

2010

Baldrige National Quality Program



NuGrain Laboratories Case Study

2010

Baldrige National Quality Program

National Institute of Standards and Technology • Department of Commerce



NuGrain Laboratories Case Study

The *NuGrain Laboratories Case Study* is a fictional Baldrige Award application prepared for use in the 2010 Malcolm Baldrige National Quality Award Examiner Preparation Course. This case study describes a fictitious government-owned, contractor-operated research laboratory. There is no connection between the fictitious NuGrain Laboratories and any other organization, either named NuGrain Laboratories or otherwise. Other organizations cited in the case study also are fictitious, except for several national and government organizations.

Because the primary purpose of the case study is to provide learning opportunities for training Baldrige Examiners and others, there are areas in the case study where Criteria requirements purposely are not addressed. While this fictional application therefore may not demonstrate role-model responses in all Criteria areas, it illustrates the format and general content of an Award application. Please refer to the *NuGrain Laboratories Scorebook* and *NuGrain Laboratories Feedback Report* to learn how the case study scored and to see its strengths and opportunities for improvement. This case study is based on the 2009–2010 *Criteria for Performance Excellence*.

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OMB Clearance #0693-0006

I. Your Organization

Official name	NuGrain Laboratories National Center for Strategic Agricultural Research	Headquarters address	1086 N. Washington St. Kearney, Nebraska 68848
Other name			
Prior name	<i>(if changed within the past 5 years)</i>		

2. Highest-Ranking Official

Mr. Mrs. Ms. Dr.

Name	Joe Maizhead	Address	<input checked="" type="checkbox"/> Same as above
Job title	Director		
E-mail	jmaizhead@nugrain.net		
Telephone	308-555-1002		
Fax	308-555-1088		

3. Eligibility Contact Point

Designate a person who can answer inquiries about your organization. Questions from your organization and requests from the Baldrige Program will be limited to this person and the alternate identified below.

Mr. Mrs. Ms. Dr.

Name	Celia Valasquez	Address	<input checked="" type="checkbox"/> Same as above
Job title	Chief Operations Officer		
E-mail	cvalasquez@nugrain.net	Overnight mailing address	<input checked="" type="checkbox"/> Same as above <i>(Do not use a P.O. Box number.)</i>
Telephone	308-555-1046		
Fax	308-555-1092		

**If you are unable to respond to any item,
call (877) 237-9064, option 3, before submitting your form.**

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4. Alternate Eligibility Contact Point

Mr. Mrs. Ms. Dr.

Name Telephone Fax

5. Application History

a. Has your organization previously submitted an Eligibility Certification Package?

Yes. *Indicate the year(s) and the organization's name at that time, if different.*

Year(s)	2009
Name(s)	NuGrain Laboratories

No
 Don't know

b. Has your organization ever received the Malcolm Baldrige National Quality Award?

Yes. Did your organization receive an Award in 2004 or earlier?

Yes. *Your organization is eligible to apply for the Award.*

No. *If your organization received the Award during 2005–2009, it is eligible to apply for feedback only. Contact the Baldrige Program at (877) 237-9064, option 3, if you have questions.*

No

c. *(Optional; for statistical purposes only)* Has your organization participated in a state or local Baldrige-based award process?

Yes. Years:

No

6. Award Category and Criteria Used

See pages 5–6 of the 2010 Baldrige Award Application Forms booklet.

a. Award category *(Check one.)*

Your education or health care organization may use the Business/Nonprofit Criteria and apply in the service, small business, or nonprofit category. However, you probably will find the sector-specific Criteria more appropriate.

For-Profit

- Manufacturing
- Service
- Small business (≤ 500 employees)
- Education
- Health care

Nonprofit

- Nonprofit
- Education
- Health Care

Eligibility Package due April 6, 2010 (March 1 if you nominate an Examiner)
Award Package due May 20, 2010 (May 6 on CD)

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b. Criteria used (*Check one.*)

- Criteria for Performance Excellence (Business/Nonprofit Criteria)
- Education Criteria for Performance Excellence
- Health Care Criteria for Performance Excellence

c. Industrial classifications. List up to three of the most descriptive NAICS codes for your organization (see page 20 of the *2010 Baldrige Award Application Forms* booklet). *These are used to identify your organizational functions and to assign applications to Examiners.*

111	115	
-----	-----	--

7. Organizational Structure

a. Total number of paid employees, staff, and/or faculty:

b. Sales, revenue, or budget

For the preceding fiscal year, the organization had _____ in

- | | | |
|---|---|--|
| <input type="checkbox"/> up to \$1 million | <input type="checkbox"/> \$1.1 million–\$10 million | <input type="checkbox"/> sales |
| <input type="checkbox"/> \$10.1 million–\$100 million | <input type="checkbox"/> \$100.1 million–\$500 million | <input type="checkbox"/> revenue |
| <input type="checkbox"/> \$500.1 million–\$1 billion | <input checked="" type="checkbox"/> more than \$1 billion | <input checked="" type="checkbox"/> budget |

Align your responses below to item 12, Site Listing. Count offices or other work areas located near each other as one site if you consider them as one for business and personnel purposes.

	Inside U.S./territories	Outside U.S./territories
c. Number of sites	4	
d. % of employees	100	
e. % of physical assets	100	

f. Attach a line-and-box organization chart that includes divisions or unit levels. In each box, include the name of the unit or division and the name of its leader. Do not use shading or color in the boxes.

- The chart is attached.

**If you are unable to respond to any item,
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g. The organization is _____ a larger parent or system. *(Check all that apply.)*

not a subunit of *(Proceed to item 8.)*

a subsidiary of

controlled by

administered by

owned by

a division of

a unit of

a school of

other _____

Parent organization

Nebraska Free University

Address

5555 Corn Grower Blvd.
Lincoln, NE 68510

Total number of workforce members

(including subunits but excluding joint ventures)

18,254

Highest-ranking official

Robin Husker

Job title

University Chancellor

h. Is your organization the only subunit of the parent intending to apply for the Award? *Based on the parent organization's size, the Program accepts multiple applications from subunits, all Award categories combined (see page 7 of the 2010 Baldrige Award Application Forms booklet).*

Yes No *(Briefly explain below.)* Don't know

i. Attach a line-and-box organization chart(s) showing your organization's relationship to the parent's highest management level, including all intervening levels. In each box, include the name of the unit or division and its leader. Do not use shading or color in the boxes.

The chart is attached.

j. Considering the organization chart, briefly describe below how your organization relates to the parent and its other subunits in terms of products, services, and management structure.

NuGrain is owned by the United States Department of Agriculture (USDA) Research Service and is managed by Nebraska Free University (NFU) through a contractor team that reports to the University Chancellor, Robin Husker.

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- k. Provide the title and date of an official document (e.g., an annual report, organizational literature, a press release) that clearly defines your organization as a discrete entity.

Title

Date

Attach a copy of relevant portions of the document. If you name a Web site as documentation, print and attach the relevant pages.

Relevant portions of the document are attached.

- l. Briefly describe the major functions your parent or its other subunits provide to your organization, if appropriate. *Examples are strategic planning, business acquisition, research and development, facilities management, data gathering and analysis, human resource services, legal services, finance or accounting, sales/marketing, supply chain management, global expansion, information and knowledge management, education/training programs, information systems and technology services, curriculum and instruction, and academic program coordination/development.*

NFU, the parent organization, provides various services to NuGrain, including finance and business services, human resources systems, training and benefits administration, legal services, and some information technology services.

8. Eligibility Determination

See also pages 5–7 of the 2010 Baldrige Award Application Forms booklet.

- a. Is your organization a distinct organization or business unit headquartered in the United States?

Yes No. *Briefly explain.*

- b. Has your organization officially or legally existed for at least one year, or since April 5, 2009?

Yes No

- c. Can your organization respond to all seven Baldrige Criteria Categories? That is, does your organization have processes and related results for its unique operations, products, and/or services? For example, does it have an independent leadership system to set and deploy its vision, values, strategy, and action plans? Does it have approaches for engaging customers and the workforce, as well as for tracking and using data on the effectiveness of these approaches?

Yes No

- d. If some of your organization's activities are performed outside the United States or its territories and your organization receives a site visit, will you make available sufficient personnel, documentation, and facilities in the United States to allow a full examination of your worldwide organization?

Yes No

- e. If your organization receives an Award, can it make sufficient personnel and documentation available to share its practices at The Quest for Excellence Conference and at your organization's U.S. facilities?

Yes No

If you checked "No" for 8a, 8b, 8c, 8d, or 8e, call the Baldrige Program at (877) 237-9064, option 3.

**If you are unable to respond to any item,
call (877) 237-9064, option 3, before submitting your form.**

Malcolm Baldrige National Quality Award**Questions for Subunits Only**

- f. Is your subunit recognizably different from the parent and its other subunits? For example, do your customers distinguish your products and services from those of the parent and/or other subunits? Are your products or services unique within the parent? Do other units within the parent provide the same products or services to a different customer base?
- Yes. *Continue with 8g.*
- No. *Your subunit is probably not eligible to apply for the Award. Call the Baldrige Program at (877) 237-9064, option 3.*
- g. Is your organization a subunit in education or health care?
- Yes. *Check your eligibility on page 6 of the 2010 Baldrige Award Application Forms booklet, and proceed to item 9.*
- No. *Continue with 8b.*
- h. Does your subunit have more than 500 paid employees?
- Yes. *Your organization is eligible to apply for the Award. Proceed to item 9.*
- No. *Continue with 8i.*
- i. Is your subunit in manufacturing or service?
- Yes. Is it separately incorporated and distinct from the parent's other subunits? Or was it independent before being acquired by the parent, and does it continue to operate independently under its own identity?
- Yes. *Your subunit is eligible in the small business category. Attach relevant portions of a supporting official document (e.g., articles of incorporation), and proceed to item 9.*
- No. *Continue with 8j.*
- No. *Your subunit is probably not eligible to apply for the Award. Call the Baldrige Program at (877) 237-9064, option 3.*
- j. Does your subunit (1) have more than 25 percent of the parent's employees, *and* (2) does your subunit sell or provide 50 percent or more of its products or services directly to customers/users outside your subunit, its parent, and other organizations that own or have financial or organizational control of your subunit or the parent?
- Yes. *Your organization is eligible to apply for the Award.*
- No. *Your organization is probably not eligible to apply for the Award. Call the Baldrige Program at (877) 237-9064, option 3.*

9. Supplemental Sections

The organization has (a) a single performance system that supports all of its product and/or service lines and (b) products or services that are essentially similar in terms of customers/users, technology, workforce or employee types, and planning.

- Yes. *Proceed to item 10.*
- No. *Your organization may need to submit one or more supplemental sections with its application. Call the Baldrige Program at (877) 237-9064, option 3.*

10. Application Format

If your organization applies for the 2010 Award, in which format will you submit your application?

- 30 paper copies (due May 20, 2010) CD (due May 6, 2010)

Eligibility Package due April 6, 2010 (March 1 if you nominate an Examiner)
Award Package due May 20, 2010 (May 6 on CD)

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11. Use of Cell Phones, Cordless Phones, and Voice-over-Internet Protocol (VoIP)

Do you authorize Baldrige Examiners to use cell phones, cordless phones, and VoIP to discuss your application? *Your answer will not affect your organization's eligibility. Examiners will hold all your information in strict confidence and will discuss your application only with other assigned Examiners and with Program representatives as needed.*

Yes No

12. Site Listing

Align the number of sites listed and the number of employees, faculty, and staff to the information you reported in items 7a and 7c. *If your organization receives a site visit, the Baldrige Program will request a more detailed listing. Although site visits are not conducted at facilities outside the United States or its territories, these facilities may be contacted by teleconference or videoconference.*

Example				
Sites (U.S. and Foreign) <i>List the city and the state or country.</i>	Check one or more. <i>List the numbers at each site.</i>		Check one. List the % at each site, or use "N/A" (not applicable).	
	Number of	<input type="checkbox"/> Employees <input checked="" type="checkbox"/> Faculty <input checked="" type="checkbox"/> Staff	% of	<input type="checkbox"/> Sales <input type="checkbox"/> Revenue <input checked="" type="checkbox"/> Budget
Feld Hall Freedom, TX	38 Faculty 10 Staff		40%	
Stark Institute of Health Sciences San Antonio, TX	35 Faculty 6 Staff		35%	
Institute of Health Sciences Dallas, TX	24 Faculty 5 Staff		25%	

Your Organization				
Sites (U.S. and Foreign) <i>List the city and the state or country.</i>	Check one or more. <i>List the numbers at each site.</i>		Check one. List the % at each site, or use "N/A" (not applicable).	
	Number of	<input checked="" type="checkbox"/> Employees <input type="checkbox"/> Faculty <input type="checkbox"/> Staff	% of	<input type="checkbox"/> Sales <input type="checkbox"/> Revenue <input checked="" type="checkbox"/> Budget
1086 N. Washington Street Kearney, Nebraska 68848	2,302		53%	
8900 Railroad Avenue Winters, California 95694	1,138		19%	
5872 P. Way West Point, Mississippi 39773	1,136		16%	
10 Route 44 W Bellefonte, Pennsylvania	1,077		12%	

Attach as many additional pages as needed to include all sites. For each, give the city and state/country; the number of employees, faculty members, and/or staff; and the percentage of sales, revenue, or budget.

**If you are unable to respond to any item,
call (877) 237-9064, option 3, before submitting your form.**

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13. Key Business/Organization Factors

List or briefly describe the following key business/organization factors. Limit your answers to the space provided, and be as specific as possible. *The Baldrige Program uses this information to avoid conflicts of interest when assigning Examiners to your application. Examiners also use this information in their evaluations.*

- a. Main products and/or services and major markets served (local, regional, national, and international)

NuGrain provides unique research and development for the USDA through a variety of projects representing “cradle-to-grave” research of corn and wheat products. NuGrain products consist of a Strategic Research Plan, research (knowledge available through publications), commercialization pathways (licenses), and an agricultural research capability to support the needs of the United States. The major market served consists of U.S. farmers and food processing organizations.

- b. Key competitors (those that constitute 5 percent or more of your competitors)

NuGrain has approximately 100 competitors in the general field of agricultural research, including universities, laboratories, and companies that perform competing types of research. Universities include those with strong agricultural sciences programs, such as the University of Agriculture of Texas, Kansas State Farming University, Surf-U Davis, Mississippi Universal University, and Pennsylvania Proper College. Laboratories include the Corn and Maize Institute, the Sweet Wheat Laboratory System, and Healthy Foods Laboratories (a private company). In addition, competitors include three organizations that also are USDA government-owned, contractor-operated laboratories: Tillmor, Farmhand, and GrowGrain.

- c. Key customers/users (those that constitute 5 percent or more of your customers/users)

USDA (which is the largest customer because it owns the facilities and equipment of NuGrain); researchers, collaborating universities (NFU, Surf U-Davis, Mississippi Universal, Pennsylvania Proper), farmers, students, industry partners

- d. Key suppliers/partners (those that constitute 5 percent or more of your suppliers/partners)

Suppliers for Research, LLC; Cultivbiz Equipment and Supplies; Hardway Office Supply Store; III International; Zepro Chem (petrochemical processors)

- e. Financial auditor

- f. Fiscal year (e.g., October 1–September 30)

Goldsmith and Samuels

October 1–September 30

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14. Nomination to the Board of Examiners

If you submit your Eligibility Certification Package on or before March 1, 2010, you may nominate one senior member from your organization to the 2010 Board of Examiners.

Nominees are appointed for one year only. Nominees

- **must not have served previously on the Board of Examiners;** and
- must be citizens or permanent residents of the United States, be located in the United States or its territories, and be employees of the applicant organization.

The Program limits the number of Examiners from any one organization. If your organization already has representatives on the board, nominating an additional person may affect their reappointment.

Board appointments provide a significant opportunity for your organization to learn about the Criteria and the evaluation process. The time commitment is also substantial: Examiners commit to a minimum of 114 hours from April to December, including approximately 40 hours in April/May to complete self-study, three to four days in May to attend Examiner Preparation, and 50–70 hours from June through September to complete an Independent and Consensus Review. If requested by the Program, Examiners also participate in a Site Visit Review of approximately nine days. The nominee or the organization must cover travel and housing expenses incurred for Examiner Preparation.

Mr. Mrs. Ms. Dr.

from our organization will serve on the 2010 Board of Examiners.

I understand that the nominee or the organization will cover travel and hotel costs associated with participation in Examiner Preparation.

Nominee's contact information:

Title	Chief Financial Officer	Home address	3458 Roberts Street Vacaville, CA 95687
Organization	NuGrain Laboratories (California)	Work address	8900 Railroad Avenue Winters, CA 95694

Select the preferred telephone number, fax number, and e-mail address.

Preferred	Telephone	Preferred	Fax	Preferred	E-mail
<input checked="" type="checkbox"/> Work	707-555-7780	<input checked="" type="checkbox"/> Work	707-555-7880	<input checked="" type="checkbox"/> Work	reapers@nugrain.net
<input type="checkbox"/> Home	707-555-8143	<input type="checkbox"/> Home	N/A	<input type="checkbox"/> Home	reapers589@plattco.net
<input type="checkbox"/> Cell					

**If you are unable to respond to any item,
call (877) 237-9064, option 3, before submitting your form.**

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15. Fee

Indicate your method of payment for the \$150 eligibility certification fee.

<input checked="" type="checkbox"/> Check (enclosed) <input type="checkbox"/> Money order (enclosed)			
<i>Make payable to the Malcolm Baldrige National Quality Award.</i>			
<input type="checkbox"/> ACH payment <input type="checkbox"/> Wire transfer			
Checking ABA routing number: 075-000-022			
Checking account number: 182322730397			
<i>Before sending an ACH payment or wire transfer, notify the American Society for Quality (ASQ; [414] 298-8789, ext. 7205, or mbnqa@asq.org). Reference the Malcolm Baldrige National Quality Award with your payment.</i>			
<input type="checkbox"/> Visa <input type="checkbox"/> MasterCard <input type="checkbox"/> American Express			
Card number		Authorized signature	
Expiration date		Printed name	
Card billing address		Today's date	


W-9 Request

If you require an IRS Form W-9 (Request for Taxpayer Identification Number and Certification), contact ASQ at (414) 298-8789, ext. 7205.

16. Self-Certification and Signature

I state and attest the following:

- (1) I have reviewed the information provided in this Eligibility Certification Package.
- (2) To the best of my knowledge,
 - this package includes no untrue statement of a material fact, and
 - no material fact has been omitted.
- (3) Based on the information herein and the current eligibility requirements for the Malcolm Baldrige National Quality Award, my organization is eligible to apply.
- (4) I understand that if the information is found not to support eligibility at any time during the 2010 Award process, my organization will no longer receive consideration for the Award and will receive only a feedback report.

	JOE MAIZHEAD	Feb. 15, 2010
Signature of highest ranking official	Printed name	Date

**Eligibility Package due April 6, 2010 (March 1 if you nominate an Examiner)
Award Package due May 20, 2010 (May 6 on CD)**

Malcolm Baldrige National Quality Award

17. Submission

To be considered for the 2010 Award, submit your Eligibility Certification Package

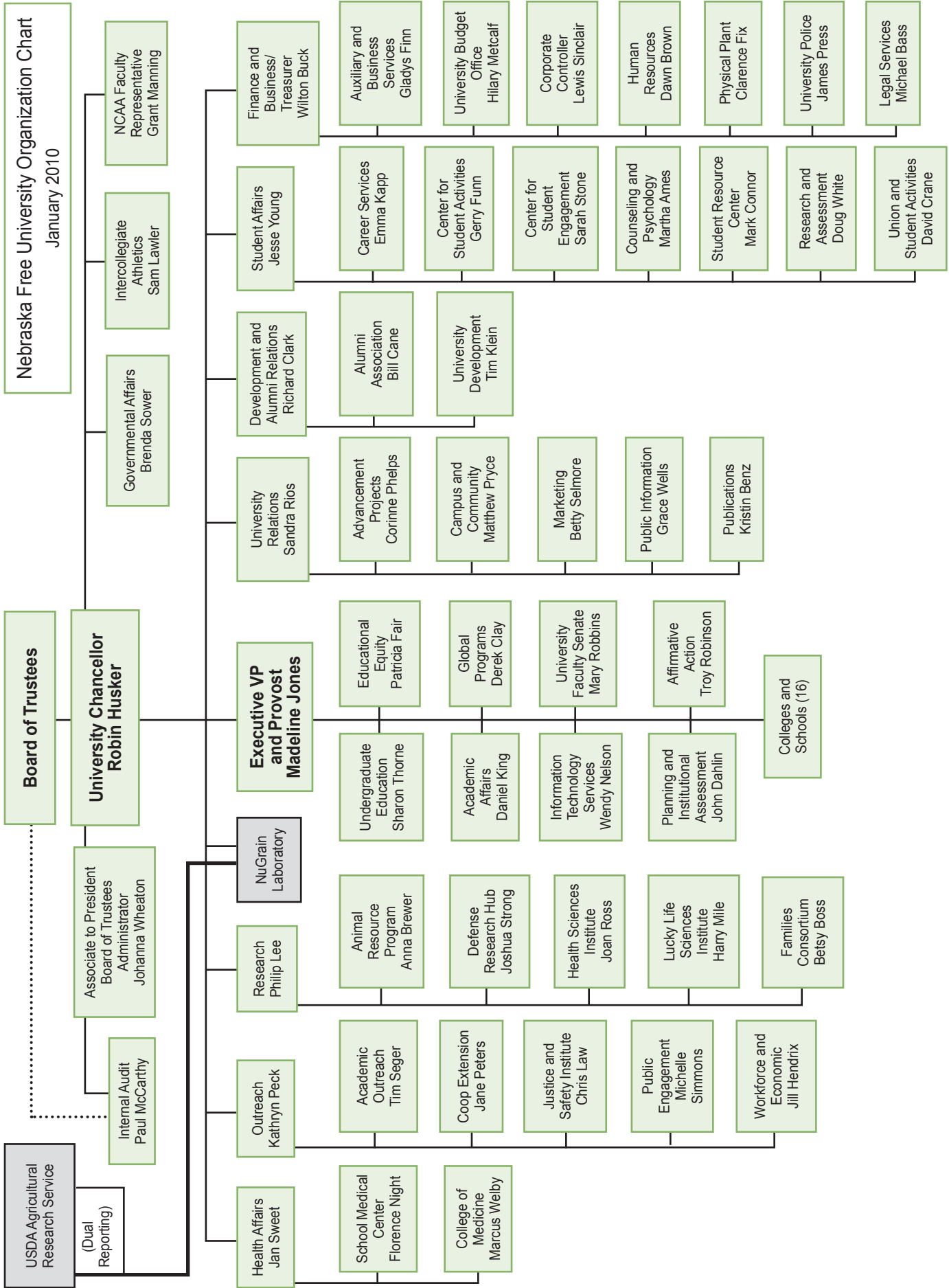
- on or before March 1, 2010, if you include a nomination to the Board of Examiners
- on or before April 6, 2010, without a nomination

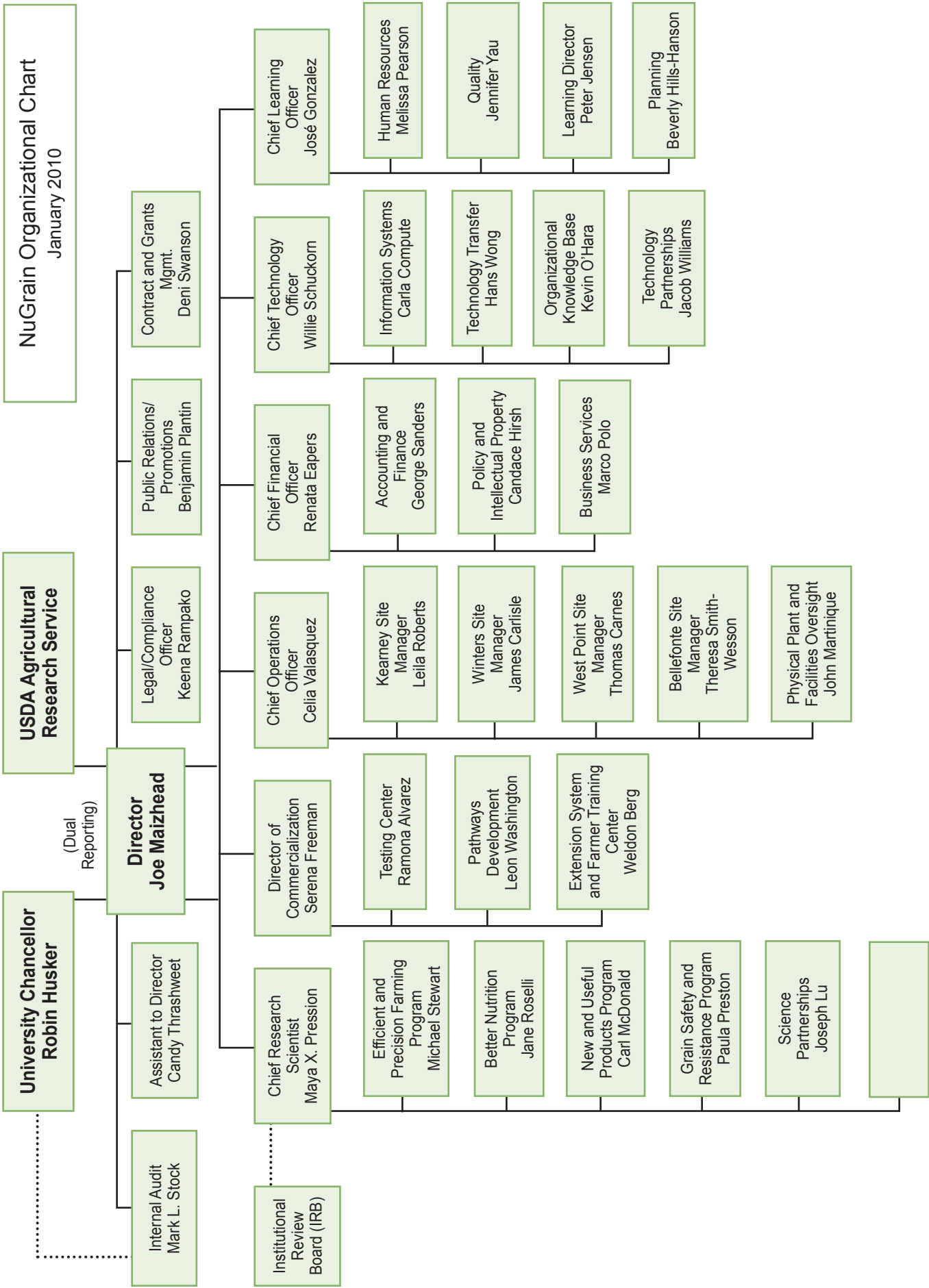
to Malcolm Baldrige National Quality Award
c/o ASQ—Baldrige Award Administration
600 North Plankinton Avenue
Milwaukee, WI 53203
(414) 298-8789, ext. 7205

Include proof of the mailing date. Send the package via

- a delivery service (e.g., Airborne Express, Federal Express, United Parcel Service, or the United States Postal Service [USPS] Express Mail) that automatically records the mailing date, or
- the USPS (other than Express Mail), with a dated receipt from the post office.

