components individually 2. Demonstrate simulated driving between rows of trees based on laser data collected in Y1Q1	1. Design document, test report 2. Demonstration
3	1. Execute 1 km continuous run row following experiment in orchard 2. Execute 10 km continuous run row following experiment in orchard 3. Map APM's design onto orchard platform	1. Demonstration 2. Demonstration 3. Design document
4	1. Develop orchard-specific row guidance and safety using precision GPS 2. Deploy of 3 different payloads from APM 3. Port APM design to different platform	1. Demonstration 2. Demonstration 3. Demonstration

Meeting and reporting schedule



Roles of the PD and PM

- Project Director
  - Set the pace of the project
  - Establish goals
  - Negotiate subcontracts
  - Control budget (macro)
  - Communicate with stakeholders
  - Make final decisions on project-related matters including cutting themes

why
what

- Project manager
  - Ensure SOW is being pursued and goals are being met
  - Prepare and issue reports
  - Organize and run meetings
  - Issue and oversee subcontracts
  - Control budget (micro)
  - Consult with USDA on project-related matters

how
when
where
whom

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- Knowledge repository
  - Field trip reports
  - Papers, articles, posters
  - Press reports/press releases
  - Announcements, calendar
  - Team and advisory panel contact info
- Base technology: Joomla

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CASC
Comprehensive Automation for Specialty Crops
Ajax Search...
Home
site frontpage
The Project
details and updates
The Team
science and industry
Publications
choose by type
In the News
featured articles
What's New
recent updates
Partnerships
our collaboration
Show Pictures
Reconfigurable Mobility
The APM
Announcements
Interpoma
November 4-6, 2010
Bolzano, Italy
Orchard tours
November 7-9, 2010
Italy
EIMA
November 10-14, 2010
Bologna, Italy
Last Updated
09.14.10
Comprehensive Automation for Specialty Crops (CASC) is a matching grant program funded by the USDA-SCRI and industry to develop comprehensive automation strategies and technologies for the specialty crop industry, with an initial focus on apples and nursery trees. We are a multi-disciplinary, multi-institutional group comprised of engineers, scientists, extension educators, growers, and industry representatives in universities, government labs, and companies spanning five states, representing some 70% of all US apple production.
Read more...

Feedback at end of Year 1

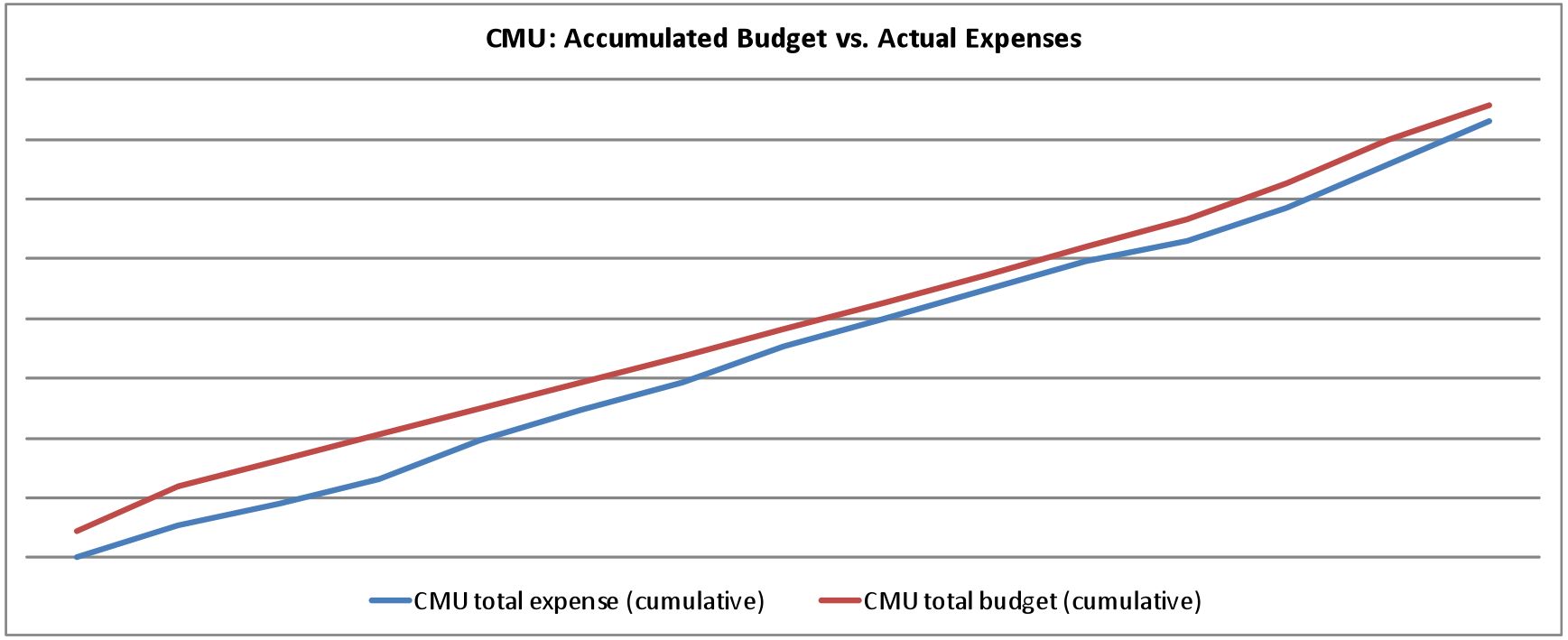
- GOOD
  - Delineated tasks
  - Participation of advisory panel
  - Team of very competent senior scientists and engineers
  - Collaborators very enthusiastic, especially the extension people
  - Field testing, especially two weeks in field in WA
  - Emails are keeping advisory panel engaged
  - Project is lots of fun for many of us
  - Undergrads and lay people love to hear about this project
  - Having a project manager

- NOT AS GOOD
  - No open discussion at meetings due to presence of stakeholders
  - Not enough time for consideration or discussion of showcase
  - Depth of communication and understanding is not as good as it could be
  - Meeting structure/frequency could be improved
  - Reporting structure/frequency could be improved
  - For economists and biologists, not much may happen month to month
  - Apparent expectations of monthly reporting are inappropriate
  - Culture of project is quite different from what some team members are used too

Challenges

- Maintain communication among all groups
- Dealing with an underperforming partner
- Share data outside project
- Engineering vs. plant science culture
- Controlling budget and matching

Budget control



Staying successful

- Motto: “Keep the program sold”
  - Funding is not an entitlement
  - Make your client look good
  - Provide continuous, easy to explain, reliable evidence that you are succeeding
- Who is the client?
  - Industry associations
  - Growers
  - USDA program manager

Summary: Winning

- Start discussions with industry early
- Land usage has great match potential, but cash contributions are the way to tell if the industry is really serious
- Outline! Don't write until content is clear
- Set metrics (criteria for success) to clarify that your project will be beneficial
- Proposal should read like it was written by a single entity
- Get industry leaders on your advisory panel
- Perform a "Red Team" review of your proposal by people not involved in writing

Summary: Managing

- Get experienced people to manage proposal and run project
  - Distinct need for a Proposal/Project Manager at 50% effort for a CAP
- Set/review goals for each team every year. Be clear on criteria for success. Use this for setting Statement of Work for each institution.
- Make expectations (reports, meetings, field trips) explicit
- Cut themes that are not working
- Keep program "sold": Involve advisory board and program manager continuously

Thank you.

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