**If you are unable to respond to any item,
call (877) 237-9064, option 3, before submitting your form.**





Malcolm Baldrige National Quality Award

OMB Clearance #0693-0006

I. Your Organization

Official name	NuGrain Laboratories for Strategic Agricultural Research
Mailing address	1086 N. Washington St. Kearney, NE 68848

2. Award Category and Criteria Used

a. Award category (*Check one.*)

- | | |
|--|---|
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Service | <input type="checkbox"/> Health care |
| <input type="checkbox"/> Small business. The larger percentage of sales is in (<i>check one</i>) | <input checked="" type="checkbox"/> Nonprofit |
| <input type="checkbox"/> Manufacturing | |
| <input type="checkbox"/> Service | |

b. Criteria used (*Check one.*)

- Business/Nonprofit
- Education
- Health Care

3. Official Contact Point

Designate a person with in-depth knowledge of the organization, a good understanding of the application, and the authority to answer inquiries and arrange a site visit, if necessary. *Contact between the Baldrige Program and your organization is limited to this individual and the Alternate Official Contact Point. If the Official Contact Point changes during the application process, please inform the Program.*

Mr. Mrs. Ms. Dr.

Name	Celia Valasquez
Title	Chief Operations Officer
Mailing address	<input checked="" type="checkbox"/> Same as above
Overnight mailing address	<input checked="" type="checkbox"/> Same as above <i>(Do not use a P.O. box number.)</i>
Telephone	308-555-1046
Fax	308-555-1092
E-mail	cvalasquez@nugrain.net

4. Alternate Official Contact Point

Mr. Mrs. Ms. Dr.

Name	Renata Eapers
Telephone	707-555-7780
Fax	707-555-7880
E-mail	reapers@nugrain.net

5. Release and Ethics Statements

Release Statement

I understand that this application will be reviewed by members of the Board of Examiners.

If my organization is selected for a site visit, I agree that the organization will

- host the site visit,
- facilitate an open and unbiased examination, and
- pay reasonable costs (\$1,500 to \$40,000) associated with the site visit (see page 4).

If selected to receive an Award, my organization will share nonproprietary information on its successful performance excellence strategies with other U.S. organizations.


Ethics Statement and Signature of the Highest-Ranking Official

I state and attest that

(1) I have reviewed the information provided by my organization in this Award Application Package.

(2) To the best of my knowledge,

- this package contains no untrue statement of a material fact and
- omits no material fact that I am legally permitted to disclose and that affects my organization's ethical and legal practices. This includes but is not limited to sanctions and ethical breaches.

	Feb. 15, 2010
Signature	Date

Mr. Mrs. Ms. Dr.

Printed name	Joe Maizhead
Job title	Director
Applicant name	NuGrain Laboratories
Mailing address	1086 N. Washington St. Kearney, NE 68848
Telephone	308-555-1002
Fax	308-555-1088

Glossary of Terms and Abbreviations

B

BCDA

U.S. Business Coaching and Development Association

Beedakers Framework

a systematic approach for designing enterprise information architectures

BF

Business Forecasts: an organization that creates comprehensive environmental scans

BOT

Board of Trustees

C

carbon footprint

annual greenhouse gas emissions assessment expressed as tons of carbon dioxide equivalent

CLO

Chief Learning Officer

COMPETES

America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science

COO

Chief Operating Officer

Cooperative Extension System

field branches in states for deployment of practices to the nation's farmers

CPI

Cost Performance Index

CRADA

cooperative research and development agreement

CRM

customer relationship management

CTO

Chief Technology Officer

D

DART

Days Away, Restricted, or Transferred: a safety measurement

DHS

U.S. Department of Homeland Security

DOE

U.S. Department of Energy

DMADV

Define-Measure-Analyze-Design-Verify

DMAIC

Define-Measure-Analyze-Improve-Control

E

E-10

Engagement 10: a customer engagement survey

EEOC

U.S. Equal Employment Opportunity Commission

endosperm

the tissue produced in the seeds of most flowering plants around the time of fertilization

EPA

U.S. Environmental Protection Agency

EWA

Engagement of Workforce Assessment

F

4H Club

a youth development organization administered by the USDA's National Institute of Food and Agriculture

FDA

U.S. Food and Drug Administration

FFA

Future Farmers of America

FY

fiscal year

G

Germplasm

a collection of genetic resources for an organism

GOCO

government-owned, contractor-operated

GOGO

government-owned, government-operated

GPS

Global Positioning System

green manure

a type of cover crop grown primarily to add nutrients and organic matter to the soil

H**Hoedown Sessions**

quarterly meetings

HHS

U.S. Department of Health and Human Services

HR

Human Resources

I**Idea Well(s)**

a system for workforce members to submit suggestions

IRS

Internal Revenue Service

Irritant Program

NuGrain's precomplaint process

ISN

Innovation Service Now Program (part of the Idea Well)

IT

Information Technology

K**Kaizen Blitz**

an event lasting two-to-five days; an accelerated version of the DMAIC Process

L**LDC**

Leadership Development Committee

LDP

Leadership Development Plan

LEED

Leadership in Energy and Environmental Design

LG

Learning Group

M**MAG**

Management Advisory Group

MIG

Metrics Infrastructure Group

MVV

mission, vision, and values

N**nanotechnology**

the study of the control of matter on an atomic and molecular scale

NFU

Nebraska Free University

NRL

national research laboratory

NSF

National Science Foundation

NuGrain

NuGrain Laboratories National Center for Strategic Agricultural Research

O**OMB**

U.S. Office of Management and Budget

OSHA

U.S. Occupational Safety and Health Administration

P**PCI**

Project Command Institute

PDA

personal digital assistant

PDP

Process Design Process

PDT

Process Design Team

PEP

Performance Evaluation Plan

PER

Performance and Engagement Review

PIP

Process Improvement Process

PLANTS

Project Learning and Analysis Tool System

PMP

Process Management Process

POP

Program Oversight Panel

PP

performance plan

PR Alert

a company that produces software for public relations management and government relations

PTP

Process Team Process

PSE

Practice for Software Engineering

PSOC

Product and Service Offering Committee

PSOP

Product and Service Offering Process

R**R-37**

Research 37 Satisfaction Survey: a customer satisfaction survey completed by the USDA

R&R

reward and recognition

R&S Team

Recruitment and Staffing Team

RCRA

Resource Conservation and Recovery Act

RDIS

Research Data and Information System

RFP

request for proposal

RFQ

request for quote

RIO

Research Integrity Officer

S**Sarbanes-Oxley Act of 2002**

legislation that set new or enhanced standards for all U.S. public company boards and management, as well as for public accounting firms

SIPOC

Suppliers-Inputs-Process-Outputs-Customers

SL

senior leader

SLT

Senior Leadership Team

SOPs

standard operating procedures

SPI

Schedule Performance Index

SPP

Strategic Planning Process

SPRR

Scientific Peer Research Review

SWOT

strengths, weaknesses, opportunities, and threats

T**Touch Point training**

customer service training

TRC

Total Recordable Case: a safety/wellness measure

U**USDA**

U.S. Department of Agriculture

V**Valor**

Virtual Agricultural Library for Online Research

VOC

voice of the customer

VOCC

Voice of the Customer Committee

W**Well Team**

team that reviews suggestions submitted from employees to the Idea Well

WFO Program

Work for Others Program: a program that allows NuGrain to work for organizations outside of the USDA and other federal agencies

WPM Process

Workforce Performance Management Process

WSPC

Workforce Safety and Preparedness Committee

WWC

Workforce Wellness Committee

Preface: Organizational Profile

P.1 Organizational Description

NuGrain Laboratories National Center for Strategic Agricultural Research (NuGrain) is a government-owned, contractor-operated (GOCO) strategic research organization managed by Nebraska Free University (NFU). It is headquartered in Kearney, Nebraska, 130 miles west of Lincoln, in facilities owned by the U.S. Department of Agriculture (USDA). NuGrain was created in February 1995, and subsequently NFU won a competitive request for proposal (RFP) to manage and operate the organization to improve America's agriculture systems to be more competitive through the use of precision agriculture. In 1997, as a result of NuGrain's research findings, the scope of its contract was expanded to include 20 new projects related to germplasm and the genetic improvement of plants.

In 2000, the NuGrain contract was expanded again to include research at three distinct U.S. geographic sites in order to study differences in growing approaches among them. Three additional laboratories and farmlands were acquired, and collaborative agreements were established with colleges in California, Mississippi, and Pennsylvania. In 2005, NuGrain accepted additional USDA projects to conduct associated research to improve the safety of food products by making grains resistant to insects, diseases, and contamination. This contract also included funding from the U.S. Department of Health and Human Services (HHS) and the U.S. Department of Homeland Security (DHS). Because of the success of its research and unique capabilities, in 2007 NuGrain received additional funding from the USDA and the U.S. Department of Energy (DOE) to manage projects that investigate the possibility of new, innovative uses of grains to create products, primarily from the use of nonedible parts of plants.

Currently, NuGrain manages 152 projects in four program areas (P.1a[1]). Approximately 70% of its funding is from the USDA, 20% is from work with other Federal agencies (DOE, HHS, and DHS), and the remaining 10% is from the Work for Others (WFO) Program, mostly through cooperative research and development agreements (CRADAs).

P.1a(1) NuGrain provides unique research and development services for the USDA through a variety of projects representing "cradle-to-grave" research of corn and wheat products. NuGrain's main product offerings consist of an Agricultural Strategic Research Plan, research and related publications, and commercialization pathways (licenses). It offers an agricultural research capability to support the needs of the United States.

NuGrain's four strategic thrusts align to four of the seven National Institute for Food and Agriculture priorities for agricultural research in the United States:

(1) **Efficient and Precision Farming.** This mature program explores opportunities to improve the competitiveness of American corn and wheat farming by improving soil and planting practices, soil conservation techniques, growing

and watering processes, and harvesting and processing approaches that provide greater efficiency, higher yield, and a much more socially valuable product that can be grown by American farmers.

- (2) **Better Nutrition Approaches.** This mature program consists of opportunities to improve the health of Americans through research in improving the nutritional value of food and in enhancing the taste of healthier products.
- (3) **New and Useful Product Development.** This emerging program area includes opportunities to develop new and more useful products from plants through innovative research projects, using the crop, as well as the nonedible parts of the plants (e.g., husks and stems) that can be reclaimed from the fields. The primary focus areas of these projects are in biochemical research, food and grain products, and fiber-conversion products.
- (4) **Grain Safety and Resistance.** This combination growth and emerging program area investigates opportunities to improve the safety of food products by resisting insects and diseases through research in the development of heartier plants and improved methods of fertilization for crops in different growing environments.

Since 1996, NuGrain researchers and scientists have delivered their research results through thousands of published articles (Figure 7.1-4). The organization has received over 300 patents and has commercialized nearly 150 new practices and products (Figure 7.1-3).

P.1a(2) NuGrain has a strong organizational culture of leadership, efficiently run organizational systems, and respect for scientific inquiry that frees the workforce to ask questions, identify problems, and innovate solutions. The organization's purpose is to align university agricultural research to meet national needs by partnering with the agricultural science industry to accelerate the commercialization of research results. Figure P.1-1 shows our mission, vision, values, and core competencies.

P.1a(3) With 152 projects underway, NuGrain has a workforce of over 5,500 people. The workforce is segmented by job type and work location (Figure P.1-2). Figure P.1-3 demonstrates the workforce's education levels and broad ethnic diversity that is the result of the organization's association with recruitment centers at the four collaborating universities.

The key factors that motivate workforce members to engage in accomplishing the organization's mission (Figure P.1-4) are determined through ongoing focus groups and are verified through the Engagement of Workforce Assessment (EWA; 5.1a[1]). Employees are not involved in organized bargaining units. Specific health and safety requirements for workforce segments are outlined in Figure 7.4-14. Benefits, which are available through the collaborating universities, are outlined in Figure 5.2-2; students are afforded the same benefits as other members of the workforce on a prorated rate, based on the number of hours worked.

Figure P.1-1 Mission, Vision, Values, and Core Competencies

We are committed to our **mission**: To develop and manage agricultural research of strategic importance to the U.S. economy and security.

Our **vision** is to be the premier government-owned laboratory system through partnerships and innovative solutions for America’s farmers.

In all of our operations, we have engrained our sense of **values**:

- Demonstrate integrity in our science, relationships, and management of government assets
- Pursue scientific knowledge and respect diverse opinions
- Cultivate innovation and creativity
- Practice open and honest communication with each other and our partners, maintaining the security of confidential information
- Demonstrate leadership in all we do, in all the communities we serve
- Focus on efficient and effective processes
- Respect the land and the people who use it

Through the annual Strategic Planning Process (SPP; 2.1a[1]), senior leaders (SLs) determine and evaluate NuGrain’s **core competencies**:

- (1) Systematic agricultural research
- (2) Systematic and controlled Process Portfolio Management and Research Portfolio Management (Figure 6.1-1; e.g., full life-cycle management of longer-term agricultural research contracts)
- (3) Development of close, collaborative partnerships among academia, government, and the agricultural science industry to merge science with solutions to create commercialization pathways
- (4) Specialized research competencies in corn endosperm mutations, corn and wheat breeding/physiology, grain gene splicing and engineering, wheat germplasm, and crop nanotechnology

P.1a(4) All facilities and equipment operated by NuGrain are the property of the USDA. Under the contract, NuGrain purchased field laboratories that include farmland in various regions that enable it to test the effect of disparate climates. These facilities’ specifications are shown in Figure P.1-5. The main laboratory in Kearney, Nebraska, includes the NuGrain headquarters; laboratories for the four primary programs; and a large, configurable, growing laboratory used for all primary research projects. This laboratory can be used to simulate growing environments for small-scale testing. Once proof

Figure P.1-2 Workforce Segments

Job Type	NE	CA	MS	PA	Total
Scientists	307	50	49	44	450
Laboratory support staff (affiliated research staff)	900	548	514	509	2,471
Farm operations staff	528	329	371	359	1,587
Students	380	173	160	123	836
Administrative support and maintenance staff	95	23	23	26	167
Senior Leaders	31	6	7	6	50
Program leads	41	5	8	6	60
Program administrators	20	4	4	4	32
Total workforce	2,302	1,138	1,136	1,077	5,653

of theory is achieved, testing is moved to the farmlands in the regional laboratories. All laboratory locations are near collaborating universities that have strong Ph.D. programs in agricultural science.

Key technologies used at NuGrain sites include

- configurable, laboratory technology (computer monitoring systems, remote response tracking, growth monitoring systems, and automated building mechanical systems)
- laboratory analytical technology (chemical, botanical, and genetic)
- data acquisition and remote sensing systems (local and satellite climate systems, and soil and botanical monitoring systems)
- precision farm implements (Global Positioning System [GPS]-guided, programmable)
- field science technology (moisture- and nutrient-level readings within each acre for more appropriate application of water and fertilizer)
- nationwide virtual private network (VPN) data, a communications network, and computing systems
- Virtual Agricultural Library for Online Research (VALOR; searchable journals, publications, and data)

Key equipment (USDA-owned) consists of (1) general and specialized laboratory equipment, including precision lasers, electron microscopes, mass spectrometers, centrifuges, and precision mixing equipment; (2) farm equipment, including heavy standard machinery (e.g., tractors, harvesters, and planters) and new-design machinery for testing and commercialization through close partnerships with manufacturers; and (3) information technology (IT) servers and desktop and network equipment.

P.1a(5) NuGrain is subject to regulatory management by multiple federal and state organizations (Figures 1.1-2 and 1.2-1). As a GOCO, numerous regulatory requirements impact organization structure and functions.

P.1b(1) Organizational oversight is provided through a joint reporting structure between the USDA and NFU. The NuGrain Director reports directly to the NFU Chancellor and to the

Figure P.1-3 Workforce Diversity

Education Levels (all sites)	NuGrain	Communities
Doctorate	37%	10%
Master’s	24%	22%
Bachelor’s	28%	37%
High school or equivalent	11%	31%
Ethnicity	NuGrain	Communities
White	46%	51%
African American	23%	26%
Hispanic	12%	9%
Asian	13%	11%
Other	6%	3%

Figure P.1-4 Factors of Workforce Engagement and Satisfaction

Workforce Segment	Factors of Engagement	Factors of Satisfaction
Scientists	<ul style="list-style-type: none"> • Scientific freedom • Collaborative environment • Access to state-of-the-art technology • Opportunity to publish and present 	<ul style="list-style-type: none"> • Challenging and meaningful work • Compensation and benefits • Effective support processes
Laboratory support and farm operations staff	<ul style="list-style-type: none"> • Organization’s mission • Recognition • Reliable compensation • Tools to do the job • Benefits 	<ul style="list-style-type: none"> • Flexible hours • Adequate employee staffing for projects • Opportunity to grow and learn
Students	<ul style="list-style-type: none"> • Work experience while in school • Opportunity to grow and learn • Ability to participate in cutting-edge research 	<ul style="list-style-type: none"> • Career support and quality mentoring • Challenging work environment • Recognition • Opportunity to publish and present
Administrative support staff and maintenance staff	<ul style="list-style-type: none"> • Job security • Alignment to organization’s mission • Recognition 	<ul style="list-style-type: none"> • Compensation and benefits • Tools to do the job
SLs, program leads, and program administrators	<ul style="list-style-type: none"> • Making a difference in farm productivity • Opportunity to shape the research agenda 	<ul style="list-style-type: none"> • Opportunity to grow and learn • Challenging and meaningful work

Director of Strategic Research at the USDA Agricultural Research Services’ Administrative Council. The NFU Chancellor reports to the Board of Trustees (BOT). The BOT hires and oversees compensation for the NFU Chancellor and the NuGrain Director, who is hired by the NFU Chancellor.

The NuGrain Director has 11 direct reports, nine of whom sit on the Senior Leadership Team (SLT). The SLT provides guidance and oversight to the Research Leadership Team and the Operations Leadership Team. The Research Leadership Team oversees NuGrain’s research and related activities (e.g., publications review), while the Operations Leadership Team oversees day-to-day operations at the four sites.

P.1b(2) Key customer groups, market segments, and stakeholder groups, as well as their requirements and expectations, are outlined in Figure P.1-6.

P.1b(3) Key suppliers, partners, and collaborators, as well as their roles in NuGrain’s work system and delivery and support services, key mechanisms for communication and relationship management, roles in innovation processes, and supply chain requirements, are shown in Figure P.1-7.

P.2 Organizational Situation

NuGrain resides in a competitive environment; however, as a government-owned organization, it is limited in its ability to “compete” in the market with private-industry organizations

that perform the same types of research, albeit for the purpose of developing products for the end consumer. Still, the field of agricultural research is very broad and provides ample opportunity for growth.

P.2a Competitive Environment

P.2a(1) The research managed by NuGrain on behalf of the USDA and other federal agencies is often in academically competitive arenas, with approximately 100 competitors that include universities, laboratories, and private companies. NFU’s contract runs for seven years, with the opportunity to win one-year contract extensions each year up to 20 years, based on annual contract performance. To maximize opportunities for contract extensions, NuGrain must not only perform to the terms of the contract but also be perceived as the USDA’s leading research management option. NuGrain is the largest GOCO in the USDA and the 15th largest GOCO in the country. The organization conducts about 10 percent of all USDA research projects, with a budget approximately one-half that of the largest GOCO in the country. Due to its ongoing outstanding performance in research and publication, NuGrain has increased its contracts from just \$20 million in 1997 to approximately \$2.4 billion in 2009. The number of projects underway has increased from 10 to 152 during that time frame.

P.2a(2) The following principal factors are important in determining NuGrain’s success relative to its competitors:

Figure P.1-5 Descriptions of Facilities

Laboratory Site	Collaborating University	# Bldgs.	Sq. Ft.	Acres
Kearney, Nebraska	NFU	6	749,934	1,525
Winters, California	Surf U-Davis	3	529,922	1,675
West Point, Mississippi	Mississippi Universal University	2	376,300	1,100
Bellefonte, Pennsylvania	Pennsylvania Proper College	3	422,492	1,220

Figure P.1-6 Customer and Stakeholder Requirements and Expectations

Customer Groups	Requirements and Expectations
USDA program managers Other government agency program managers (e.g., DOE, HHS, and DHS) WFO program managers	<ul style="list-style-type: none"> • Achievement of contract deliverables (PEP) • Award and commercialization of patents • Publication of articles in peer-reviewed journals • Project overhead costs at or below contract specification • Low contract fees • Effective program and project execution at a competitively lower cost • Collaborative relationships and shared technology • Reduction of research cycle times and adherence to deadlines
Market Segments	Requirements and Expectations
Funding community (e.g., DOE, DHS, FDA, HHS, NSF, USDA). Segmented in four program/strategic thrust areas (see P.1a[1])	<ul style="list-style-type: none"> • Achievement of contract deliverables (PEP) and adherence to research cycle timeline • Efficient prime contract management with adherence to timeline • Low contract fees • Collaborative relationships and shared technology • Total project cost within budget • A cost-effective and timely Commercialization Process
Agricultural community (farmers) in various geographies	<ul style="list-style-type: none"> • Easily applied farming practices • Increased crop yields • Savings through reduced fertilizer and pesticide usage • Timely commercialization of products • Reduction in soil erosion
Scientific community	<ul style="list-style-type: none"> • Publication of articles in strategic thrust areas • High ratings of programs by peers • Publications in peer-reviewed journals
Stakeholder Groups	Requirements and Expectations
NFU	<ul style="list-style-type: none"> • Low project costs associated with overhead • Low contract fees • Efficient process management • Total project cost within budget • Positive public relations
Collaborating universities (Surf U-Davis, Mississippi Universal University, Pennsylvania Proper College)	<ul style="list-style-type: none"> • Achievement of contract deliverables (PEP) • Collaborative relationships and shared technology • Cost-effective and timely commercialization of products • Publications in peer-reviewed journals • Positive public relations
Students	<ul style="list-style-type: none"> • Opportunities to contribute to research • Scholarship awards • Diverse training offerings
Industry partners (e.g., seed suppliers, equipment and implement manufacturers, IT specialists, GPS technology manufacturers)	<ul style="list-style-type: none"> • Opportunities for shared research, learning, and collaboration • Collaboration with the agricultural community • Timely commercialization of products • WFO projects within budget, with effective, on-time project planning and execution

- (1) the cycle time to bring research opportunities to commercialized use
- (2) the rate of implementing innovations
- (3) the ability to engage in high-risk research
- (4) the ability to attract the brightest minds in agricultural science and technology
- (5) strong business practices that provide systematic, repeatable results in business management
- (6) a systematic “cradle-to-grave” strategic research system for the longer-term projects that competitors typically will not take on because of the slow payoff
- (7) excellent and sustainable relationships with customers, suppliers, partners, and collaborators
- (8) participation and visibility in the community (e.g., NuGrain sponsors and hosts local science fairs)

- (9) a reputation for a customer-centered culture

Two key changes are taking place that may affect NuGrain’s competitive situation and provide opportunities for innovation and collaboration:

- (1) a reduction in funding opportunities for general crop research, with an overall increase in funding for research related to natural-based fuels
- (2) consolidation of food research companies in the private sector through mergers and acquisitions (private competitors are becoming much larger than ever before)

P.2a(3) Comparative and competitive data are available through other GOCOs; through the annual performance evaluations of government-owned, government-operated (GOGO)

Figure P.1-7 Key Suppliers, Partners, and Collaborators

Type	Role in Work System/Innovation	Communications	Supply Chain Requirements
Suppliers: <ul style="list-style-type: none"> Laboratory supplies Laboratory equipment Farm supplies Farm equipment 	<ul style="list-style-type: none"> Supply required research materials and equipment Supply crop-growing equipment for research Provide innovative ideas for new work technologies 	<ul style="list-style-type: none"> RFP/RFQ Contract specifications Monthly supplier meetings 	<ul style="list-style-type: none"> Quality On-time delivery Flexible/tailorable solutions Best value
Partners: <ul style="list-style-type: none"> Industry/technology partners (GPS and petrochemical processors) 	<ul style="list-style-type: none"> Provide expertise in technology to further knowledge base Provide non-core-competency services Bring innovative ideas for approaches and equipment 	<ul style="list-style-type: none"> Partnership agreement Program Advisory Committees (PACs) 	<ul style="list-style-type: none"> Knowledge transfer Fair treatment Flexible/tailorable solutions Innovation
Collaborators: <ul style="list-style-type: none"> University collaborations Cooperative Extension System 	<ul style="list-style-type: none"> Support administrative and program management of contracts Provide methodology to disseminate knowledge Provide innovative solutions to organization management and commercialization approaches 	<ul style="list-style-type: none"> Contract Memorandum of Understanding USDA technology transfer meeting PACs 	<ul style="list-style-type: none"> Knowledge transfer Fair treatment Flexible/tailorable solutions Innovation Capable staff

organizations; and through partnerships with selected progressive GOCO/GOGO management organizations. Ongoing personal relationships with these organizations allow NuGrain to obtain measures of performance in similar process activities. VALOR is an ongoing source of comparative information for processes and some data in the research community. Some comparative and competitive data and information are available from prior Baldrige Award recipients, as appropriate, and from best-in-class organizations outside the industry (see 4.1a[2]).

NuGrain’s ability to obtain relevant comparative and competitive data from privately held, for-profit competitors is limited. The industry focuses on applied research that can quickly turn into profitable products and/or services. Organizations like NuGrain take a longer-term strategic viewpoint on research, which makes direct comparisons difficult and often counter-productive to its mission.

P.2b Strategic Context

NuGrain’s strategic challenges and advantages are shown in Figures P.2-1 and 2.2-1.

P.2c Performance Improvement System

The key elements of NuGrain’s performance improvement system include strategic planning for systemwide improvements (see 2.1a[1]); scorecard reviews, the Process Team Process, and Process Improvement Process (PIP; see 6.2); and the Scientific Peer Research Review (SPRR) Process (results and publications). Process Idea Wells (see 5.1a[2] and 6.2a) facilitate organizational learning and innovation. The USDA’s Office of Scientific Quality Review arranges peer-review panels to ensure independence. An annual external assessment of the organization to the Baldrige Criteria is used to identify high-impact improvement opportunities for teams to address throughout the year.

Figure P.2-1 Strategic Challenges and Advantages

Challenges	Advantages
<ul style="list-style-type: none"> Uncertain funding environment (e.g., possibility that the USDA could lose funds, NFU could lose the contract, and/or national research priorities could change)* 	<ul style="list-style-type: none"> The USDA’s knowledge of NuGrain; record of strong results and efficient processes* The ability to anticipate and adapt to changing research priorities and to develop innovations*
<ul style="list-style-type: none"> Competition with other contractors (universities and industry)* 	<ul style="list-style-type: none"> Long-term continuity; uninterrupted, consistent support based on a continuing relationship*
<ul style="list-style-type: none"> High cost of entry into new research programs 	<ul style="list-style-type: none"> Well-established facilities and a reputation for continuing success
<ul style="list-style-type: none"> Changing contract performance requirements* and conflicts between industry and government 	<ul style="list-style-type: none"> Proven Prime Contract Management Process*
<ul style="list-style-type: none"> Declining number of agriculture graduates* 	<ul style="list-style-type: none"> NFU’s strong reputation for agricultural research* NFU’s strong relationships with community colleges NFU’s strong reputation for leading industry research (so it can better attract graduate students)
<ul style="list-style-type: none"> High expense of new technologies for farmers 	<ul style="list-style-type: none"> Strong partnership with Cooperative Extension System*

*Associated with organizational sustainability

1: Leadership

1.1 Senior Leadership

Leadership begins with senior leaders' (SLs') role in setting the tone for excellence and customer focus. The Leadership Integration Model (Figure 1.1-1) is designed to facilitate the integration of NuGrain's mission (center of the diagram) with the requirements of the organization's customer and stakeholder groups (second ring) and with its core competencies (third ring). Leaders use the processes shown in the rectangles as an integrated system to set the tone for excellence and customer focus. Each of these process steps is described in the Item referenced above the rectangles.

1.1a(1) NuGrain's Senior Leadership Team (SLT), the Director, and 11 SLs utilize the Leadership Integration Model (Figure 1.1-1) to guide and sustain NuGrain. As part of the original 1995 business plan, the USDA and Nebraska Free University (NFU) created the mission, vision, and values (MVV; Figure P.1-1). Since then, the MVV have been reviewed and revised annually as needed during Step 1 of the Strategic Planning Process (SPP; Figure 2.1-1).

Each year, as the SLs deploy the Strategic Plan to employees, they discuss the MVV and how it guides all decisions of the organization. Department managers continue this discussion as they design their supporting plans for the coming year. For reinforcement, the MVV are posted at each site's cafeteria, meeting rooms, and other common areas. At new employee orientation and at quarterly Hoedown Sessions, SLT members share their insights about the MVV, describing their personal applications. The SLT also focuses on the relationship of the MVV to the current strategic objectives. Each SL creates a 10-minute MVV/strategic objective teaching moment for managers across the organization to present during monthly staff meetings to reinforce alignment. Each manager identifies one or two learnings that are compiled and used during Hoedown

Sessions. To make the MVV and strategic objectives actionable, action plan responsibilities are included in each workforce member's annual performance plan (PP; see 5.1a(3)).

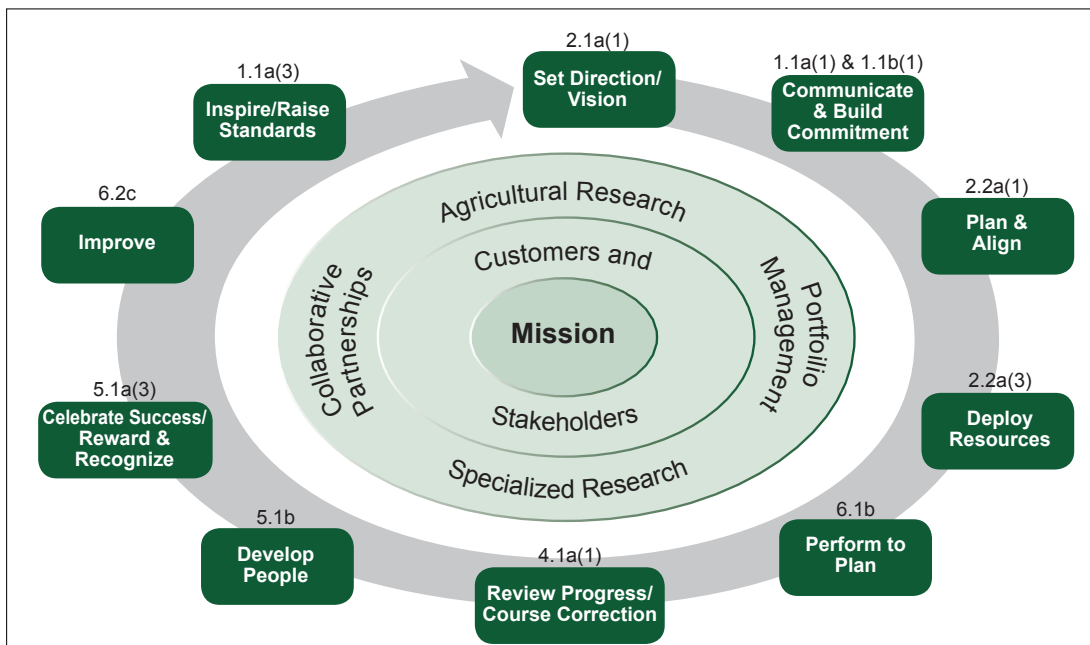
To help align NuGrain with its stakeholders, all partner and supplier contracts include the MVV, with specific and measurable performance expectations. To align with its key customer, NuGrain includes the USDA Director of Strategic Research or another member of the USDA Administrative Council in the SPP. The MVV and Strategic Plan are shared with USDA program managers and other customers as part of contract discussions (at Performance and Engagement Reviews [PER] meetings) and the end-of-year Annual Report (Figure 3.1-3).

1.1a(2) SLs promote legal and ethical behavior by reinforcing the organization's values, including "demonstrate integrity in our science, relationships, and management of government assets." SLs set clear legal and ethical expectations through ethics training and a Code of Conduct review for all new hires and the annual ethics and Code of Conduct refresher for all workforce members. SLs sign the Codes of Conduct during a quarterly Hoedown Session and provide personal examples of ethical business conduct. They reinforce a legal and ethical environment by consistently applying organizational policies and having a "no-tolerance" approach for violations. In 2006, as a result of a PIP, SLs began conducting a mandatory, annual legal and ethical webcast for the workforce and partners. During this two-hour session, SLs review the annual USDA Ethics Report, consider legal and ethical performance measures, identify new legal requirements, and role-play case studies, using interactive viewer responses. Measures of legal and regulatory performance are in Figure 1.1-2; measures of ethical behavior are in Figure 1.2-2.

1.1a(3) As shown in the Leadership Integration Model (Figure 1.1-1), SLs have a comprehensive approach to creating a sustainable organization by aligning NuGrain's mission, key

customer and stakeholder requirements, and core competencies. All SLs are trained as Six Sigma champions, and they support, focus, and participate in the organization's Six Sigma methodology. This commitment to Six Sigma and the SLs' focus on the Baldrige Criteria for Performance Excellence help build a sustainable performance improvement culture. In order to create an environment focused on accomplishment of the MVV and strategic objectives, the SLT sets organizational direction and vision through the

Figure 1.1-1 Leadership Integration Model



SPP (Figure 2.1-1). It then communicates and builds commitment throughout the workforce by conducting an interactive Web-based session to present the new strategic objectives and their relationship to the strategic challenges, strategic advantages, and core competencies. SLs participate in developing action plans for their own work groups.

As a research organization, NuGrain has made innovation a part of its culture. SLs participate in the SPP (Figure 2.1-1), Action Planning Process (Step 9, Figure 2.1-1), Work System Design Process (Figure 6.1-2), Process Design Process (PDP; 6.2a), and Stage-Gate Process (Figure 6.2-1) to ensure innovation is a focus in each process. SLs reward innovation in research and operational practice via three Awards for innovation (Figure 5.1-1). Partner agreements contain measurable outcomes for implementing new approaches. A focus on role-model performance through the use of comparative data (P.2a[3] and 4.1a[2]) gives SLs the information to achieve NuGrain’s vision to be the premier government-owned laboratory system. The use of benchmarks when analyzing data has built a healthy sense of competitiveness, which also leads to accelerating improvement and discovery.

Organizational agility is built into strategic planning by SLs’ ongoing evaluation of the environment and monitoring the adherence of NuGrain’s performance to the Strategic Plan and the contract Performance Evaluation Plan (PEP; Figure 4.1-3), as exhibited in the Leadership Integration Model (Figure 1.1-1). Conducting regular performance analysis (Figure 4.1-3) enables course modifications as needed. Agility is further enhanced through SLs’ attention to people development. A key enabler of agility is a well-trained, highly competent workforce, and NuGrain’s SLs emphasize workforce learning by personally delivering portions of key training. They also emphasize organizational learning through the analysis and use of the outcomes of NuGrain’s performance measures, as well as through benchmarking results and best practices. SLs reinforce outstanding results and practices within NuGrain through rewards for success (Figure 5.1-1). SLs participate in one or more process teams to model learning behaviors. Project teams are cross-functional groups focused on a specific project.

SLs embrace the value “demonstrate leadership in all we do.” Each year, as part of the Leadership Development Plan (LDP), SLT members select one leadership skill to work on together,

based on workforce satisfaction results, 360-degree evaluations, and the Human Resources (HR) Development Plan. The SLT identifies measurable goals and sets improvement levels. In addition, SLs identify and set measurable outcomes in their PPs for improving individual leadership skills.

SLs participate in organizational learning by teaching and/or participating in ongoing learning activities. In 2005, the HR Plan identified a lack of internal qualified applicants for two SL positions that would become vacant in 2006. SLs created an LDP with a comprehensive succession plan for all SL and top manager positions. A Six Sigma Black Belt team led by the Chief Learning Officer (CLO), who is the Master Black Belt, developed a Succession Planning Process that was successfully piloted in late 2006. In 2008, NuGrain implemented an annual organization-wide process to identify future leaders, and in 2009, the organization implemented an SL mentoring program to help develop candidates for future leadership positions. In the event that a new NuGrain Director is needed, the NFU BOT makes the appointment.

1.1b(1) NuGrain’s Senior Leader Communication Plan includes methods of internal and external communication with the workforce, existing and potential customers, the research community, partners, and suppliers. The most frequently used workforce communication methods are shown in Figure 1.1-3. The culture of investigation and experimentation, with a no-blame/no-wrong-way attitude taken by SLs, has created an environment where employees feel free to speak openly about their thoughts, ideas, and concerns (demonstrated by high scores in employee satisfaction regarding open communication). Direct, two-way, e-mail communication with SLs and 24-hour response to those e-mails grew out of employee engagement focus groups in 2007. In 2008, SLs initiated daily rounding with employees. The HR staff provides a random list of 10 workforce members for each SLT member to contact weekly either through a webcam or face-to-face. Information from these discussions is entered into an organization-wide database, which is integrated with the Project Learning and Analysis Tool System (PLANTS; 4.1a[1]) to track and trend results. Other forms of communication include a monthly internal newspaper, the intranet, and the NuGrain Web site.

Hoedown Sessions are conducted via closed-circuit TV, which enables all participants to receive information at the same

Figure 1.1-2 Regulatory/Legal Measures

	Measure	Goal, Results Figure #/Location
EEOC	# of validated complaints	Zero complaints, Figure 7.6-3
OSHA	Total Recordable Case (TRC) rate, loss of life issues	Best in class, Figure 7. 4-12
	Days Away, Restricted, or Transferred (DART) rate	Best in class, Figure 7.4-13
	Emergency readiness ratings	Best in class, Figure 7.5-6
EPA/State Environmental Health	EPA/state environmental audit findings	Zero findings, Figure 7.6-3
	ISO 14001 certification	Sustained certification, 7.6a(5)
	Results of internal RCRA inspections for gasoline usage and recycling	Gasoline usage, 9.0 tons, Figure 7.6-8 Electronics recycling, .29 tons, Figure 7.6-8
USDA Inspector General	Audits and investigations for suspected ethics violations	Zero findings, Figure 7.6-3
Legal Actions	Lawsuits or legal actions	Zero adverse findings, 7.6a(3) and Figure 7.6-3

time. Based on feedback from the 2009 EWA, SLs now solicit topics and questions before the Hoedown Sessions, which are videotaped to make them available for replay. Minutes from strategy sessions and quarterly report meetings are available to the workforce through the intranet. Depending on the anticipated effect and timing of key decisions, SLs may choose to communicate information at a Hoedown Session, via e-mail or the Web, or, if necessary, in person at each of the sites. The Senior Leader Communication Plan provides a decision matrix to assist in choosing the appropriate communication method.

SLs participate directly in the various methods of reward and recognition (R&R; 5.1a[3]), by presenting selected awards, writing personal thank-you notes for model behaviors, and publicly recognizing employees at Hoedown Sessions for most effectively representing the organization's values. Each year, one SL volunteers to work with the PLANTS Team.

1.1b(2) SLs use the Leadership Integration Model (Figure 1.1-1) and the SPP (Figure 2.1-1) to direct the accomplishment of strategic objectives; Step 11 of the SPP summarizes the process. SLs regularly review and analyze results of performance to plans during Step 12 of the SPP (Figure 2.1-1), an ongoing process that includes the reviews, measures, and analyses outlined in Figures 4.1-2 and 4.1-3. As described in 4.1b, this ensures alignment to strategic objectives, progress to plans, and a focus on customers' requirements. During its weekly meeting, the SLT addresses any needed changes to timelines or action plans identified in monthly Strategy Sessions. The Strategy Sessions are comprehensive reviews of strategic objectives, of action plans, and of progress in implementing action plans. Each meeting focuses on one or more specific strategic objectives, rotating so that all are reviewed quarterly. Strategy Session presentations include an overview of progress for each action plan, leading to the key results shown in Figure 2.2-1. Any changes to action plans and timelines are discussed, as well as potential duplications or unplanned impacts on other strategy processes.

As described above, SLs who are trained as Six Sigma champions participate in the PDP, Process Management Process (PMP), and Annual Process Performance Analysis (6.2c) activities. This culture of performance improvement, coupled with the communication of key measures identified in Figure 4.1-2, sets the stage for NuGrain to achieve its vision as the premier government-owned laboratory system.

In 2005, an NFU graduate class project structured an approach for NuGrain SLs to use during the SPP to assess and balance

customer/stakeholder value (2.1b[2]). This methodology is included in stakeholder agreements and is the basis for presenting organizational performance expectations to all stakeholders. It has been used by the SLT since 2007 with minor modifications and has been used by several organizations inside and outside the industry as a benchmark approach.

1.2 Governance and Societal Responsibilities

1.2a(1) NuGrain's governance system has two main components: (1) oversight by NFU's BOT and Chancellor, and (2) adherence to federal and state laws and regulations (Figure 1.1-2) and to USDA contract requirements that have been translated into organizational policies and procedures. To ensure accountability for management's actions, SLs are accountable to the BOT, and the university Chancellor annually evaluates the NuGrain Director's performance. In addition, NuGrain's Director meets quarterly with the USDA Director of Strategic Research (or another member of the USDA Administrative Council) and NFU's Chancellor to review all aspects of governance and contract responsibilities. The Legal/Compliance Officer supports the SLT in identifying and ensuring legal and ethical behavior across the organization. Management's accountability for organizational performance is accomplished through the Workforce Performance Management (WPM) Process, which links leaders' pay increases to performance on both individual and organizational plans and goals. Fiscal accountability is addressed monthly through an internal audit of randomly selected systems and then verified annually through the external financial auditing processes required by the USDA. NuGrain's internal auditor reports directly to the NFU Chancellor to ensure the independence of the audit process. The USDA conducts fiscal and project audits annually under the contractual agreement (Figure 1.2-1).

Members of the NFU BOT are selected by a Trustee Selection Committee composed of the governor (or his designee), two members of the Alumni Association, and two members of the current board. Selection criteria for BOT members were created by the BOT and the governor in 1987 and have been regularly updated. They are published on the NFU Web site and in college, alumni, and local newspapers when position openings are announced. The committee reviews all applicants' information and provides additional information about the open position and disclosure requirements to allow them to self-determine their willingness to participate. The committee then selects the incoming BOT member.

Figure 1.1-3 Workforce Communication Methods

Method (Two-way)	What is Communicated	Owner	Group	Frequency
SL Rounding	Open agenda, provocative questions	Director	SLs	Daily
SLT Meetings	Strategies, decisions	Director/ COO	SLs	Weekly
Results of Strategy Sessions	Results, information, decisions	Director/ COO	SLT, program leads, process owners	Monthly
Hoedown Sessions	Information, operational progress on projects	SLs	Entire workforce	Quarterly
Quarterly Report Meetings	Project status, year-to-date budget	Contract and grants management	Contractors and grantees	Quarterly
E-mail with SLs	Open agenda	SLs	Entire workforce	24/7
Ethics Hotline (anonymous)	Ethics and legal concerns	Internal auditor	Entire workforce	24/7

In 2003, although not required by any of its stakeholder groups, NuGrain proactively adopted criteria related to the Sarbanes-Oxley Act of 2002, including those for internal audits and reporting compliance. NuGrain recognized the value in going beyond expected compliance as a recognized leader in fiscal accountability. In 2007, NuGrain volunteered to pilot the U.S. Office of Management and Budget (OMB) Federal Funding Accountability and Transparency Act of 2006 (S 2590). As an early adopter of these standards, NuGrain has had no major external audit findings or material weaknesses since 2006. Transparency is further addressed through an open performance review system (Figure 4.1-3) that allows any stakeholder to view the results of performance review meetings.

Protection of stakeholder interests is addressed through policies at NuGrain and NFU. These policies include restriction of gifts (accepting and giving), specific criteria for the selection of suppliers and agreements with outside agencies, and full compliance with employee hiring laws and requirements.

1.2a(2) The performance of the Director and of other SLs is evaluated annually through the WPM Process (5.1a[3]). The Director’s performance also is evaluated annually by NFU’s Chancellor, with input from the USDA and SLs. Copies of the Director’s evaluations are provided to the USDA and other funding agencies. All other SLs’ performance evaluations are conducted by the Director. An organization-wide LDP is created annually at a special SLT meeting dedicated to overall leadership system review. Strategic objectives, core competencies, and action plans, as well as individual leaders’ PPs, are the foundation of the LDP design. NFU’s BOT, which hires and oversees compensation for the NFU Chancellor and the NuGrain Director (P.b[1]), conducts an annual self-assessment and identifies areas for personal and board improvements.

Using Six Sigma processes (6.2c) and the Baldrige Criteria for Performance Excellence, each year SLs analyze and review how their actions and decisions improve performance and lead toward attainment of NuGrain’s vision. In 2005, SLs identified a need to integrate their various activities/duties into a cohesive model. They designed the Leadership Integration Model (Figure 1.1-1) and deployed it during strategic planning that year. In 2006, using workforce satisfaction results and focus group outcomes, SLs identified the need for workforce-wide participation in evaluating the leadership system and added related questions to the EWA.

1.2b(1) NuGrain and the USDA place an emphasis on public and workforce safety, as well as on potential impacts on society of NuGrain’s products and operations. NuGrain’s research and products have the potential to affect the world’s food sources through germplasm, germ splitting, nanotechnology, the utilization of chemicals and fertilizers, and experimental processes. With this knowledge, NuGrain developed and continuously improves its Environmental Protection Process, which is an enabling process in the Process Portfolio Work System (Figure 6.1-1). Proposed research projects follow a comprehensive review process that includes environmental impact statements and approval by the Ethics, Safety, and Research Review Committees. Each project has an approved risk management plan that identifies actions needed to manage compliance risks, societal risks, and risks to successful project delivery. These plans are developed during the project planning stage and approved by SLs during the planning stage gate, and the actions are included in the project plans.

Annually, NuGrain holds public meetings at each of its sites to share current and future project information and to hear directly from farmers, local citizens, and businesses about their concerns and interests. In preparation for these annual meetings, NuGrain produces a publication, the *State of the Organization Report*, which includes local information about current and upcoming research projects specific to each site, methods to request additional information and ask questions, and an invitation to the public meetings. Questions and concerns are collected and aggregated by the Metrics Infrastructure Group (MIG) and become part of the environmental scan for the SPP. Based on such findings, NuGrain sites now provide notification to their neighbors regarding burn days, construction, and potential noise impacts.

NuGrain uses a government relations software product, PR Alerts, to monitor legislation and track congressional inquiries and contacts, enabling the organization to proactively address potential concerns. SLs also participate in and attend conferences to monitor international concerns and risks in agricultural and other research areas. Through its Internal Audit Office Inspection Process, NuGrain proactively identifies and addresses many risks or potential regulatory/legal issues. For example, the office searches for research articles and news reports to identify potential risks. Other actions taken to reduce risk include

- emergency response teams to investigate and mitigate the effects of accidents or spills

Figure 1.2-1 Fiscal Accountability Processes, Measures, and Goals

Process	Measure	Goal (Results in Figure 7.6-2)
Monitoring of credit card abuse/fraud	# of occurrences of abuse or unethical use of credit cards	Zero occurrences
Internal audits	# of audits completed, findings, and material weaknesses	Zero material weaknesses and findings
External fiscal and project audits by the USDA and OMB	# of audits completed, findings, and material weaknesses	Zero material weaknesses and findings
Conflict of Interest forms	% of workforce signing disclosure and financial forms	100% workforce completion
Sarbanes Oxley/IRS 990 audit	% compliance related to fundraising expenses, public contributions, noncash contributions, loans, tax-exempt bonds, lobbying activities, and expenses	100% compliance

- procedures and training for all personnel for containment and safe disposal of hazardous materials
- orientation, training, and testing for all workforce members on equipment

Supply-chain management processes are required to meet certification guidelines, requiring NuGrain to carry specific levels of insurance, to ensure its products contain no banned substances, and to ensure its workforce meets ethical and confidentiality standards. Key compliance processes, including internal audits and quality assurance, and key measures and goals for regulatory and legal requirements are shown in Figures 1.1-2 and 1.2-1.

1.2b(2) SLs focus on the value of integrity by providing ethics training during new employee orientation and during the annual ethics review to ensure that its workforce and partners understand expectations, can identify potential ethical issues, and know how to respond if faced with one. The Research Integrity Officer (RIO) works with the Legal/Compliance Officer to enforce the two Codes of Conduct (one general and one dealing with research), ensuring that 100% of research projects are reviewed by the Ethics, Safety, and Research Review Committee before initiation. The RIO ensures that training is provided on the responsible conduct of research and on research ethics required under the 2007 America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act. Zero tolerance for violations of the Codes of Conduct or ethics is included in the NFU agreement and in all partner/supplier agreements.

The Legal/Compliance Office scrutinizes proposals, requests for proposals (RFPs), contracts, Financial Disclosure Reports, and customer documents for potential ethical issues. The Legal/Compliance Officer conducts exit interviews, shares annual audit findings with the workforce and partners, and, based on a learning from 2009 Hoedown Sessions, distributes ethics-based scenarios from research and agribusiness via e-mail. Hotline claims, inquiries, investigations, findings from internal monitoring, and actual violations are aggregated and used for selecting ethics-based scenarios. The Legal/Compliance Office designs and monitors corrective action plans.

NuGrain’s processes, measures, and goals for ethical behavior are shown in Figure 1.2-2. The internal auditor’s routine audit

process includes internal audits of all departments and functions (Figure 7.6-2), as well as a review of travel accounts, petty cash receipts, and purchases over the cost-center-cap amounts. An ethics hotline, which funnels calls regarding NuGrain to the internal legal auditor, is monitored by NFU. The university enters all potential breaches in a secure risk-management software program, which tracks all inputs and response times, directs the investigation process, identifies the level of an actual breach, and aggregates and trends the data. The internal auditor functions independently to investigate all potential ethical issues. Also, the Contract/Procurement Review Process enables evaluation of the effectiveness of the ethics and integrity approaches used by identifying related areas that are out of compliance.

1.2c(1) During Step 5 of the SPP, NuGrain conducts a focused evaluation of strengths, weaknesses, opportunities, and threats (SWOT) on societal well-being to identify key issues. NuGrain helps its key communities in many ways; for example, economically, NuGrain provides jobs, pays taxes, and purchases equipment and supplies. NuGrain is in the business of researching ways to make farming safer, more efficient, and more nutritious, and to use all the plant components. A key consideration for all of NuGrain research and product development is the affordability of the products, recognizing that most farmers have very narrow margins with which to purchase innovations. As part of the PDP, the Contract and Grants Management Office identifies potential government grants available to purchasers of NuGrain inventions.

While NuGrain uses many natural resources, including large amounts of water, electricity, gasoline, and soil nutrients, it also maintains major initiatives to minimize the organization’s impact on the environment. NuGrain uses recaptured water for nonresearch purposes (including gray water for landscaping), energy from solar cells at each facility, and alternative fuels. NuGrain has also been proactive in the research and use of environmentally friendly fertilizer products, as well as the use of “green manure.”

In response to workforce members’ 2002 suggestion to recycle soda cans in the cafeteria, the Chief Operating Officer (COO) invited employees to design and implement an Environmental Concerns Taskforce. This multidisciplinary group, sponsored by SLs, is called the Green Team; team members at all sites

Figure 1.2-2 Ethics Processes, Measures, and Goals

Process	Measure	Goal, Results Figure #
Codes of conduct (General and research)	% attendance and signing of codes at new hire orientation and annual update	100% completion, Figure 7.6-4
Review of students’ and other workforce members’ trust in SLs/governance system	Rating on EWA for trust in SLs and governance system	Rating of 4.8 out of 5.0, Figure 7.6-5
Review of customers’ and other stakeholders’ perception of SLs/governance	% strongly agree they trust SLs and governance system	95% strongly agree, Figures 7.6-6 and 7.6-7
America COMPETES Act	% compliance with regulations related to plagiarism or falsification of data	100% compliance, Figure 7.6-4
Ethics hotline use	Volume of calls	Not applicable, Figure 7.6-4
Ethics investigations	Total number of investigations conducted	Not applicable, Figure 7.6-4
Ethics violations	Total number of violations	Zero violations, Figure 7.6-4

meet virtually each quarter to review progress. In 2004, during the SPP review of the MVV, the value “demonstrate leadership in all we do” was expanded to include the words “in all the communities we serve.” In 2005, a value was added, “respect the land and the people who use it.” As part of its focus on the environment, NuGrain will require all future construction to be consistent with the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) certification. As a cycle of improvement to the already proactive stance on environmental conservation, the Green Team is developing tools to measure and reduce NuGrain’s carbon footprint.

1.2c(2) In 2003, evaluation of the SPP identified the need to add the systematic Community Support Process to support and strengthen NuGrain’s four local communities. Based on its core competencies, NuGrain identifies which communities are best served and in what way it can best support them.

NuGrain’s communities are

- local communities surrounding NuGrain’s lab sites and its university partners
- agriculture-focused students, agricultural degree program graduates, and farmers



2: Strategic Planning

2.1 Strategy Development

2.1a(1) NuGrain operates under a comprehensive Strategic Plan to guide its decisions and activities. The SLT conducts strategic planning each year using a formal 12-step SPP (Figure 2.1-1). In Step 1, the Preparation Phase, data and information are collected, aggregated, and reported by staff members from the MIG. With the help of an expert facilitator, the SLT analyzes these data and information one month prior to the strategic planning retreat. Step 1 also includes a review of key documents, such as the NuGrain research contract with the USDA, the USDA Strategic Plan, and the Agricultural Strategic Research Plan. The SPP analysis includes multiple topic areas (Figure 2.1-2). The wide range of data gathered and analyzed helps ensure that all stakeholder needs are considered and balanced as part of the SPP. Many of the data are also reviewed by SLs on a monthly basis, since many of the structures and information that support the SPP also support ongoing performance reviews (4.1b).

Each year, the SLT conducts a two-day strategic planning retreat with key stakeholders (Steps 2–8). Key participants from academia include the Chancellor of NFU and agriculture program deans from all four collaborating universities, plus community college representatives; USDA program managers; Cooperative Extension System representatives; DOE, HHS, and DHS program managers; key industry partners; and representatives from the agricultural community. The inclusion of key industry partners and farmers (a 2004 improvement based on an evaluation of the SPP) reflects an increased focus on commercialization and the recognition of conflicts between industry and government (a strategic challenge). The first activity at the two-day retreat (Step 2) is to revisit and reaffirm

- colleges, universities, high schools, and middle schools with future technical workforce potential

Some examples of community support are

- SLs and other workforce members acting as speakers for the Chamber of Commerce and other service organizations; for community events, such as science fairs; and for school assemblies
- sponsoring/supporting 4H Clubs, Future Farmers of America (FFA), and agricultural graduate or postgraduate student programs
- sponsoring local science-fair competitions
- supporting education programs in high schools and colleges, such as tutoring students, working on special research projects, and collaborating on summer farmers’ programs

SLs personally support one community initiative per year, which is included in their PPs. They encourage workforce members to participate in NuGrain’s identified initiatives, such as those shown in the bulleted list above. Employees receive up to 24 paid hours per year to do so.

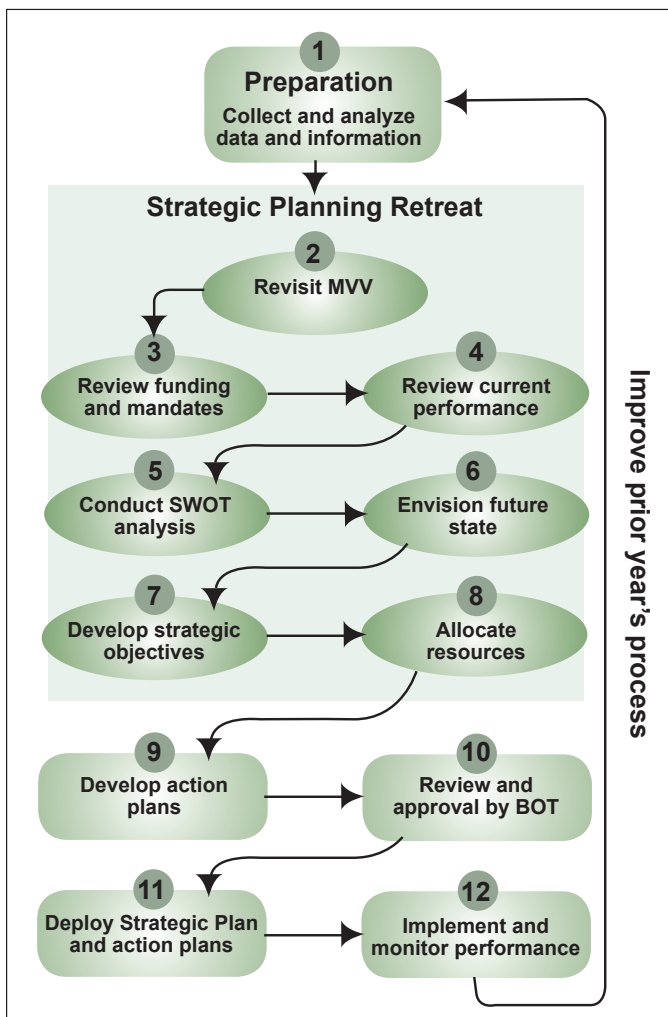
NuGrain’s MVV. Over time, minor wording changes have been made to the MVV, and in 2005, “Respect the land and the people who use it” was added as a value. Retreat participants review NuGrain’s funding and mandates in Step 3, recognizing budget gaps and unfunded mandates. Step 4 is a review of current organizational performance, including a review of performance compared to action plans from the previous year and progress toward strategic objectives.

In Step 5, the facilitator leads participants through a review of an environmental scan prepared by Business Forecasts (BF) and draws on the participants’ expertise to determine NuGrain’s SWOT. Based on the SWOT, participants identify strategic challenges and the most important corresponding strategic advantages. Blind spots are identified through data collection and analysis, the environmental scan, the SWOT analysis (2.1a[2]), and input from all stakeholders.

In Step 6, appreciative inquiry is used to envision the future state of the organization. Based on strategic challenges and advantages, NuGrain’s core competencies are revisited and reaffirmed to provide direction to resource allocation and the prioritization of plans. With a common understanding of NuGrain’s strategic challenges and advantages, core competencies, and vision of the future, retreat participants brainstorm, modify, and record strategic objectives in Step 7. All of these components are recorded as they are identified in the Strategic Alignment Document (Figure 2.2-1), a logical thought model used to ensure alignment of the Strategic Plan.

Planning horizons reflected in the Strategic Plan are long-term (ten years), intermediate-term (five years), and near-term (one year). These horizons were proposed by the SLT and supported by the BOT to provide flexibility in meeting

Figure 2.1-1 Strategic Planning Process



near-term requirements while making steady progress toward longer-term strategic objectives. The ten-year planning horizon reflects the long-term strategic nature of the research done, and it was purposely adopted to look beyond the initial seven-year contract with the USDA. NuGrain also has a ten-year Agricultural Strategic Research Plan, with subplans for each strategic thrust area (P.1a[1]); a ten-year Site Plan (facilities and major equipment acquisitions); and a ten-year Capability and Capacity Plan.

The near-term planning horizon was initially a two-year business plan; however, experience showed a need to revisit the plan on an annual basis. SLs officially adopted a one-year, near-term planning horizon in 2008, as NuGrain began operating under one-year contract extensions. This one-year cycle allows for rapid adjustments to address changes in the political, economic, or regulatory environments. In 2008, NuGrain also began developing five-year performance projections based on long-term strategies (Figure 2.2-1). This time frame corresponds with the USDA's Strategic Plan.

2.1a(2) Step 1 of the SPP includes the collection of relevant data and information by the MIG and analysis by the SLT one month prior to the retreat. Figure 2.1-2 shows the types and sources of information that are included in this review. The *SWOT analysis* reconciles customer requirements gathered

through Key Listening and Learning Methods (Figure 3.2-2) and internal feedback from workforce surveys and focus groups. These analyses are supplemented by supplier recommendations gathered through meetings and contract negotiations, as well as from industry feedback.

Early indications: As part of the SWOT analysis (Step 5), customers, subject-matter experts, and academics identify new and emerging issues, such as shifts in technology, markets, products, customer preferences, competition, and the regulatory environment. Participants review an annual environmental scan developed by BF's global research staff from information in print and electronic media. The preparation of this environmental scan by an independent, external organization helps NuGrain avoid blind spots in its analysis of changing market, technological, and societal needs. The scan serves as a starting point for the SWOT discussion.

Long-term organizational sustainability is accomplished through NuGrain's SPP and organizational performance reviews (4.1b), financial planning, systematic evaluation and improvement of work processes (6.2c), and emergency readiness (6.1c). Long-term sustainability is considered in the analysis of strategic challenges and in the development of strategies to address them. *Core competencies* (Figure P.1-1) are determined and evaluated in Step 6 of the SPP, taking into account NuGrain's mission and results of the SWOT analysis. Using the Strategic Alignment Document (Figure 2.2-1), strategic objectives, long-term strategies, and near-term action plans are designed to address the strategic challenges/advantages and build on core competencies. Organizational performance reviews (Figure 4.1-3) enable the SLT to modify action plans or develop new plans as appropriate, as well as to reprioritize strategies and action plans as needed.

The *ability to execute the Strategic Plan* is achieved through the allocation of resources in Step 8; this is accomplished with the use of a Budget Plan, HR Plan, and IT Plan that are aligned with the Strategic Plan. Performance is closely monitored throughout the year (Step 12), and adjustments to action plans are made when necessary. Workforce members' annual PPs reflect their responsibilities for implementing action plans; incentives are tied to achievement.

Finally, the SPP is reviewed annually to identify opportunities to further strengthen and leverage it, resulting in improvements such as the introduction of the Strategic Alignment Document in 2006 to ensure that all components of the plan are addressed and remain aligned to each other. In 2005, the MIG was formed to help manage the regular collection and review of strategic planning input, as well as ongoing organizational performance, and the BF environmental scan report was first used to identify industry and market trends.

2.1b(1) Five key strategic objectives, all of which fall within the ten-year planning horizon, are shown in Figure 2.2-1; timetables for accomplishment vary. Long-term strategies for their accomplishment can also be found in Figure 2.2-1.

2.1b(2) Step 5 of the SPP translates the SWOT into strategic challenges and advantages that are then entered into the

Figure 2.1-2 Sample Environmental Scan Inputs for SPP

Topic Area	Example of Sources
Customer needs	<ul style="list-style-type: none"> — USDA Strategic Plan/Agricultural Strategic Research Plan — Summaries of technology transfer meetings with USDA — Annual contract performance/evaluation plan review — Inputs from key listening and learning methods (Figure 3.2-2) — USDA's Research 37 (R-37) Satisfaction Survey
Industry trends and competitive environment	<ul style="list-style-type: none"> — Information on customers and market segments from key listening and learning methods (Figure 3.2-2) — Newspaper and industry publications — BF environmental scan
Technology shifts	<ul style="list-style-type: none"> — BF environmental scan — IT association reports/publications — Information from suppliers/vendors of equipment
HR needs and capabilities	<ul style="list-style-type: none"> — Workforce surveys/focus groups — Monthly staff meeting minutes — Assessment of workforce capability and capacity (5.2a)
Organizational capabilities	<ul style="list-style-type: none"> — Operational measures for process efficiency and utilization — Results of complaints, irritants, and work system review — Results of Annual Process Performance Analysis (6.2c)
Financial capabilities and needs	<ul style="list-style-type: none"> — Current budget and financial reports — Budget projections
Regulatory issues	<ul style="list-style-type: none"> — Results of audits and inspections, early indicators (1.2a)
Partners/suppliers directions and capabilities	<ul style="list-style-type: none"> — BOT directives and policy statements — Strategic plans of collaborating universities — Performance capability reports

Strategic Alignment Document. In Step 6, the SPP participants review and modify core competencies that are required to overcome challenges, capitalize on advantages, and gain a competitive advantage. As shown in Figure 2.2-1, the core competencies are aligned to the challenges and advantages, as are the strategic objectives.

Opportunities for innovation in products, operations, and the business model are built into the Strategic Plan based upon innovative ideas that come from SPP inputs (2.1a[2]). The Strategic Alignment Document and approach (with linked planning horizons and a flow-down approach to planning) ensure that strategic objectives address current and future core competencies, as well as balance short- and long-term challenges and opportunities.

NuGrain's research is customer-driven, conducted by its workforce, and delivered to the agricultural community through partnerships with industry, universities, and the Cooperative Extension System. NuGrain creates and balances value for customers and other stakeholders through (1) consideration of inputs from all stakeholder groups in Step 1 of the SPP, (2) the active participation of these various stakeholders in the SPP (including in the development of action plans), and (3) the composition of the BOT that reviews and approves the Strategic Plan (board members have affiliations with government, industry, and academia).

Over the past 15 years, the Strategic Plan has evolved, along with the process for creating it. Early plans focused on internal processes, and the outputs included completed research, final reports, and papers for publication. Emphasis was placed primarily on communicating results to other researchers, rather than to users. As this process matured, strategic objectives

became focused both externally and internally, and greater emphasis was placed on commercialization. NuGrain recognized the importance of balancing customer needs with those of the scientific and agricultural community, so in 2003 and 2004 the organization invited representatives of industry and the agricultural community to participate in the SPP. In 2005, an NFU graduate-class project structured an approach for NuGrain's SLT to use during the SPP to assess and balance customer and stakeholder value. This methodology is now included in stakeholder agreements and is the basis for presenting organizational performance expectations to all stakeholders. This model has been benchmarked inside and outside the industry as best in class.

2.2 Strategy Deployment

NuGrain's integrated SPP includes steps for the deployment of the Strategic Plan to all employees. Each employee is evaluated according to his or her contribution to the strategic direction of the organization.

2.2a(1) Figure 2.2-1 lists some of the key short- and longer-term action plans (called "sample near-term action plans" and "long-term strategies"). Detailed action plans and all other action plans are available on-site. Key planned changes in products, customers, and markets are generally identified within the strategic objective, "Become indispensable to USDA and other funding agencies in their strategic research efforts." Within that objective, a longer-term strategy focused on an Agricultural Strategic Research Plan that details changes in research priorities and activities, such as increasing the level of research related to health and nutrition funded by HHS.

Key planned changes in operations are included within the objective for "Operate using a strong business model." Having come through a period of rapid growth, NuGrain recognizes that it is currently operating in an uncertain funding environment (a strategic challenge), and it anticipates being asked to do more with stagnant or declining financial and human resources. Thus, the current Strategic Plan includes long-term strategies and near-term action plans focused on improving key work processes (6.2), such as the long-term strategy to "achieve best GOCO performance in meeting contract requirements" and near-term actions to achieve ISO 14001 certifications and to increase process efficiencies.

Essential to the Strategic Plan are IT capabilities that can enhance internal capabilities and improve communications with customers and partners. Conveying messages, research results, and analyses to key customers in the form they want and at the right time is as important as doing excellent work on relevant projects. Thus, NuGrain has adopted a long-term strategy to "communicate accomplishments to customers/policymakers," supported by a short-term communications action plan. NuGrain has also developed a five-year IT Plan, tied to its Strategic Plan,

Figure 2.2-1 Strategic Alignment Document: Logic Flow Model for Planning

Strategic challenges (Figure P.2-1)	Strategic advantages (Figure P.2-1)	Strategic objectives	Long-term strategies (aligned with core competencies [CC], Figure P.1-1)	Sample near-term action plans	Key Measure(s)	Results (Figure #)	Performance projections 2010	Performance projections 2014	Competitor/ Best in Class 2014
Uncertain funding environment Competition with other contractors High cost of entry into new research programs	Record of strong results and efficient processes Long-term continuity Well-established facilities and reputation for continuing success	Become indispensable to USDA and other funding agencies in their strategic research efforts	Develop and implement Agricultural Strategic Research Plan (CC #1), covering — efficient and precision farming — better nutrition approaches — new and useful product development — grain safety and resistance (all aligned with strategic thrusts, P.1a[1]) — Produce innovations for which no one else has the capability (in expertise areas, see P.1a[1]) (CC #4) — Push innovations to market better, faster (CC #1) — Demonstrate impact in key areas (CC #1)	Engage USDA program managers, other federal agencies, and congressional representatives in planning and budgeting for the integrated Agricultural Strategic Research Plan (1) Focus on Agriculture Strategic Research Plan (2) Implement Technology Deployment Plan	Overall PEP Score Funding growth (budget) Satisfaction with involvement in program planning	7.1-1 7.3-1 7.2-1	99% \$2.5B 96%	99% \$4B 99%	n/a \$3.8B 92%
Competition with other contractors	NFU's strong reputation for agricultural research	Develop a reputation for outstanding, innovative research	Identify opportunities for related research (CC #4) — Increase publications in peer-reviewed journals (CC #1,3,4) — Communicate accomplishments to customers/policymakers (CC #3)	(1) Effectively engage customers in program and project planning (2) Write research proposals	Satisfaction with research program results Patents awarded and commercialized Research total cycle time Impact: — Crop yield per acre — Cost savings — Reduced soil erosion	7.2-2 7.1-3 7.5-1 7.1-5 7.1-6 7.1-7	96% 50 31 \$175 \$28 0.7 ton	98% 60 27.5 \$250 \$40 0.5 ton	89% 60 30 \$235 n/a n/a
Competition with other contractors	Proven Prime Contract Management Process	Operate using a strong business model (efficient, quality-directed)	Achieve best GOCO performance in meeting contract requirements (CC #2) Obtain third-party certifications for major compliance areas (CC #3,4)	Implement University Communications Plan (1) Implement Contract Performance Improvement Plan (2) Improve responsiveness to the VOC for programs, projects, and processes	Sources of funding Satisfaction with involvement in program planning Satisfaction with program execution Satisfaction with involvement in research project planning # articles published in peer-reviewed journals/periodicals	7.3-5 7.2-1 7.2-1 7.2-2 7.1-4	30% non-USDA 96% 96% 92% 3,425	40% non-USDA 99% 99% 94% 3,700	30% 95% 84% 84% 2,500
Changing contract performance requirements	Proven Prime Contract Management Process	Operate using a strong business model (efficient, quality-directed)	Achieve best GOCO performance in meeting contract requirements (CC #2) Obtain third-party certifications for major compliance areas (CC #3,4)	(1) Implement Contract Performance Improvement Plan (2) Improve responsiveness to the VOC for programs, projects, and processes	Overall PEP Score VOC Ratings: — Satisfaction with program execution — Satisfaction with involvement in research project planning — Satisfaction with cost of research	7.1-1 7.2-1 7.2-2 7.2-1 7.4-12, 7.4-13 7.6a(5)	99% 96% 92% 96% 3.0, .8 2.9, .8	99% 99% 94% 98% 2.8, .4 2.5, .8	n/a 84% 84% 84% n/a n/a n/a

Continued on p. 10

Figure 2.2-1 (continued) Strategic Alignment Document: Logic Flow Model for Planning

Strategic challenges (Figure P.2-1)	Strategic advantages (Figure P.2-1)	Strategic objectives	Long-term strategies (aligned with core competencies [CC], Figure P.1-1)	Sample near-term action plans	Key Measure(s)	Results (Figure #)	Performance projections 2010	Performance projections 2014	Competitor/ Best in Class 2014
Declining number of agriculture graduates	NFU's strong reputation for agricultural research NFU's strong relationships with community colleges	Build capability and capacity of workforce	Focus on 10-year Capacity and Capacity Plan to — attract and retain outstanding researchers (CC #1,4) — develop the next generation of researchers (CC #1,4)	(1) Increase number internships/post-doc positions for agricultural research (2) Provide practical and meaningful learning opportunities	Scholarships (total \$, # of scholarships) Practical and meaningful learning opportunities/ publications — Practical learning opportunities — Scholarships — Training Research, licensing, and collaboration opportunities — Research — Commercialization — Collaboration Training investment	7.3-8 7.2-9 7.2-10	\$241K #98 83% 92% 89%	\$424K #150 87% 93% 91%	n/a n/a n/a
Conflicts between industry and government High expense of new technologies for farmers	NFU's strong reputation for leading industry research Strong partnership with Cooperative Extension System NFU's strong relationships with community colleges	Implement industry-friendly research collaboration methods and technology-transfer mechanisms	Focus on results —Begin with the end in mind (research is customer-driven) (CC #1,4) —Engage customers throughout the research process (CC# 1,4) —Push innovations to market more effectively, faster (CC#1,4) —Develop partnerships for technology transfer and commercialization (CC #3)	(3) Provide training and continuing education opportunities for workforce (4) Improve workforce engagement (5) Improve workforce satisfaction	Workforce engagement Workforce satisfaction (students/ employees)	7.4-1 7.4-5	4.2 4.1	4.5 4.3	n/a n/a n/a
				(1) Effectively engage customers (including industry) in program and project planning and execution (2) Increase efficiencies to speed process from proof of concept to market (3) Implement Technology Deployment Plan to —develop relationships with Cooperative Extension System —develop industry commercialization partnerships	Assistance with education and cost (for industry implementation) —Education —Cost Satisfaction with being informed of research progress and collaboration —Informed —Collaboration Collaborative relationships and technology sharing —Relationships —Technology Research total cycle time Patents —Awarded —Commercialized	7.2-7 7.2-7 7.2-5 7.5-1 7.1-3	96% 65% 90% 92%	98% 75% 94% 95%	n/a n/a n/a 30 60

and will continue to invest in integrating useful new IT, (e.g., webinars, the Windblown Conference Tool, Wiki environments, and Web-based Communities of Practice).

2.2a(2) In Step 9 of the SPP, action plans are developed by teams assembled and led by SLs who are responsible for the strategic objectives. The cross-functional, multi-organizational strategic objective teams include key staff members, suppliers, and partners to help ensure their buy-in, action plan implementation, and the ability to execute the Strategic Plan. For each strategic objective, a team identifies actionable strategies and develops short-term action plans and measures.

The members of the SLT who are responsible for the strategic objectives compose the Action Planning Council. They use a streamlined version of the Work System Design Process (Figure 6.1-2) to develop action plans. In 2002, the council adopted a standard template for the development and presentation of action plans, and this template was modified in 2003 to include budget information. The template assists the SLT in reviewing action plans and tracking implementation. Review and reconciliation of action plans by the Action Planning Council, using the Strategy Argument Document, help ensure that there are no gaps (e.g., strategic objectives not addressed) and that plans capture cross-cutting initiatives, have appropriate measures, are aligned with strategic objectives, and cover all key deployment areas and stakeholders. Based on its review of the action plans, the SLT may make changes to the allocation of resources initially made in Step 8 of the SPP.

After action plans are developed, the BOT approves the Strategic Plan, including the budget, action plans, and metrics, in Step 10. Then the plan is deployed to the entire workforce, including remote sites, in Step 11. This is accomplished through an interactive Web-based session, followed by meetings at each location in which the Strategic Plan is presented and discussed. In this way, members of the workforce can understand how their responsibilities are related to NuGrain's strategies. Members of the workforce have their responsibilities spelled out in their annual PPs. Employee incentives are based on completion of action plans. Key suppliers and partners have responsibilities for performance and deliverables spelled out in contracts and cooperative agreements, and responsibilities are reviewed at monthly supplier meetings.

Throughout the year, as shown in Step 12, NuGrain monitors implementation of the Strategic Plan, including action plans; reviews data; captures lessons learned; conducts trend analyses; and evaluates prior-year goal performance and feedback. Step 12 also serves as the beginning of the next planning cycle. Data are collected and used for revising the current Strategic Plan or creating the next SPP cycle. In Step 12, SLs use the Leadership Integration Model (Figure 1.1-1) to direct the accomplishment of strategic objectives and related action plans. Progress is monitored through the SLT Scorecard (Figure 4.1-2), in which the key measures originate from the SPP. SLs review and analyze results during their weekly SLT meeting. As described in 4.1b, this analysis helps ensure alignment to strategic objectives, appropriate progress on action plans, and a focus on customers' requirements. During its meetings,

the SLT approves or denies any changes to timelines or action plans proposed during Strategy Sessions (see 1.1b[2]). At quarterly Hoedown Sessions, the strategy leader summarizes the progress of strategy implementation, and the workforce can review the Scorecard on the intranet.

NuGrain ensures that key outcomes of action plans are sustained through the PDP (6.2a). The last step is to standardize the improvement/change into the workflow of the process. This ensures that the improved process/approach does not revert back to its prior state. Additionally, changes are sustained because of PP accountability, which is part of the WPM Process (5.1a[3]). SLs' performance agreements reflect their responsibilities for achieving strategic objectives and related action plans. The NuGrain Director updates the BOT quarterly on the status of the Strategic Plan, including key changes and action plans. The board's routine oversight holds the SLT accountable for the outcomes of action plans and the achievement of strategic objectives.

2.2a(3) The Strategic Plan sets NuGrain's long-term direction and guides resource allocation and redistributions. The Chief Financial Officer, with assistance from SLs, develops the annual budget to support the strategic objectives and the long-term strategies established in Step 7 of the SPP. Financial, human, and technology resources are initially allocated in Step 8 and finalized for specific action plans in Step 9 (see 2.2[a]2). The budget, which is submitted for review and approval to the BOT in Step 10, includes a small contingency fund to ensure funds for unanticipated circumstances.

To maintain adequate financial resources to meet current obligations and support long-term research, NuGrain works closely with the USDA to support the presidential administration's budget proposals. Also, NuGrain maintains reserve funds at a safe level (six months of active expenditures) to ensure that the organization can weather difficult times and can afford to invest in important longer-term action plans.

2.2a(4) As shown in Figure 4.1-2, monthly program reviews provide information on performance and include identification of action plans needing attention, increased support and resources, etc. When action plans are not performing as expected, SLs may allocate additional resources or efforts may be stopped and resources redeployed elsewhere.

Midyear course changes/new requirements also may come from customers in the form of policy changes, emergencies, or other significant events. Customer feedback from the Key Listening and Learning Methods (Figure 3.2-2) is used to identify potential blind spots that may emerge during the year. The MIG collects and analyzes this information and provides updated information at SLT meetings. Frequent reviews by SLs enable them to quickly identify environmental changes and to shift resources if needed.

New action plans may be added throughout the year to keep pace with performance review findings and changing needs. When circumstances require a shift in plans, SLs and team members modify and/or develop and deploy new action plans, along with performance measures. This may result in an

increase in resources for an action plan or a redeployment of resources to accomplish new action plans. Any changes are rapidly communicated and deployed to all locations through one-on-one discussions and a cascading meeting structure.

2.2a(5) Step 8 of the SPP includes the allocation of human resources to accomplish strategic objectives and action plans. Like the Budget Plan, the HR Plan cascades from the Strategic Plan and is directly linked to strategies and action plans. SLs annually conduct a one-day retreat after the SPP is complete to finalize the HR Plan, review/revise the succession plan, and set outcomes for their roles in the Mentoring Program (5.1b[4]).

One of the strategic objectives is to build the capability and capacity of the workforce, and this includes long- and near-term action plans. NuGrain has a ten-year Capability and Capacity Plan (part of the HR Plan), which is intended to attract and retain outstanding researchers and to develop the next generation despite the decreasing number of agriculture graduates from U.S. universities. The HR Plan also identifies NuGrain's human-capital challenges and ways to monitor and address these challenges, including meeting the demand for cutting-edge research talent and building expertise in specialized research areas. Key elements of the HR Plan include (1) a focus on strong academic and/or professional credentials; (2) a recruiting process that engages universities; (3) a development program for new staff members, with additional mentoring by senior staff members; (4) scholarship support for graduate research fellows; (5) incentives for actively publishing research findings; (6) support for presenting papers at academic conferences and seminars; and (7) an evaluation process that provides incentives for the accomplishment of action plans.

The NuGrain Foundation raises money and provides scholarships (Figure 7.3-8) to students in master's and doctoral programs in order to attract outstanding graduate students and build agricultural research capabilities. The foundation surveys its scholarship students at six months and five years after



3: Customer Focus

3.1 Customer Engagement

3.1a(1) NuGrain identifies and innovates product offerings to meet the requirements and expectations of its customers and market segments through the systematic deployment of the Product and Service Offering Process (PSOP; Figure 3.1-1). The PSOP, an integral element of program initiation for the Process Management Processes within the Research Portfolio Management Work System (Figure 6.1-1), capitalizes on the core competency of systematic agricultural research. Customer needs and requirements from voice of the customer (VOC) sources and the research initiation process are reviewed and analyzed by a Product and Service Offering Committee (PSOC). The PSOC includes the customer program or project manager, the NuGrain research program or project lead, university researchers, and the ultimate end user of the research (e.g., industry representatives and farmers). Since research

graduation to determine how many go to work for NuGrain, for other agricultural research programs, and into other fields of work. Of those students receiving foundation scholarships, approximately 30% who complete master's degrees and 60% who complete doctorates go to work for NuGrain. The retention rate for these students is high, with 90% of those employed by NuGrain remaining after five years.

2.2a(6) The Action Planning Council ensures that the action plan measurement system reinforces alignment with the Strategic Plan and covers key deployment areas and stakeholders. The alignment of key performance measures, near-term action plans, long-term strategies, and strategic objectives is demonstrated in Figure 2.2-1. SLs seek validation of performance measures and methodologies from employees involved in collecting data and measuring performance. When key performance measures were first introduced in 2001, the SLT noticed discrepancies in the data collected from different sites. Staff from all NuGrain locations were interviewed to validate the information, identify discrepancies, and develop more meaningful performance measures and improved methods of measurement.

The Action Planning Council also reviews the overall progress and effectiveness of action plans in achieving strategic objectives. Improvements in the Action Planning Process have included the introduction of a standard template in 2002 and its subsequent improvement, as well as linkage of action plans to workforce PPs and incentives.

2.2b For key performance measures, performance projections for short and intermediate planning horizons and comparative projections to competitors'/best-in-class performance (when available) are included in Figure 2.2-1. These projections are determined by the strategic objective teams that develop action plans based on analysis of NuGrain's competitive environment and prior performance against goals. Action plans are developed specifically to address gaps in comparisons with competitors/comparable organizations.

programs or projects encompass different areas of inquiry, PSOC's end-user members vary for each research program.

In Steps 3 and 4 of the PSOP, PSOCs refine customer and research needs to identify specific product features. In Step 5, NuGrain develops specific research features and research outcomes. The PSOP allows NuGrain to innovate product offerings to attract new customers (potential customers and markets are represented on PSOCs) and provide opportunities for expanding its relationships with current customers, who are key members of all PSOCs. To ensure organization-wide consistency and use, the COO acts as the organizational PSOP champion and reviews PSOC activities.

3.1a(2) Customer support is designed to make NuGrain easy to do business with and responsive to customers' expectations, as expressed in the value of open and honest communication (Figure P.1-1). The VOC Committee (VOCC) leads the process to determine key customer support requirements and

mechanisms to meet these requirements, including access and communication methods. The process includes a review of analyses and findings from the organization’s key quantitative and qualitative listening and learning methods (Figure 3.2-2). Customer support, access, and communication approaches are reviewed and refined annually by the VOCC, and they are further refined during the SPP (see 2.1a[1]). Data and information for this review are collected at monthly PERs with program or project leads (6.1b[1]), at Program Oversight Panel (POP) meetings, and through the R-37 Satisfaction Survey. Figure 3.1-2 lists key mechanisms that enable customers to seek information and conduct business and shows how customer support and communication mechanisms vary for current customer groups and potential customers (market segments).

NuGrain customer support is not a central department within the organization but a fully deployed process implemented in each research program and project. Since most customer inquiries concern specific research, NuGrain has found that the research program and project leads provide customers with the greatest, most reliable, and most knowledgeable customer support. All staff members receive Touch Point training to ensure professional, consistent, and clear communication that enhances customer engagement. Key customer support requirements are communicated to all staff members and research partners through monthly staff meetings, quarterly Hoedown Sessions, and monthly managers’ meetings, as well as to the MIG for inclusion in the SPP environmental scan (2.1a[1]). These requirements are also communicated to HR staff for inclusion in Touch Point training updates (5.1b).

3.1a(3) PSOP and customer support approaches are reviewed annually for currency with research needs and directions and to identify and innovate product offerings. The COO and program leads meet in October for PSOP Innovation and Improvement Day to review PSOC members’ suggestions and to revise the PSOP as necessary. Improvements occur through use of the Process Team Process (PTP; 6.2c). The most recent improvement to the PSOP was the 2008 addition of industry partners and farmers. The VOCC and the SPP team review key customer-support requirements and related mechanisms annually. A 2007 improvement was the provision of Touch Point training to all university research partners.

Through the SPP, NuGrain keeps its approaches for identifying and innovating product offerings current. Throughout the year, stakeholders submit ideas through the Innovation Service Now (ISN) program (part of the Idea Well system), customer suggestions gathered through the VOC Process (Figure 3.2-1) provide input to the PSOP (Figure 3.1-1), and other input comes from discoveries and ideas generated through our own research process. These inputs are included in the environmental scan that is used during the SWOT (Figure 2.1-2) to identify opportunities that may lead to new or modified innovative product offerings.

3.1b(1) Providing exceptional research services, operating research like a business, and maintaining a customer-centered culture serve as foundations for achieving NuGrain’s vision. SLs promote a positive customer experience and enhance

customer engagement by reinforcing the MVV, including “demonstrate leadership in all we do.” To deploy the culture, SLs set clear expectations for customer satisfaction and engagement through the SPP, and they communicate these through various department meetings and quarterly Hoedown Sessions. Action plans are developed (2.2a[2]) to achieve the expectations for customer satisfaction and engagement, and performance is monitored as described in 4.1b.

NuGrain’s customer-centered culture is further reinforced through the Touch Point program. In 2007, to ensure professional, consistently positive interactions with customers throughout the customer life cycle, NuGrain instituted Touch Point training for workforce members in the customer-response chain. Training is provided on customer needs, service standards, customer relationship management (CRM), and the Irritant Program (3.2b[3]). All new workforce members receive Touch Point training, and current staff members and researchers receive annual training updates.

The POPs, which engage the customer throughout the research life cycle, further reinforce NuGrain’s customer-centered culture. POPs—composed of customers, researchers, and market segment members, including the agricultural community—oversee ongoing research and technology transfer. Panel members, in effect, become the “champions” for research and promote the use of the resulting products or services.

Figure 3.1-1 Product and Service Offering Process

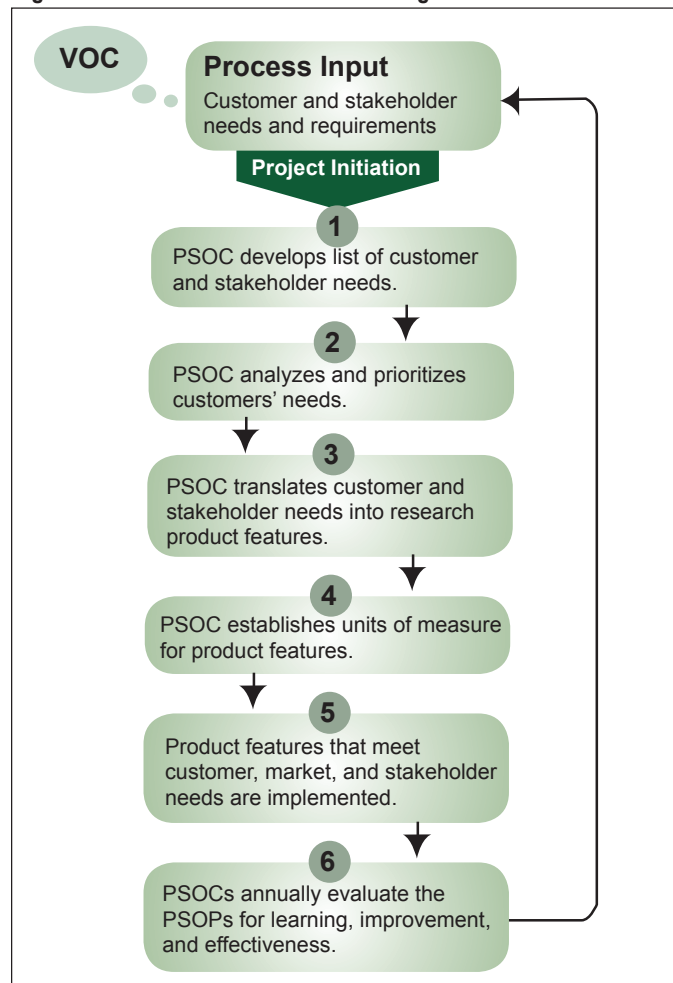


Figure 3.1-2 Support and Communication Mechanisms for Customer Groups

Group	Customer Support Mechanism	Key Communication Mechanism
Customers: USDA program managers Managers of other government agency (e.g., DOE and DHS) programs and WFO projects	*Personal contact with program and project leads *Personal contact with researchers *Web site **Newsletters *Personal contact with program and project leads *Personal contact with researchers *Web site **Newsletters	*Monthly and annual PERs with USDA program managers and end-of-year Annual Report *POPs and PSOCs *Telephone, e-mail, Internet *Monthly <i>What is Growing?</i> newsletter ** <i>Research Activity Update</i> newsletter *Monthly and annual PERs and end-of-year Annual Report *POPs and PSOCs *Telephone, e-mail, Internet ** <i>What is Growing?</i>
Markets: Funding, scientific, and agricultural communities	*Personal contact with program and project leads *Web site **Newsletters	** <i>Research Activity Update</i> *Monthly and annual PERs *POPs *Telephone, e-mail, Internet ** <i>What is Growing?</i>

*Used to seek information and conduct business; **Used only to seek information

The effectiveness of NuGrain’s customer-centered culture is evidenced by the creation of the ISN program by Grain Safety and Resistance Program staff members who identified the need for improved customer service. Due to its tremendous success, ISN (described in 6.2a) was implemented organization-wide in late 2007. Staff members, researchers, and partners offer suggestions to help NuGrain enhance customer experiences in specific research areas or throughout the organization. Workforce members receive tokens of appreciation or bonuses for ideas that are implemented. NuGrain receives over 1,000 ideas a year from workforce members, including 100 from students participating in research. The ISN Committee, composed of key program leads and SLs, collects ISN ideas monthly and selects ideas for implementation. Monthly, the committee shares aggregated themes and trend data with program leads, the SLT, the VOCC, and the MIG for inclusion in strategic planning. Implemented changes are communicated to the workforce and partners through staff meetings and e-mails. The Irritant Program, also designed by staff members, also demonstrates the workforce focus on creating positive customer experiences.

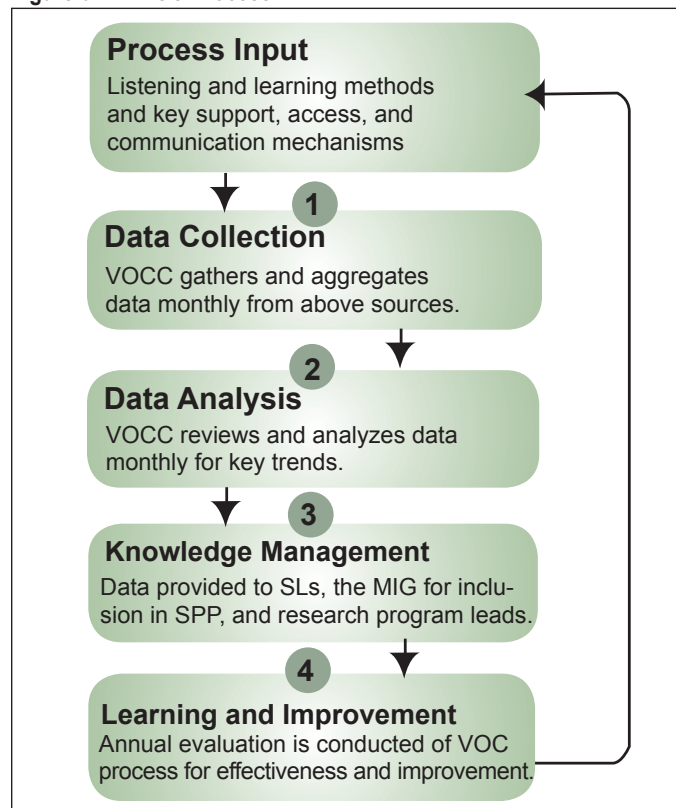
The WPM system (5.1a[3]) further reinforces the customer-centered culture by evaluating leaders’ and staff members’ performance, in part, on achieving customer satisfaction and engagement targets determined in the SPP (2.1a[1]). SLs are evaluated on whether they achieve overall targets, and program and project leads are evaluated on whether they achieve targets for their specific research programs. General workforce performance is evaluated on customer satisfaction within a program or project; other considerations are the number of Irritant Program issues resolved and the percentage of ISN suggestions instituted.

3.1b(2) Building and managing excellent and sustainable relationships with customers throughout the customer life cycle—and with suppliers, partners, and collaborators—is a principal factor of competitive success. NuGrain builds relationships with customers/potential customers to meet their requirements and increase engagement through several programs. Current customers, potential customers, industry partners, and farmers, all of whom could be new or additional customers, are invited

to participate on various PSOCs and POPs. In addition, USDA and NuGrain project and program leads, as well as other government agencies and WFO project customers, work side-by-side in determining key performance measures for each key research program or project (see 6.1b[1]). Relationships are also built and managed through customer interactions via a variety of listening and learning methods (Figure 3.2-2) and customer support means (Figure 3.1-2).

NuGrain uses its CRM to manage customer/potential customer relationships by combining policies, programs, processes, and a data system to unify customer interactions. CRM also is used to track customer/potential customer information. The Touch

Figure 3.2-1 VOC Process



Point program is an essential cornerstone of the customer interaction component of CRM. All workforce members are trained to interact at each stage of the customer life cycle and to collect and enter information into the CRM data system. The VOCC manages CRM and reviews, aggregates, and analyzes data quarterly to identify trends. Results are communicated for action to all staff members and researchers who (1) interact with customers and (2) provide input annually to the MIG on results to be included in strategic planning. The Irritant Program captures irritants or “small frustrations.”

3.1b(3) The VOCC annually reviews the effectiveness of the VOC Process (Figure 3.2-1), which keeps the customer-centered culture and relationship-building methods current. This review includes customer support and CRM information from customer and market-segment feedback gathered through the listening and learning methods (Figure 3.2-2). The SLT further reviews the success of the customer-centered culture and relationship-building approaches during Steps 4–7 of the SPP. The SLT initiates recommended improvements through the PTP (6.2c). The enhanced Touch Point training and the development and deployment of the POPs in 2007 are examples of innovative improvement initiatives.

3.2 Voice of the Customer

3.2a(1) NuGrain utilizes a variety of listening and learning methods (Figure 3.2-2) to capture actionable information and feedback on research programs and customer support, identify new or modified product offerings to submit to the ISN program for evaluation during the SPP, and determine anticipated customer requirements and expectations. NuGrain deploys these methods through the systematic VOC Process (Figure 3.2-1), which is managed by a cross-functional VOCC composed of key SLs, program leads, and project leads throughout all locations. NuGrain’s qualitative and quantitative listening and learning methods (Figure 3.2-2) vary by customer group and market segment and enable it to capture relevant data throughout the customer life cycle, from program planning to program closure (see 6.1a[1]). Key quantitative information includes results from the R-37, Engagement 10 (E-10), and market satisfaction surveys, monthly and annual contract PERs; CRM; complaints; and the Irritant Program.

As part of the strategic objective to develop a reputation for outstanding, innovative research (Figure 2.2-1), in 2005 NuGrain began to cultivate long-term relationships with writers from leading scientific and agricultural journals. PR Alert software tracks information about NuGrain found in the media, and it has shown that this effort has increased positive press coverage. In 2006, NuGrain began to actively monitor agricultural research blogs for research ideas and insights about the organization’s reputation.

To ensure that customers receive immediate and actionable feedback, NuGrain uses monthly PERs with customer program and project managers to follow up on the quality of research and customer support, satisfaction, and loyalty throughout the customer life cycle. PERs also capture complaint information.

The VOCC reviews, analyzes, and aggregates data from listening and learning methods monthly. The committee then

provides key data for organizational scorecards to the SLT and program and project leads (see 4.1[a,b]) and to the MIG for inclusion in the SPP. Annually, the VOCC evaluates the effectiveness of the entire VOC Process, including the listening and learning methods (SPP, Step 5), and contributes aggregate findings to the SPP. As a result of annual reviews, NuGrain acquired the PR Alert system in 2005 and started monitoring agricultural research blogs in 2006.

3.2a(2) Although NuGrain’s current primary customer is the USDA, additional funding comes from other government agencies (e.g., HHS, DHS, and DOE) and WFO projects (primarily through CRADAs). NuGrain obtains actionable information and feedback from these customers/potential customers through their involvement in PERs, PSOCs, POPs, government and agricultural managers’ roundtables, farmer forums, RFPs, research blogs, and the PR Alert. As one of several GOCOs providing research services for the USDA, NuGrain learns about USDA satisfaction with “competitors” through the means listed in Figure 3.2-2, including the R-37, which USDA completes quarterly for each GOCO that

Figure 3.2-2 Key Listening and Learning Methods

Customer and Market Segment	Listening and Learning Method	When*	
Customers: USDA program managers	USDA annual goals	A	
	PERs with USDA and NuGrain program leads	A, M	
	PSOCs	O	
	POPs, E-10, R-37	Q	
	Complaints, Irritant Program, and CRM	O	
	Government and agricultural managers’ roundtable	B	
	PR Alert and agricultural research blogs	O	
	Managers of other government agency (e.g., DOE and DHS) programs and WFO projects	USDA annual goals	A
		PERs with customers and NuGrain project leads	A, M
		POPs, E-10, R-37	Q
Complaints, Irritant Program, and CRM		O	
PSOCs and RFPs		O	
Government and agricultural managers’ roundtable		B	
Market Segments: Funding and scientific communities	USDA annual goals	A	
	Government and agricultural managers’ roundtable	B	
	PERs with customers and NuGrain project leads	A, M	
	POPs, E-10, R-37	Q	
	Complaints, Irritant Program, and CRM	O	
	Market satisfaction surveys	A	
	PSOCs and RFPs	O	
	PR Alert and agricultural research blogs	O	
Agricultural community	USDA annual goals	A	
	Government and agricultural managers’ roundtable	B	
	Market satisfaction surveys	A	
	Complaints, Irritant Program, and CRM	O	
	PR Alert and agricultural research blogs	O	
	POPs, farmer forums	Q	
	PSOCs and RFPs	O	

*A—annual; B—biannual; M—monthly; O—ongoing; Q—quarterly

conducts research for the agency. NuGrain has never lost a customer and therefore does not have former customers.

3.2a(3) NuGrain has received only nine formal customer complaints in the past eight years: four concerning research progress, two concerning access to research sites, and three concerning other minor issues. The organization proactively solicits complaints in monthly PER meetings with customers, which include a standing agenda item of “improving customer service.” The program and project leads ask customers for any complaints or irritants that NuGrain should address and to “please name one thing we could do to provide better service to you.” Any identified complaints are discussed with the customer in order to immediately correct the issue and recover the customer’s confidence. As appropriate, the discussion also helps NuGrain gather enough information to begin a PTP improvement (see 6.2c) to ensure the process is improved permanently. After the issue is defined (D in the process), it is passed on to a team to measure, analyze, improve, and control it, and the improvement’s progress is communicated to the customer in future PER meetings.

Complaint data are captured and aggregated within CRM; results are reviewed for trends by the VOCC and provided monthly to the SLT, all program and project leads, and the MIG for inclusion in the SPP environmental scan. SLs also discuss key trends at the quarterly Hoedown Sessions.

3.2b(1) The VOCC leads the process to determine customer satisfaction and engagement through analysis of the findings from the quantitative and qualitative key listening and learning methods (Figure 3.2-2), which are tailored to various customer and market segments. These methods capture actionable information over the customer life cycle for use in meeting and exceeding customer expectations. The primary sources of information are the R-37, E-10, market satisfaction surveys, and monthly PERs. The R-37, which is conducted by an independent firm, is required for GOCOs conducting research for the USDA. It has 37 questions regarding customer satisfaction and engagement with research programs for project planning, execution, and closure. Non-USDA customers do not require satisfaction surveys; however, NuGrain values their feedback and contracts with the firm to administer the same R-37. To obtain enhanced information on customers’ levels of engagement, NuGrain developed and administers the quarterly E-10. The monthly PERs with customers also provide feedback on how NuGrain is meeting customers’ needs.

The VOCC reviews, analyzes, and aggregates data from listening and learning methods monthly. The committee then provides key data for organizational scorecards to the SLT and program and project leads (4.1[a,b]) and to the MIG for inclusion in the SPP. R-37 results are segmented by research program and project and contain comparisons to other GOCOs. Key customer and market satisfaction targets are determined in Steps 6 and 7 of the SPP for NuGrain as a whole, as well as within each program. The SLT monitors desired performance through weekly meetings. Programs and/or projects not meeting desired expectations must develop action plan modifications (2.2a[4]). SLs and program leads are

evaluated on whether they achieved key customer satisfaction targets as part of the WPM (5.1a[3]).

During an annual review in 2004 of the effectiveness of the listening and learning methods, the VOCC and SLT identified a need to obtain more quantitative data from the various market segments. Using the PTP (6.2c), NuGrain developed the annual market satisfaction surveys to obtain satisfaction results for key market segments. After the 2005 VOCC review revealed the need for enhanced customer-engagement data and information, the PTP was used to develop the E-10.

3.2b(2) NuGrain obtains satisfaction data relative to competitors from a variety of sources, including POPs, PSOC members, market segment forums, PR Alerts and research blogs, agricultural managers’ roundtables, PERs, and RFPs. In addition, NuGrain uses the R-37 to compare USDA satisfaction and engagement with other GOCOs (including two competitors), as well as to benchmark performance. Information from all listening sources is reviewed, aggregated by the VOCC for trends, and communicated to SLs. Deviations from performance targets are identified by SLs, and revised action plans are developed as necessary. The SLT identifies key areas where NuGrain’s performance exceeds that of competitors and uses this information when preparing RFPs for research. Information is also communicated to the MIG for inclusion in the SPP, and the SLT identifies specific marketing opportunities and key performance targets in Steps 6 and 7 of the SPP.

3.2b(3) By capturing and understanding customer dissatisfaction, NuGrain enhances its processes to more fully satisfy and engage customers. The primary sources of customer dissatisfaction information are the same as for determining customer satisfaction, as described in 3.2b(1): the complaint process in 3.2a(3) and the Irritant Program and CRM data system (see below). The Irritant Program provides a means to capture customer concerns, or “irritants,” before they become a point of dissatisfaction. Several staff members in the Winters site Seed Development Research Project originated this program in 2005. They noticed that customers often expressed frustration with little things, such as a lack of clear signage around the research facility. They believed that capturing these small frustrations or irritants and then eliminating or fixing them would lead to enhanced customer satisfaction and loyalty. Upon hearing a customer irritant, a staff person immediately logs it into the CRM data system. The VOCC aggregates irritants, analyzes them for trends, and segments them by program each quarter. Based on the success of the local Irritant Program, it was expanded to the entire organization in 2006.

The VOCC reviews and analyzes the actionable data and information from these listening methods and compiles a quarterly customer dissatisfaction report noting key dissatisfaction and irritant themes. This report is communicated to the SLT, to the MIG for inclusion in the SPP, and to each research program and project lead. Themes are discussed at staff meetings and quarterly Hoedown Sessions. The VOCC recommends potential process improvements quarterly to the SLT and annually during the SPP. Potential improvements utilize the PTP.

3.2c(1,2) NuGrain’s customer groups include the USDA, other government agencies, and customers through WFO program contracts (primarily CRADAs). NuGrain uses customer, market, and product offering information gathered through the PSOP and all of its VOC listening and learning methods to identify current and anticipate future customer groups and market segments, as well as to anticipate key customer requirements and expectations. Key methods include the PERs, PSOCs, POPs, complaints, irritants, R-37, E-10, market satisfaction surveys, CRM, agricultural managers’ roundtables, RFPs, farmer forums, PR Alert, and agricultural research blogs. These sources provide information throughout the customer life cycle from program and project planning to closure, and they also provide information about what customers are being served by other research facilities (customers of competitors). Throughout the year, the VOCC collects, analyzes, aggregates, and communicates data and information to the SLT and to program and project leads for weekly and/or monthly reviews and scorecards.

The VOCC identifies potential and future customer requirements through key VOC data, as described in 3.2a(2) and 3.2b(2), which are communicated to the MIG for inclusion in the SPP. NuGrain collects data and information on current customer requirements, changing expectations, and their relative importance to customer purchasing or relationship decisions through the key VOC listening and learning methods (Figure 3.2-2), including the PSOCs. The SLT utilizes this information during Steps 4–7 of the SPP to further refine current and identify potential requirements and changing expectations for the customer groups and their importance in contracting with NuGrain for research services.

3.2c(3) As described above, NuGrain captures a variety of information on customer satisfaction, needs, and requirements



from the VOC Process to identify current and future customer groups and markets, as well as to identify customer requirements and changing expectations. The SLT identifies current and future customer groups as potential markets for future business and the groups’ associated needs and expectations during Steps 4–7 of the SPP. Then the Public Relations/Promotions Manager develops the NuGrain Strategic Marketing Plan, which sets forth strategies and initiatives to attract these identified customers and groups and to meet their respective anticipated requirements. Customer, market, and product offering information captured through the VOC Process is used to constantly reinforce the customer-centered culture.

NuGrain identifies opportunities for innovation through multiple methods, such as (1) the VOCC’s capture and analysis of data and information from the listening and learning mechanisms, (2) the SLT review of the customer service operating performance compared to targets, (3) the VOCC systematic reviews of listening and learning methods’ effectiveness, and (4) the review of PSOP effectiveness.

3.2c(4) NuGrain keeps current its approaches for listening to customers and determining their satisfaction, dissatisfaction, and engagement through the annual, fact-based, systematic review of the entire VOC Process by the VOCC; this includes reviews of the effectiveness of the listening and learning methods. The SLT further reviews data yearly during Steps 4–5 of the SPP. Improvements to these customer-related approaches occur through use of the PTP (see 6.2c). In addition, NuGrain uses the Baldrige Criteria each year to create a self-assessment of its systems. Feedback is gathered internally through this process, and in the last three years external examiner feedback has identified current and future performance improvement opportunities.

4: Measurement, Analysis, and Knowledge Management

4.1 Measurement, Analysis, and Improvement of Organizational Performance

4.1a(1) Multiple measures are used for tracking daily operations and overall organizational performance. They are selected and created using the Measure Selection Process (Figure 4.1-1), part of NuGrain’s *Measures for Excellence Manual*. The process owner is the Chief Technology Officer (CTO), and the process is supported by a Yellow Belt in concert with the MIG. This process provides a standard approach used by multiple levels of NuGrain leadership and staff to develop key measures for the organization. The SLT uses the process to define key measures aligned with strategic objectives (Figures 2.2-1 and 4.1-2), and the process cascades through the organization as a way to develop measures for the contract PEP, programs, key and nonkey processes, action plans, and departments.

NuGrain ensures that data and information are aligned and integrated through the use of its Enterprise Architecture Process. Built upon the best-practice Beedakers Framework,

the Enterprise Architecture Process ensures that all data and information are aligned and integrated at the user, data, application, and hardware architectural levels. The process is improved by a Yellow Belt and a team from Information Systems. Incorporation of the Beedakers Framework was a 2004 refinement resulting from a Six Sigma PIP project.

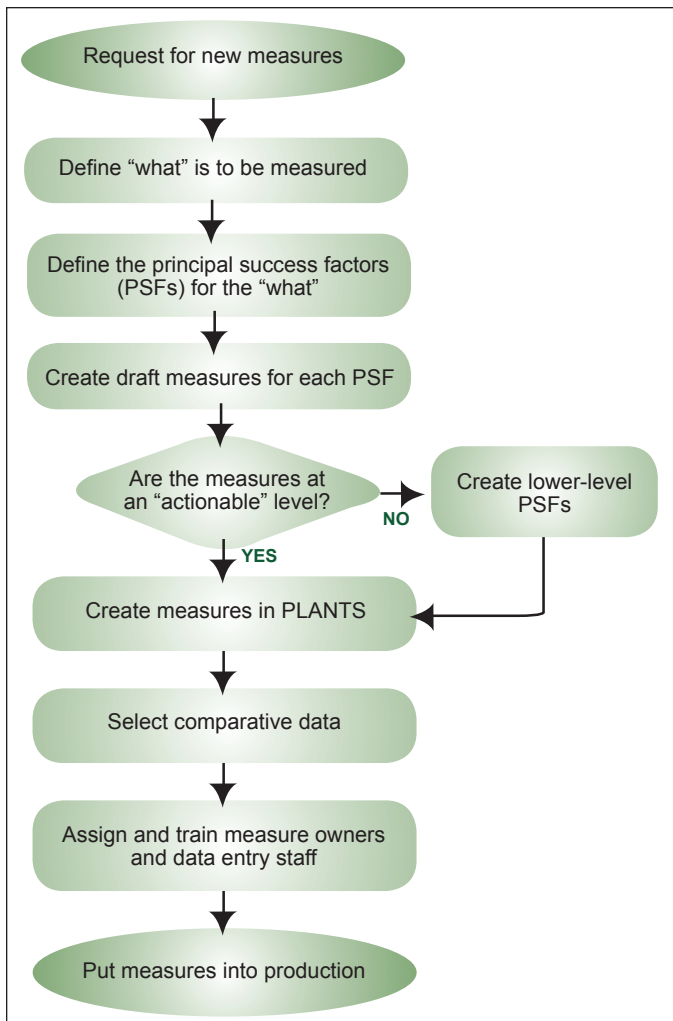
NuGrain data and information are made available through PLANTS and the Research Data and Information System (RDIS). The MIG owns PLANTS, a “business intelligence” application that accesses data from multiple NuGrain databases to develop customized reports for project leaders to track progress. Formal reports, including scorecards, are typically issued monthly; however, data are updated daily from the field locations, and project leads can produce reports on demand as needed. In 2007, PLANTS was enhanced to provide comprehensive portfolio management capabilities, including resource-loaded project plans that incorporate data from the HR and procurement databases. PLANTS also provides reporting and analytical capability to support daily, weekly, monthly, and

quarterly reviews, as well as enterprise scorecards for department and leadership reviews.

This collection of data and information is facilitated by customized data collection modules built within the RDIS. The MIG also owns this application and works with each program leader, project leader, and process owner to set up these modules based on their needs. RDIS accommodates the entry of data and information through multiple channels, including on desktop and laptop computers via the Internet and intranet. Also, data can be downloaded from personal digital assistants (PDAs) and other remote sensors and mobile devices so that researchers can enter data and information (e.g., experimental data and research calculation results) from the laboratory and literally from the fields where crops are grown at all four sites. In 2008, RDIS was expanded to provide access for NuGrain’s key partners, allowing them to input key design and test data onto Global Positioning System (GPS) designs and enhancements, which are integral to many of NuGrain’s projects.

Data and information are used to support decision making, improvement, and innovation through performance reviews (Figure 4.1-3), strategic planning (Figure 2.1-1), and process management, as described in 6.2. They also support the Program and Project Stage Gate Process (Figure 6.2-1) decisions for the Execution Stage and the Closure Stage.

Figure 4.1-1 The Measure Selection Process



4.1a(2) NuGrain selects effective comparative data (see P.2a[3]) through its Comparative Data Selection Process. This multistep process is part of NuGrain’s *Measures for Excellence Manual*, it is used in conjunction with the Measure Selection Process (Figure 4.1-1), and it is supported by the MIG. It uses a formal set of selection criteria and alignment matrices to ensure that comparative data support (1) achievement of the strategic objectives, (2) competitive success, and (3) organizational sustainability.

4.1a(3) NuGrain’s measurement systems are evaluated through benchmarking best practices, Baldrige assessments, and ongoing external expert input about best practices. For the processes used in developing and managing information and data, NuGrain uses the PMP and Annual Process Performance Analysis described in 6.2b(1) and 6.2c.

To keep its performance measurement system current with future business needs and directions, NuGrain uses a five-year IT Plan developed by the Information Systems Department and the CTO. The plan is integrated with the organizational

Figure 4.1-2 Key Measures (SLT Scorecard)

Key Performance Areas	Key Measures	Reporting Frequency
Contract growth and performance	% of PEP deliverables achieved (Figure 7.1-1)	Monthly
	Funding growth (Figure 7.3-1)	Monthly
	Incentive award fees earned (Figure 7.1-2)	Quarterly
Research products	Patents awarded* (Figure 7.1-3)	Quarterly
	Articles published in peer-reviewed journals and periodicals (Figure 7.1-4)	Quarterly
	Satisfaction with research programs (Figure 7.2-1)	Quarterly
Research capabilities	Aggregated external peer review scores* (Figure 7.5-2)	Annually
	Published articles* (Figure 7.1-4)	Quarterly
	Research cycle time* (Figure 7.5-1)	Quarterly
Commercialization	Patents commercialized* (Figure 7.1-3)	Annually
	Collaborative agreements (Figure 7.5-7)	Annually
Program effectiveness	Increase in crop yields per acre* (Figure 7.1-5)	Annually
	Savings in fertilizer and pesticide usage* (Figure 7.1-6)	Annually
	Reduction in soil erosion* (Figure 7.1-7)	Annually
	Increase in grain protein content* (Figure 7.1-8)	Annually
	Crop vulnerability identification and solution rate* (Figure 7.1-9)	Annually
Financial performance	Performance to budget (Figure 7.3-2)	Annually
	Total project cost as compared to baseline project cost (Figure 7.5-10)	Monthly
	Project overhead costs (Figure 7.3-6)	Monthly

*Direct and indirect measures of innovation

plans described in 2.1 during the SPP. Recent enhancements to NuGrain’s IT architecture and capability are the introduction of PDAs and other mobile devices to capture data on location and the upgrade to 64-bit processors in 2008. In 2009, the architecture was enhanced to provide real-time connectivity between RDIS and PLANTS. In addition, NuGrain’s license agreement for its business intelligence application (PLANTS) provides for new upgrades without additional costs. This allows the organization to stay current with state-of-the-art functionalities in the business intelligence field.

NuGrain ensures that its performance measurement system is sensitive to rapid or unexpected organizational and external changes with an approach that considers new measures for review that do not affect the overall measurement system; this allows the introduction of new measures between measurement review activities. Also, the Help Desk structure, allows reports to be generated and measurement requests to be modified as needed. Then, in Step 1 of the PDP (6.2a), agility is built into the design of measurement systems to ensure they can be modified to remain aligned to business needs. For example, the customized data collection modules in RDIS are designed to address the needs of each research project.

4.1b NuGrain uses planned performance reviews that address contractual, strategic, program, process, and organizational performance dimensions, as indicated in Figure 4.1-3. The SPP and Annual Process Performance Analysis are used to review organizational capabilities. To support these reviews and ensure that conclusions are valid, analyses are performed by process teams. The frequency of reviews is established so that NuGrain has sufficient time to adjust performance to

achieve desired targets by the end of each fiscal year (i.e., the contractual performance period).

The SLT also reviews the performance of department leads for key support functions every quarter. The focus of these reviews is to look for opportunities to improve efficiency and effectiveness and to drive innovation in order to better support the research program and project leaders.

4.1c NuGrain uses action plans (Figure 4.1-3), to translate performance review findings into improvements. Action plan owners are assigned at the lowest level in the organization that can affect results. Action plans are entered into a database that is integrated with PLANTS, which enables the SLT to review the entire set of action plans assigned an improvement priority. PLANTS also is used to transmit action plan assignments to the workforce and for employees to report progress. Action plans can range from simple tasks up to Six Sigma Process Improvement Projects when breakthrough improvement or innovation is required. To keep suppliers, collaborators, and partners informed of improvement priorities, a special PLANTS report was developed based on action plans. It provides high-level information about upcoming improvements, and the report is transmitted to suppliers, collaborators, and partners to ensure alignment.

4.2 Management of Information, Knowledge, and Information Technology

4.2a(1) To ensure the high standards of NuGrain data and information, the organization uses formal enterprise system acquisition, design, development, testing, and maintenance processes managed and improved as described in Item 6.2,

Figure 4.1-3 Scheduled Performance Reviews

Review/ Frequency	Participants	Analyses	Assessment Use and Improvement Method
SPP/annually	SLT, program leads, process owners, key partners, USDA liaisons	SWOT, action plan progress, regression analysis, histogram, projections, trending	Set direction to ensure organizational sustainability and competitive success in alignment with the MVV and core competencies (see 2.1a[1]).
Strategic progress/ quarterly	SLT, program leads, process owners, key partners, USDA liaisons	Action plan performance (action plans are managed as projects and undergo the same analyses as projects)	Adjust and modify plans and resources as necessary to ensure the achievement of strategic objectives and desired future competitive success (see 2.1a[1]).
SLT Scorecard/ monthly	SLT	Target comparison, trending	Review levels and trends and implement SLT Scorecard recovery action plans when measures are not performing as desired.
PER/monthly	SLT, program leads, process owners, USDA liaisons	End-of-year projections, barrier analysis	Project end-of-year contract performance to allow adjustments to ensure success in PER score and award fee. Create action plan (known as PEP recovery plan) if progress needs adjustment.
Program delivery/ monthly <i>and</i> Project delivery/ weekly	Program leads, project leads, process owners, project team members	Cost Performance Index and Schedule Performance Index (see 7.5a[2]), deliverables achieved (Figure 7.1-1), stage gate performance (Figures 7-5.3 and 7.5-8)	Determine if program is on track to meet contractual deliverables and satisfy customers. Modify related project plans or create action plan (PEP recovery plan) if progress needs adjustment.
Process improvement/ monthly	Process owners, process Six Sigma Yellow Belt, process teams	Process control charts, regression analysis, process measure trending, process action plan progress	Determine if process is in control, satisfying customers, and making adequate progress toward improvement objectives. Create action plan (PEP recovery plan) if performance needs adjustment.
Measure review/ monthly	Measure owners (SLT, program leads, process owners, department leads), USDA	Target comparison, trending, causal analysis	Review measure levels and trends. If not meeting target or measure, owners use causal analysis to define the problem, determine cause and actions needed to recover, and set a time frame for recovery.

Work Processes. The organization is a member of the Practice for Software Engineering (PSE), and NuGrain’s enterprise system processes incorporate PSE best practices for engineering, management, and acquisition of information systems. Figure 4.2-1 describes some of the specific methods used by the Information Systems Department to ensure the accuracy, integrity and reliability, timeliness, security, and confidentiality of its data, information, and knowledge.

4.2a(2) NuGrain makes needed data and information available through its intranet. This includes high-speed network connectivity among all of NuGrain’s geographic research locations. Information is made available on employee desktops through browser-enabled portals that customize the content and its organization on the employee’s home page based on the employee’s job assignment. For example, a researcher’s portal would include VALOR and content related to the research projects that are relevant to him or her. Portals also are available with customized content management for suppliers, partners, collaborators, and customers. This approach to job-based content management and display was an innovation initiated by an IT strategic planning activity in 2005.

4.2a(3) NuGrain uses its Knowledge Management Process, designed and managed with the PDP (see 6.2a) and PMP (6.2b), to ensure the capture and transfer of knowledge important to organizational success and sustainability. The CLO and CTO serve as coprocess owners, supported by a Knowledge Management Process team composed of HR and Information Systems staff members.

A key aspect of the Knowledge Management Process is translating NuGrain’s core competencies and strategic objectives into knowledge sets that must be in place for long-term success. Collection and transfer methods, how the knowledge can best be used, and knowledge users are then defined for each set. Defined users include employees, customers, suppliers, partners, and collaborators. This information is used as input to the Enterprise Architecture Process (4.1a[1]) and Workforce Performance Management Process (5.1a[3]) to ensure that it is deployed across NuGrain through its systems and jobs. Each set has an assigned senior leader who ensures accountability for collection and use of the knowledge, as well as ensures that the knowledge sets are integrated into NuGrain’s SPP. For example, in the Process Knowledge Set, all processes have process specification documents in PLANTS that capture key process information for transfer to and reuse by process teams. The Portfolio Management Set captures and makes available knowledge that is key to estimating program and project costs for future work. In the Research Expertise Set, the RDIS captures research publications, presentations, data, and notebooks for transfer and reuse.

Rapid identification, sharing, and implementation of best practices occurs through the Idea Wells, monthly meetings of process owners that include sharing of best practices with broad relevance, and NuGrain’s PDP and PMP.

4.2b(1) To ensure that hardware and software are reliable, secure, and user-friendly, NuGrain uses formal enterprise system acquisition, design, development, testing, and

Figure 4.2-1 Methods to Meet Information Management and Technology Standards

Property	Methods Used to Ensure Property
Accuracy	Enterprise Architecture Process Data Administration Process Trained data owners and custodians Routine data quality audits Data validation on input screens Certification of data sources Calibration of experimental data equipment
Integrity and reliability	Routine data quality audits System Design, Testing, and Acquisition Processes System performance monitoring (real-time; see Item 7.5) System trouble calls (trended, aggregated)
Timeliness	System performance standards System Testing Process
Security and confidentiality	Standard authentication method for all systems (includes need-to-know) One-time token cards for passwords System and application security plans Standard desktop configurations (includes security features) System vulnerability monitoring (daily)

maintenance processes managed and improved as described in Item 6.2. These processes incorporate PSE best practices for engineering, management, and acquisition of information systems. Approaches to ensure user-friendliness include pilot testing new products, training on new software, and extensive IT support. Some specific methods for reliability and security are described in Figure 4.2-1.

4.2b(2) All NuGrain operational and research data and information are backed up at a redundant off-site storage facility. The remote site is fully capable and is exercised on a monthly basis. This involves assuming real-time operational support of all users for a 24-hour period every month.

To ensure the continued availability of hardware, software, and information in the event of an emergency, NuGrain uses its Information Management Contingency and Disaster Recovery Process. This process is implemented by Information Systems, and it includes a risk analysis tool that defines the following for each system: risk categorization based upon a site impact analysis (SIA), critical components and the impact those components have on other systems, external systems that may impact the system being analyzed, the cost of system inoperability, the cost of restoring the system after a failure, and maximum allowable downtime (MAD). Information Systems, using these analyses, develops for each system a call list, a disaster Data Recovery Plan, and a Contingency Plan. Once these are developed, NuGrain puts each system through an annually revalidated accreditation process.

4.2b(3) NuGrain keeps its information availability mechanisms and hardware and software systems current with business needs and directions through multiple methods. Throughout the year, ideas for continuous improvement and innovative new approaches are identified through the IT Idea Well. The PMP and Annual Process Performance Analysis (6.2b[1] and 6.2c) are used to ensure that the processes used for data,

information, and knowledge management go through cycles of improvement each year. For example, in the last three reviews of data access availability, IT staff identified new software opportunities that provide greater access at a much-reduced

cost. To keep data, information, and knowledge management processes aligned with future business needs and directions, as well as technological changes, NuGrain uses its five-year IT Plan to proactively prepare for the organization's needs.



5: Workforce Focus

5.1 Workforce Engagement

5.1a(1) In 1995, based on best practices identified by Baldrige recipients, NuGrain surveyed its workforce to determine what makes people come to work, enjoy their jobs, and commit themselves to accomplishing NuGrain's mission. In 2000, to further determine and validate factors of workforce engagement and workforce satisfaction, HR collaborated with industrial and organizational psychologists at each collaborating university to survey and conduct interviews and focus groups by workforce segments. This effort identified key workforce requirements (i.e., factors of engagement and satisfaction; Figure P.1-4) that remain the foundation for the annual EWA and drive improvement efforts across all NuGrain sites and workforce segments.

In 2002, the SLT established Management Advisory Groups (MAGs) at each NuGrain site. MAG members are nonsupervisory representatives from each workforce segment who receive training in team dynamics, team building, and problem solving. MAG responsibilities include assessing and monitoring changes in workforce attitudes and needs, as well as evaluating and improving the approaches used to evaluate workforce engagement and satisfaction. Results of MAG reviews and analyses are presented annually during Step 1 of the SPP. The results are also a foundation of the HR Plan.

MAGs meet monthly to discuss identified workforce issues, review satisfaction and dissatisfaction data gathered through exit interviews, and monitor progress in accomplishing any action plans. Each quarter, MAGs at all sites participate in a video conference to share issues, best practices, and lessons learned. In 2004, MAGs identified the need to have more focus groups for farm operations staff to ensure consistent outcomes at all locations. Using recent research on workforce

engagement, MAGs are also investigating the impact of rewards and recognition on productivity and absenteeism.

5.1a(2) HR, SLs, and MAGs use multiple methods to encourage NuGrain's culture of open and honest communication (Figure P.1-1), an engaged workforce, and respect for diverse opinions. For example, the Process Improvement Idea Well (6.2a) is designed to cultivate innovation and creativity. Workforce members submit ideas to the Idea Well, and the Well Team reviews and immediately implements those considered to be quick wins. Other, more complex ideas are shared with the appropriate process owner and process Six Sigma yellow belt. The Well Team monitors progress and provides quarterly status reports on the intranet to all workforce members.

NuGrain actively fosters high-performance work through its Workforce Performance Management (WPM) Process (5.1a[3]) and its diverse reward and recognition (R&R) methods (Figure 5.1-1). For example, the Silver Wheat Shaft Award encourages the workforce to turn challenging situations, including unsuccessful approaches, into opportunities for learning and innovation.

NuGrain benefits from the diverse thinking, ideas, and culture of its workforce by ensuring that team and committee composition consider (1) the appropriate departments and facilities; (2) core competencies; and (3) a blend of positions, backgrounds, experience, ages, and tenure. Policies and procedures establish and reinforce nondiscriminatory practices and workforce inclusion, and a Diversity Council (see 5.2a[2]) at each site works with recruiters and hiring managers to help accomplish diversity goals and values.

The SLT sponsors quarterly colloquiums at rotating sites for staff to share research findings and new or innovative farming methods and techniques, lessons learned, and best practices. Summaries and videos of colloquiums are available through the knowledge management system (4.2[a]3). In addition, an annual corporate-wide symposium features outside researchers who share scientific findings and directions. To support the core competency of project and contract management, SLs meet twice a year with business and management gurus to discuss new business theories.

The SPRR Process and monthly operational information-sharing forums foster the exchange of ideas among technical experts, project leads, scientists, students, and laboratory support and farm operations staff. The exchange of ideas among people from different workforce segments enhances research quality, relevance, and performance by providing feedback and suggestions for improvement. Each forum focuses on methods to improve processes in the laboratory or on the farm. In 2007, based on focus group feedback, the Human Resources

Figure 5.1-1 Reward and Recognition Examples

Year Initiated	Title	Reward/Recognition
1995	Safety Award	Accident-free work units/teams
1996	Corn Cob	Outstanding customer service
2002	Platinum Ethics Award	Ethical challenges and outcomes
2003	Innovative Technology	New technology improving land utilization
2005	Cotton Gin Award	Innovation
2006	Silver Wheat Shaft Award	Organizational learning/innovation derived from challenges
2007	Expand Green	Improve "green" footprint and quality and productivity

Performance Committee recommended communities of interest, discussion groups (e.g., students, laboratory support and farm operations staff) that communicate across NuGrain’s sites via the Internet and post discussion summaries on the intranet.

5.1a(3) The WPM Process is designed to reinforce high standards aligned with NuGrain’s core competencies (Figure P.1-1), strategic objectives, and action plans (Figure 2.2-1). All supervisors, team leaders, and those in management positions work with individuals to create electronic PPs. The PP format prompts supervisors to address key areas consistent with each workforce member’s job description and uses drop-down menus for development options.

Supervisors meet quarterly with their team members to assess progress and adjust PPs. In the performance evaluation, 45% is based on accomplishment of objectives and 55% on innovation, diversity, scientific integrity, demonstrated leadership, and completion of individual action plans. Compensation and monetary incentives (i.e., rewards/bonuses) are tied to accomplishment of action plans. Student workers participate in identical PP meetings without discussion of compensation. Monetary and honorary rewards and recognition (Figure 5.1-1) reinforce customer focus and achievement of action plans.

5.1b(1) Once the SPP is complete, SLs conduct a retreat to finalize the HR Plan, review/revise the Succession Plan, and set outcomes for the LDP. They intend the HR Plan to balance the needs and desires of the workforce with core competencies, strategic challenges, and accomplishment of both near- and long-term action plans. The plan also delineates the performance goals for the Learning and Development System. Consistent with the strategic challenge of the declining number of agriculture graduates in recent years, NuGrain recognizes the need to internally develop personnel with the core competencies needed to achieve its mission.

In the learning and development system, much of the training (Figure 5.1-2) is provided internally by Learning Group (LG) trainers and managers. Development opportunities also include coaching by peers, mentoring for students and employees identified for leadership development, and hands-on work-related experiences for scientists and future leaders.

5.1b(2) HR tracks overall learning objectives identified in the PPs and aggregates data to identify workforce development gaps. As an HR team, the LG works with the four collaborating universities to create programs to address these gaps; for example, Advanced Leadership Skills and Laboratory Leadership were implemented at NFU. An extensive computer-based training library supports self-identified training needs and career development. Managers and team leads serve as coaches and mentors, and the workforce has access to job rotation and shadowing opportunities.

The systematic transfer of knowledge from retiring or exiting workforce members takes place through shadowing, cross-training by the departing employee, and the use of process specification documentation (6.1b[2]) to create flow charts of key process steps and document standard operating procedures (SOPs) and key requirements. HR works with the departing employee’s supervisor to ensure coverage and continuity, and it conducts exit interviews to document lessons learned and best practices.

To reinforce new skills and on-the-job knowledge, NuGrain uses practical work experiences, coaches, leads’ reviews, risk management audits, and regular competency checks. Each student is assigned a proctor (a coworker who is expert at the student’s assigned tasks) to facilitate on-the-job learning.

5.1b(3) A variety of approaches measure the effectiveness of the learning and development system. For example, the LG worked with the NFU Education Department to build a systematic evaluation process for the training curriculum. In addition, NuGrain uses all four levels of the Ebonywood Model for Assessment to evaluate training effectiveness.

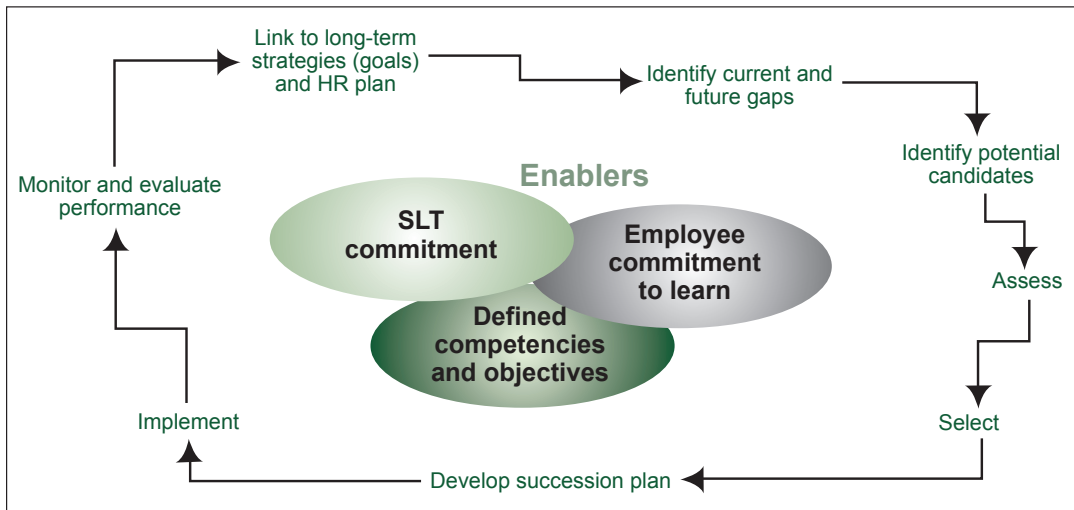
Data gathered at each evaluation level are used as input to a biannual curriculum review, where training and development programs are reviewed for improvement opportunities. Performance data such as safety violations and accident rates (Figures 7.4-12–7.4-13) provide information regarding the effectiveness of safety training. The effectiveness and utility of developmental experiences are evaluated through several mechanisms, including the EWA, feedback at completion of training, and the supervisor-employee quarterly review process. The LG uses several measures to assess training efficiency (e.g., dollar investment per workforce member and participation in online training and mentoring). The LG and HR staff members review results for organizational performance measures and HR Plan objectives to determine the effectiveness of NuGrain’s learning and development system.

5.1b(4) Effective career progression is accomplished through the WPM Process and the Work System Design Process (Figure 6.1-2), through which performance expectations, skills, and competencies for each work process and job category

Figure 5.1-2 Training Overview

Courses	Target Audience
Portfolio Management	Specialists and leads
Project Management	All workforce members
Six Sigma/Lean	Team leads, program leads
Quality Training (Black, Green, Yellow belt)	
Being a Process Owner	
Running Effective Teams	
Going Green	Operations and maintenance staff, Farm operations staff
Safety Training	
Research Process	Scientists, laboratory support staff, students
Technical Training in Core Competencies (e.g., crop nanotechnology)	
Writing for Publication	
Conducting Scientific Research	Scientists
Scientific Peer Review	
Annual Training in Ethics, Diversity, the Code of Conduct, and Data Integrity	All workforce members
Leadership at Center	SLs and leads
Working in Government	All workforce members

Figure 5.1-3 Succession Planning Process



workforce group. HR also monitors employee turnover (Figure 7.4-11), productivity (Figures 7.5-4 and 7.5-5), job safety data (Figures 7.4-12–7.4-13), ideas submitted and implemented via the Idea Well (Figure 7.5-18), and formal grievances and complaints (see 7.6a[3]). The SLT reviews these measures quarterly, along with survey data and associated action plans.

5.1c(2) HR conducts correlation analyses to

are defined, and training and development requirements are outlined. Using tools within these processes, workforce members map out career goals and job progression strategies, and they can access their training and development transcript. Quarterly and annual performance sessions enable continuous monitoring of progress on developmental objectives—and adjustments, if warranted. The WPM Process also communicates job postings and developmental assignments.

New hires receive a “buddy” to help them adjust to the job and better understand how they support NuGrain’s MVV. Mentors work with workforce members who want to change jobs, develop new skills and competencies, or become leads. Also, retirement coaches are available to ensure that both the departing employee and the organization accomplish necessary transition plans.

Succession planning (Figure 5.1-3) is accomplished through an LDP created by SLs and managed by a Leadership Development Committee (LDC) at each site. Following development of the HR Plan, each LDC uses current known staff changes, along with a prediction model, to determine current and future gaps in leadership capability and capacity. The LDC and HR draft recommendations to fill identified gaps.

Candidates for senior leadership positions who receive tentative approval by the SLT undergo a series of interviews and evaluations at the Leadership Development Center at Pennsylvania Proper College. After final selections are made, each new leader develops an executive succession plan and timeline and is paired with a member of the SLT who provides coaching. New leaders attend the Leadership Development Center and work six months at each laboratory site.

5.1c(1) NuGrain assesses workforce engagement and satisfaction through numerous formal and informal mechanisms. The EWA (5.1a[1]), which is the primary method, is administered annually to the entire workforce (including students). The survey covers factors that contribute to the engagement and satisfaction of its diverse workforce segments (Figure P.1-4) and to the overall health of the organization. HR can stratify survey data by age, gender, ethnicity, length of employment, and department to identify any concerns in a specific

determine factors of workforce engagement with a strong relationship to business results (Figure 5.1-4). The results of quarterly reviews are input into the SWOT analysis (Step 5 of the SPP; Figure 2.1-1) and are used to create specific HR action plans to address workforce engagement. These initiatives are linked to one of the identified strategic objectives (Figure 2.2-1) and are tied to business outcomes and results.

5.2 Workforce Environment

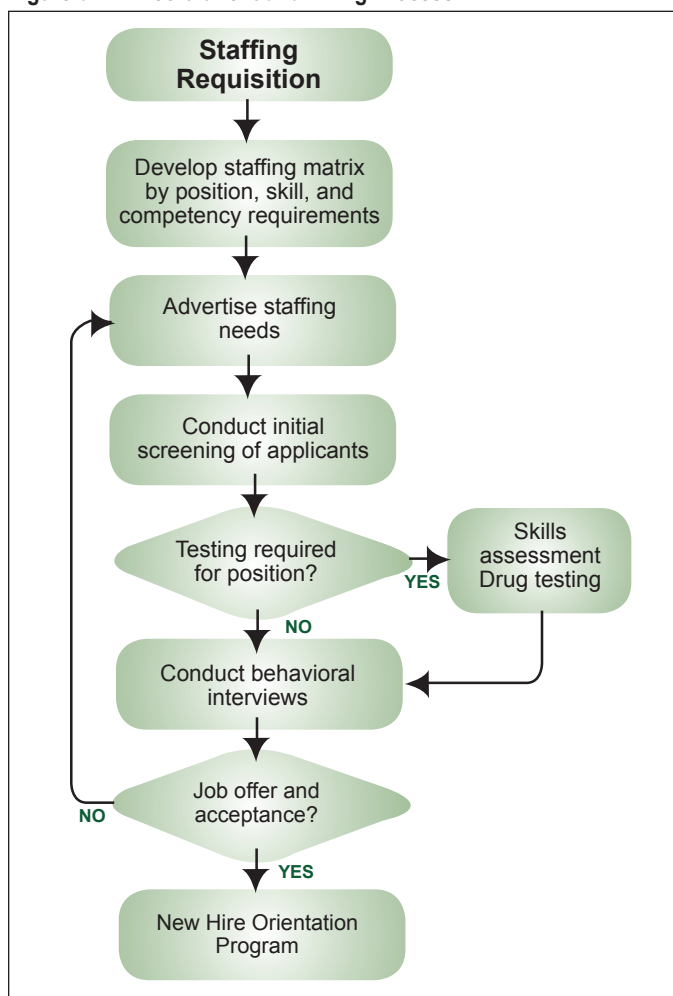
5.2a(1) To assess workforce capability and capacity needs, NuGrain develops an annual staffing matrix and a ten-year Capability and Capacity Plan. As part of the HR Plan development, the Recruitment and Staffing (R&S) Team conducts an annual assessment of current and projected staffing needs using the Six Sigma Process (6.2[a]). Key process performance data and systematic reviews, (e.g., the annual Work Systems Review (6.1a[2]), Annual Process Performance Analysis, PDP, and PIP) are used to identify areas for improvement. The R&S Team surveys project, program, and proposal development leads to document current staffing needs and planned and potential contract efforts. The R&S Team also identifies changes in customer needs and the expected completion of existing contract requirements that could reduce current staffing levels.

Using these inputs, the R&S Team builds a staffing matrix by location and position to outline needed changes to skill and competency requirements. The matrix also includes information on the number of positions, the level of effort (e.g., full-time,

Figure 5.1-4 Engagement and Business Results

Workforce Engagement	Business Results
Supervisors’ feedback, training, and PPs	Reduced turnover (Figure 7.4-11), higher productivity (Figures 7.5-4 and 7.5-5), higher levels of customer satisfaction (Figures 7.2-1 through 7.2-10)
R&R events	Reduced turnover (Figure 7.4-11), higher customer satisfaction (Figures 7.2-1 through 7.2-10), higher productivity (Figures 7.5-4 and 7.5-5)
Workforce members feel they contribute, focus-group comments	Higher participation in research pilots, increased participation in community service (Figure 7.6-10)

Figure 5.2-1 Recruitment and Hiring Process



part-time, seasonal), special or unique competency requirements, and the date each position needs to be filled. Gaps and strategies to meet these staffing requirements are identified and built into the HR Plan, which is approved by SLs.

The HR Plan identifies NuGrain’s human-capital challenges and ways to monitor and address them (see 2.2a[5]). To help address its challenge of the declining number of agriculture graduates, in 2004 the SLT established the NuGrain Foundation to provide scholarships and paid internships for qualified undergraduate and graduate students, as well as postdoctoral positions for recent graduates whose research aligns with NuGrain’s strategic objectives (Figure 7.3-8).

5.2a(2) NuGrain’s recruitment process for hard-to-fill positions begins long before a position is requested and is included in the Capability and Capacity Plan. The Recruitment and Hiring Process (Figure 5.2-1) for most positions begins with the submission of a staffing requisition.

HR advertises staffing needs internally and externally. Electronic postings are updated weekly and made available internally through the NuGrain Online Job Openings posting system. Candidates can submit a resume and complete an application form on the NuGrain Web site. The Workforce Referral Program, which gives workforce members a bonus for referring applicants who are hired and remain with NuGrain

for at least six months, has been effective in attracting and retaining highly qualified personnel. Other recruitment tools include advertising in professional and research publications and Web-based newspapers, posting traditional classified ads, and presenting at job fairs. For specialized skills, recruiters and executive search firms are used. For seasonal or summer employment, the R&S Team works with agriculture programs for youth, such as the 4H Club and FFA.

Position descriptions and staffing and development requirements are standardized. Program leads document unique or specialized skills required. The R&S Team works with recruitment centers at the four collaborating universities to ensure recruiters understand the position specifications. The NFU Recruitment Center partners with agriculture departments at collaborating colleges near NuGrain facilities to identify possible student candidates. Paid and unpaid positions provide practical experience for students and give NuGrain an opportunity to assess the students’ skills and competencies for possible long-term employment.

The R&S Team conducts an annual review of its recruitment and retention policies and procedures to ensure alignment with strategic objectives (see Figure 2.2-1). As a result, recruitment strategies were adjusted in 2009 to increase the likelihood of meeting corporate diversity goals, which are based on the composition of the community in which the laboratories reside, as well as NuGrain’s broader hiring community. To get a diverse pool of qualified applicants, recruiters advertise in ethnic-oriented journals and visit minority colleges. A Diversity Council at each site works directly with recruiters, leads, and team members to ensure their understanding of NuGrain’s recruitment and retention policies, diversity goals, and values.

Retaining employees begins on day one. The New Hire Orientation Program introduces NuGrain’s culture, priorities, training opportunities, mentoring, and R&R programs. In 2002, based on best-practice research, NuGrain identified a strong correlation between retention and the employee-immediate supervisor relationship. In 2002, training for supervisors was introduced, and in 2004, HR implemented a Web site with ideas for supervisors on increasing retention.

5.2a(3) NuGrain organizes and manages work and jobs around two integrated work systems: the Process Portfolio Management Work System and the Research Portfolio Management Work System (Figure 6.1-1). The work systems help NuGrain translate customer requirements and strategic objectives into multiyear research programs. Product specifications; performance expectations and standards; and competency, skill, and staffing requirements are defined through the Prime Contract Management Process. Cross-discipline, integrated teams execute the work. Process owners utilize a charter to define the roles, responsibilities, and accountabilities of each team and its members. Work and jobs are organized around system processes, thus supporting the core competencies required to meet contract requirements. The organization structure of teams and work systems is reviewed annually using the Work System Design Process (Figure 6.1-2) to ensure alignment to the Strategic Plan.

NuGrain’s staffing matrix helps the organization develop a pool of people within specialty positions who work together to ensure common processes and approaches across all work sites. When projects need additional staff or when an employee is scheduled to attend training or take leave, leads can pull someone from another team within the pool to a particular project until the original team member returns. Employees receive training, professional development, and shadowing opportunities to prepare them for forecasted assignments. In addition, they have an opportunity to work with the Contract Proposal Development Team to share their knowledge and expertise to develop award-winning proposals.

5.2a(4) NuGrain’s workforce capability and capacity needs change based on contract requirements, expected and projected contract awards, and information derived from the SPP environmental scan of the market and the industry. The R&S Team prepares NuGrain for changing workforce capability and capacity needs, as well as developmental/training needs, through the HR Planning Process (see 2.2a[5]). This process incorporates data from the annual Work System Review, the Annual Process Performance Analysis, process design projects, and process improvement projects. Each year, the R&S Team uses the HR Plan to assess current and projected staffing needs, create the staffing matrix, and update the ten-year Capability and Capacity Plan.

In early 2006, NuGrain forecast a potential economic downturn with the possibility of reduced federal funding and workforce reductions. The SLT developed a strategic initiative to begin training and knowledge-sharing meetings to take NuGrain into the search for renewable energy. Then, in 2008, when the government focused its efforts on being “green,” NuGrain was ready with expertise to help the USDA lead the charge (see 7.6a[5] for a sample of NuGrain’s “green” initiatives). The 2009 SPP included a specific focus on submitting research proposals to the DOE related to renewable energy and the use of organic products as chemical substitutions.

Preparations began in 2006, and because the new skill sets had been developed, the initiatives are now being implemented.

NuGrain does not spend resources to prepare the current workforce for reductions because there is a high level of job security through the ten-year Capability and Capacity Plan, the seven-year renewable contract with the USDA, and being government-owned. Even if NuGrain’s contract were not renewed, the laboratories and the work could be managed by the USDA or another contractor and the workforce retained.

5.2b(1) Workforce health, safety, and security are systematically addressed at each site through the Workforce Safety and Preparedness Committee (WSPC), the Workforce Wellness Committee (WWC), and site emergency plans (see 6.1c). Workforce representatives from each department and location serve on the WSPC to reduce or eliminate workplace hazards, reduce the number of lost-time accidents, and increase workforce participation in safety events and training.

A safety officer at each site conducts risk assessments, provides safety training, and ensures compliance with OSHA, other regulatory agencies, and NuGrain safety standards. All safety officers meet monthly with the WSPC to review risk assessments, accidents, workers’ compensation claims, and audit and safety inspection data. Root-cause analysis helps determine actions needed to prevent safety hazards (e.g., revised or new training, establishment of new policies or SOPs, and additional audits or inspections). Safety officers meet virtually every quarter to share best practices and lessons learned. The WSPC sponsors safety awareness events, workshops, monthly departmental safety training sessions, and an annual, coordinated, workforce-preparedness exercise.

Each position description outlines safety procedures and requirements, which are prominently displayed in the work environment. Personnel receive specific safety training for their jobs. Work systems integrate safety checklists, personal protective devices, safety procedures for operating equipment

Figure 5.2-2 Workforce Services, Benefits, and Policies

Focus Area	Services	Benefits	Policies
Sustain a healthy workforce	<ul style="list-style-type: none"> Gym membership Wellness programs Emergency child care Nursing services (flu shots, screening) Employee assistance services Seminars on workforce issues 	<ul style="list-style-type: none"> Comprehensive health insurance options Dental and vision plan Sick leave Prescription plan Flexible spending options Long-term care insurance 	<ul style="list-style-type: none"> Stay-home-when-sick policy Shared time for fitness (½ hour your own time and ½ hour NuGrain time up to three times per week)
Create a safe and healthy environment	<ul style="list-style-type: none"> Centralized safety and health information for each job category Ergonomic check of workstations 	<ul style="list-style-type: none"> Family leave Corporate-sponsored community service: Baldrige training/site visits (hours aligned with USDA policy) 	<ul style="list-style-type: none"> SOPs, safety checklists Safety Committee Sick leave donations Policies exceed standards
Develop the workforce	<ul style="list-style-type: none"> E-learning (access to 10,000 classes) Certification programs Continuing education 	<ul style="list-style-type: none"> Tuition reimbursement Tuition reduction Paid professional memberships 	<ul style="list-style-type: none"> Mandatory training: valuing diversity, annual ethics training
Sustain workforce satisfaction and engagement	<ul style="list-style-type: none"> Retirement seminars Long-/short-term disability insurance Credit union Legal services Corporate-sponsored research grants Funded internships and post-doctoral positions 	<ul style="list-style-type: none"> Military/bereavement/jury leave Adoption leave Paid vacation Ten federal holidays (two floating) Basic and optional life insurance 401K Pretax flexible spending accounts 	<ul style="list-style-type: none"> Home/work life balance Job assurance following maternity, paternity, and military leave

and/or handling hazardous materials, and safety standards that are assessed through audits and inspections.

The WSPC works with security personnel at collaborating universities to ensure facility and laboratory security. Workforce identification badges and passwords control access. Security cameras monitor laboratories, facilities, and field perimeters.

The WWC partners with the collaborating universities and local health providers to provide the workforce with access to programs and services that foster and maintain healthy lifestyles. These include gym memberships; nutrition, weight reduction, and smoking cessation programs; special-topic seminars (e.g., caring for aging parents); blood drives;



6: Process Management

6.1 Work Systems

6.1a(1) NuGrain’s overall work system is used to translate customers’ requirements and the organization’s strategic objectives into multiyear research programs that are then accomplished over time through multiple focused research projects. The work system is further designed so that research projects are supported by efficient and effective enabling processes. To design its work system, NuGrain used a Work System Benchmarking Process that consisted of the following steps: (1) review work systems for other large research organizations; (2) determine which were most effective and efficient for large research organizations; and (3) select the best fit based upon NuGrain specific contracts, mission, and strategic objectives.

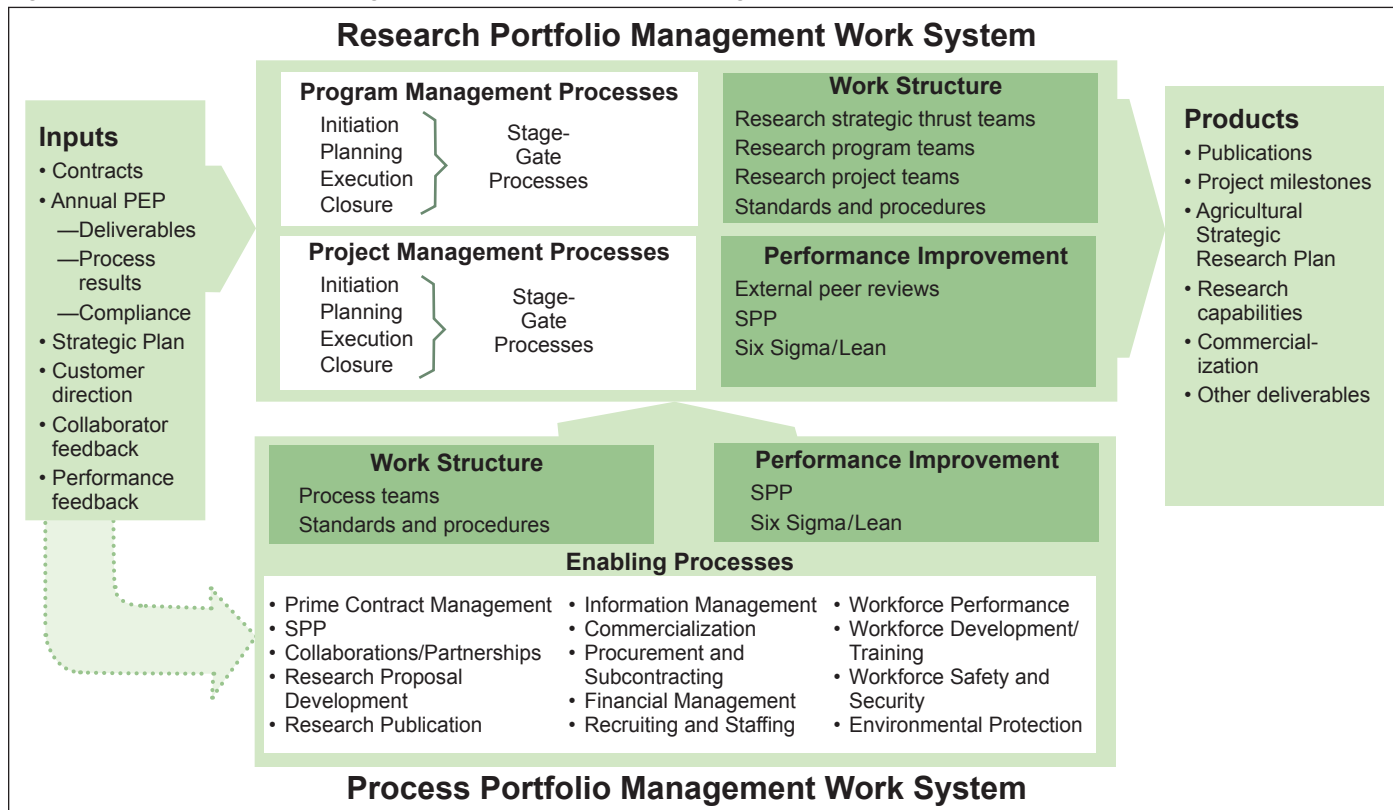
flu shots; access to university health services; workforce assistance; and counseling.

5.2b(2) NuGrain supports its workforce members through numerous policies, services, and benefits (Figure 5.2-2). The Workforce Benefits Group monitors the policies, services, and benefits and conducts an annual review of the benefits offerings. In addition, focus groups organized by workforce segment are held with the MAG at each site to better understand any desired adjustments to policies, services, or benefits. Resulting changes include the addition of a floating holiday in 2003 to provide time off for people of varying religions and, in 2006, a dependent care benefit for the increasing number of workforce members with young children or aging parents.

The outcome of the process was the development of two integrated work systems: Process Portfolio Management and Research Portfolio Management, as shown in Figure 6.1-1.

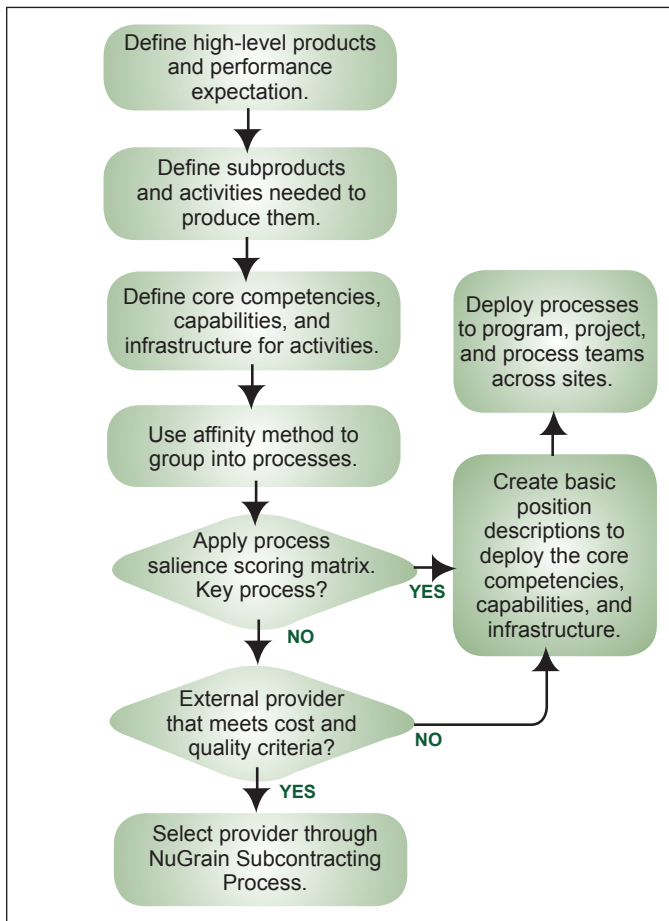
The Work System Design Process (Figure 6.1-2) is owned by the SLT and was first used to complete the high-level design of the work systems. The SLT selects the key processes by using a process salience scoring matrix with four basic criteria: (1) the relevance of the process to the quality, cost, and timeliness of the research specified in the contract; (2) the relevance of the process to delivering on other terms and conditions of the contract; (3) the degree to which the capabilities required to execute the process utilize NuGrain’s core competencies; and (4) the fraction of the organization’s resources used by the process. The matrix results in unique scores, ranging from

Figure 6.1-1 Process Portfolio Management and Research Portfolio Management



Note: Key work processes are in white boxes.

Figure 6.1-2 Work System Design Process



0 to 100, for each criterion, which are averaged to determine the final process salience score. Processes with scores above 75 are considered key NuGrain processes. Processes not determined to be key are evaluated for potential outsourcing, using cost and quality criteria, and the Subcontracting Process is used to select the provider. Processes for building and equipment maintenance were the first to be outsourced in 2004; desktop computer maintenance and telecommunications followed in 2006 and 2007, respectively. This outsourcing led to significant cost savings for NuGrain’s customers.

Many refinements have resulted from the fact-based improvement approach within the annual Work System Design Process. Initially, at the work system level, many research-specific subprocesses included in the Research Portfolio Management Work System were considered distinct from the Stage-Gate Processes (see 6.2b[2]). Over time, activities associated with these subprocesses were built into the Stage-Gate Processes. These improvements resulted from determining that multiple process interfaces contributed to delays in the delivery of research projects. Collectively, the number of key processes has decreased by over 40%. Similarly, the Work System Design Process has been refined multiple times to reduce its cost and cycle time. Initially, the process required four days and a trained facilitator; now it can be executed in less than a day since data are more readily available to use in analysis and the process is formalized through tools that support rapid and effective decision making.

Figure 6.1-3 Deployment of Core Competencies

NuGrain Core Competency	Deployment to Key Processes
Systematic agricultural research	Proposal Development Program Management Processes Project Management Processes Research Publication
Systematic and controlled portfolio management	Prime Contract Management SPP Program Management Processes Project Management Processes
Development of close, collaborative partnerships among academia, government, and industry	SPP Collaborations/Partnerships Commercialization Procurement and Subcontracting Recruiting and Staffing
Specialized research competencies	SPP Program Management Processes Research Publication Recruiting and Staffing Workforce Performance

6.1a(2) The Work System Design Process is used to ensure that the basic elements of the work system capitalize on NuGrain’s core competencies. Specific knowledge associated with the core competencies is built into process specifications (e.g., maps, standards, procedures) to ensure that the process can be applied and retained (see Figure 6.1-3).

The WPM Process (5.1a[3]) is used to deploy the work system design and its relationships to the core competencies to all employees and work units. As part of this process, NuGrain develops and applies competency standards to ensure the systematic embedding of the core competencies into job-specific position descriptions. The WPM Process also systematically translates job-specific competencies into education, training, and performance plans for individuals. Aggregating these plans provides capability and capacity determinations—segmented by work system, process, position, competency, and site—used as input to the SPP and Learning and Development System (5.1b).

6.1b(1) NuGrain’s 22 key processes are identified in Figures 6.1-1 and 6.1-4 and segmented as Program Management Processes, Project Management Processes, and Enabling Processes. NuGrain uses a value stream methodology to specify the high-level role of the work systems and their key processes in translating contract performance and strategic direction into products for NuGrain’s customers.

NuGrain’s key processes contribute to organizational success, financial return, and customer value through their linkage to contract performance. Program and project deliverables are tied to annual contract performance ratings and to NuGrain’s award fee—key measures of customer value, success, and financial return. To ensure this linkage, as part of the Prime Contract Management Process, NuGrain’s program leads adhere to specific standards and procedures to engage their USDA counterparts during the annual PEP negotiations. This engagement results in the selection of an initial set of program and project deliverables to be included in the annual contract PEP, which subsequently is refined using a formalized catch-

ball process with NuGrain's project leaders and then finalized through program lead meetings with USDA counterparts.

The aggregate of all negotiated deliverables and performance measures is manifested in the PEP Scorecard. The SLT and the USDA review scorecard performance monthly; both NuGrain and the USDA rate performance for each measure; and for any differences or performance gaps, they modify action plans to adjust performance to meet year-end goals. The annual PEP Negotiation Process and monthly PEP Scorecard Performance Review Process have undergone multiple cycles of refinement. For example, in 2005 NuGrain and the USDA started negotiating a rolling three-year set of contract performance measures that included the upcoming year and the next two years. While only the measures for the upcoming year were considered essential for contract negotiation, NuGrain found that starting with a multiyear vision cut the cycle time for negotiations by more than 50%.

Key processes also contribute to organizational success and sustainability through process-specific action plans developed during the SPP. These plans are developed by the process owner working with his or her process team, using standard templates that clarify how each action relates to customer value and strategic success. Key processes further contribute to organizational sustainability by formalizing organizational knowledge throughout the organization.

6.1b(2) Process teams, which include suppliers, partners, collaborators, and NuGrain staff, as appropriate, use Six Sigma tools to formally document each key process in a process specification document. Tools include Suppliers-Inputs-Process-Outputs-Customers (SIPOC) maps, process relationship maps, a process value-stream map that defines how the process supports the strategic objectives, VOC results, cause-and-effect diagrams for cost and timeliness, and XY matrices that correlate primary customer requirements with process inputs to define key supplier requirements.

PSOCs (Figure 3.1-1) use a Product and Service Offering Process (PSOP) and Six Sigma tools to specify the applicability of key process requirements—cost, timeliness, compliance, product quality, and customer satisfaction—to all processes. The requirements' importance to a specific process can vary, as seen in Figure 6.1-4. NuGrain has significantly customized Six Sigma tools and methods to make them effective in a research environment. For example, SIPOC maps are customized to include research program and project customers, and XY matrices are customized to include correlations with research quality. Six Sigma tools and methods are reviewed annually by a team of Six Sigma Black Belts who collect feedback on needed improvements from process owners and their teams and then make adjustments to the tools.

6.1c NuGrain uses site emergency plans to ensure work system and workplace preparedness for disasters or emergencies. Site managers, working with their site management teams, develop the plans following standards and procedures maintained by the NuGrain Emergency Director, who ultimately approves the plans. The plans include the following steps: assign responsibilities, guide the categorization of emergencies, state necessary notifications for emergency-response personnel and

the public, outline how to assess on-site and off-site hazardous material conditions during and/or following an emergency, outline an effective course of action to protect the public and site personnel in the event of an emergency, implement protective actions to prevent emergencies, guide mitigation of hazardous material consequences, outline training needed for emergency-response personnel, provide a comprehensive emergency exercise program plan, provide an evacuation plan for the site, provide guidance on protective equipment, and define the process for continuity of operations and recovery to normal operations based on the emergency.

Site-emergency plans are updated and reapproved annually following the SPP. Continuity of operations for information systems is ensured by the Information Management Contingency and Disaster Recovery Process (4.2b[2]). Annually, after the Strategic Plan is updated, the Emergency Director holds a performance review and improvement workshop attended by the site managers and the workforce performance, workforce development and training, workforce safety and security, environmental protection, and information management process owners. The team, facilitated by a Black Belt using customized Six Sigma tools, reviews performance on emergency exercises and any upcoming changes to NuGrain's work scope or workforce to identify needed improvements. Many improvements have resulted from these workshops; recently, a standardized method was implemented to engage local emergency-response personnel in developing site emergency plans, and an electronic hazardous material inventory is now accessible to emergency-response personnel in NuGrain's locations, even if telecommunications are disrupted.

6.2 Work Processes

6.2a The Program Management and Project Management Processes are designed according to the Project Command Institute (PCI) and its *Project Command Guide*. This standard reflects project and program management best practices for a wide range of industries. NuGrain participates in PCI to ensure that its standards remain effective for research environments. For other processes, NuGrain uses Six Sigma Black-Belt-led Process Design Teams (PDTs), which include the process owner; process Yellow Belt; process team members; and customers, suppliers, and partners, as appropriate.

Process designs are managed as projects, using the standardized PDP and the following Six Sigma DMADV steps: (1) *define* design goals that are consistent with customer demands and the SPP; (2) *measure* and identify characteristics that are critical to quality, product or service capabilities, production process capability, and risks (this step formally addresses the key requirements noted in 6.1b[2]); (3) *analyze* options to develop and design alternatives, create a high-level design, and evaluate design capability to select the best design (this includes the use of benchmarks and innovation brainstorming); (4) *design* details, optimize the design, and plan for design verification (for complex processes, this phase uses simulations to find the optimal design point for productivity, cost, quality, and cycle time characteristics); and (5) *verify* the design, set up pilot runs, implement the production process, and hand it over to the process owners and their process teams, who use the PMP.

Figure 6.1-4 Key Measures and Indicators used for Control and Improvement of Key Processes

	Key Work Process	Key Requirements					Key Measures and Indicators
		C	T	L	Q	S	
Research Portfolio Management Work System	Research Project Initiation		X		X		Stage-Gate Approval Rate (Figure 7.5-3); cycle time (Figure 7.5-8)
	Research Project Planning		X		X		Stage-Gate Approval Rate (Figure 7.5-3); cycle time (Figure 7.5-8)
	Research Project Execution	X	X		X	X	Stage-Gate Approval Rate (Figure 7.5-3); Research Total Cycle Time (Figure 7.5-1); Baseline Change Request Rate (available on-site); Total Project Cost to Baseline (Figure 7.5-10); contingency usage (available on-site); CPI (7.5a[2]; available on-site); SPI (7.5a[2], available on-site); customer satisfaction (Figures 7.2-2 and 7.2-3)
	Research Project Closure		X		X	X	Stage-Gate Approval Rate (Figure 7.5-3); cycle time (Figure 7.5-8); customer satisfaction (Figure 7.2-2)
	Research Program Initiation		X		X		Stage-Gate Approval Rate (Figure 7.5-3); cycle time (Figure 7.5-9)
	Research Program Planning		X		X	X	Stage-Gate Approval Rate (Figure 7.5-3); cycle time (Figure 7.5-9); customer satisfaction (Figure 7.2-1)
	Research Program Execution	X	X		X	X	Stage-Gate Approval Rate (Figure 7.5-3); CPI (7.5a[2]; available on-site); SPI (7.5a[2]; available on-site); customer satisfaction (Figure 7.2-1); Aggregated External Peer Review Scores (Figure 7.5-2)
	Research Program Closure		X		X	X	Stage-Gate Approval Rate (Figure 7.5-3); cycle time (Figure 7.5-9); customer satisfaction (Figure 7.2-1)
Process Portfolio Management Work System	Prime Contract Management		X		X	X	Contract management performance (Figure 7.5-11); PEP performance (Figure 7.1-1); contract modification cycle time (Figure 7.5-11)
	SPP	X	X		X		Accomplishment of Strategy and Action Plans (Figure 7.6-1)
	Collaborations/Partnerships		X			X	Collaborator/Partner Satisfaction (Figures 7.2-8 and 7.2-10); collaborative agreement cycle time (Figure 7.5-7)
	Research Proposal Development	X	X		X		Cost (Figure 7.5-12); Procurement and Subcontracting Process Performance Indicators (Figure 7.5-15); acceptance rate (7.5 a[1])
	Research Publication		X		X		Cycle time (7.5a[1]); number of publications (Figure 7.1-4); acceptance rate (7.5 a[1])
	Information Management	X	X	X	X	X	IT system availability (Figure 7.5-14); system vulnerabilities (Figure 7.5-14); customer satisfaction (available on-site; see also 7.5a[2])
	Commercialization	X	X				Commercialization cycle time and cycle cost (Figure 7.5-13)
	Procurement and Subcontracting	X	X	X	X	X	Cycle time (Figure 7.5-15); cost (Figure 7.5-15); customer satisfaction (available on-site; see also 7.2)
	Financial Management	X	X	X			Project costs (Figure 7.5-10); Budget Prep Milestone Performance (available on-site); Fiscal Accountability Performance (Figure 7.6-2)
	Recruiting and Staffing	X	X		X		Hiring cycle time (Figure 7.4-9); hiring cost (Figure 7.4-9)
	Workforce Performance	X	X		X		Performance plan cycle time (7.4a[3]); performance plan objective performance (7.4a[3]); salary adjustment process costs (available on-site; see also 7.4a[3])
	Workforce Development and Training	X			X		Training Investment (Figure 7.4-6); Training Effectiveness (Figures 7.4-8A and 7.4-8B)
	Workforce Safety and Security	X		X	X		TRC (Figure 7.4-12); DART (Figure 7.4-13); work safety plans (7.4a[4]); worker exposure assessments (7.4a[4])
Environmental Protection	X		X	X		Environmental audit findings (Figure 7.6-3); ISO 14001 certification (7.6 a[5]), "Greening" the Environment (Figure 7.6-8)	

Key: C=Cost, T=Timeliness, L=Compliance, Q=Product quality, S=Customer satisfaction

The PDP is supported by a toolbox that includes the Six Sigma tools specified in 6.1b(2), as well as tools to help a team establish efficient and effective benchmarks, set up pilot tests, and formalize the handoff to a PDT. For example, process handoff includes the process specification document; process measures as part of a process control plan; training and development for process team members and users, as needed; process standards and procedures, as appropriate; and a change communication plan. Process handoff includes 90-day and 180-day process checkpoints where the PDT and the Process

Operations Team jointly review performance to ensure that the production process is performing to design specifications and the process operations team has demonstrated process control. The process specification document, the process control plan, and the change communication plan provide the basis for the process operations team to rapidly make well-designed adjustments to the process in the future if agility becomes important. Cost, cycle time, and defects occurring more than 90 days after production are reviewed annually by NuGrain Black Belts for potential PDP improvements. Process performance gaps

trigger a Define-Measure-Analyze-Improve-Control (DMAIC) Process (see 6.2c).

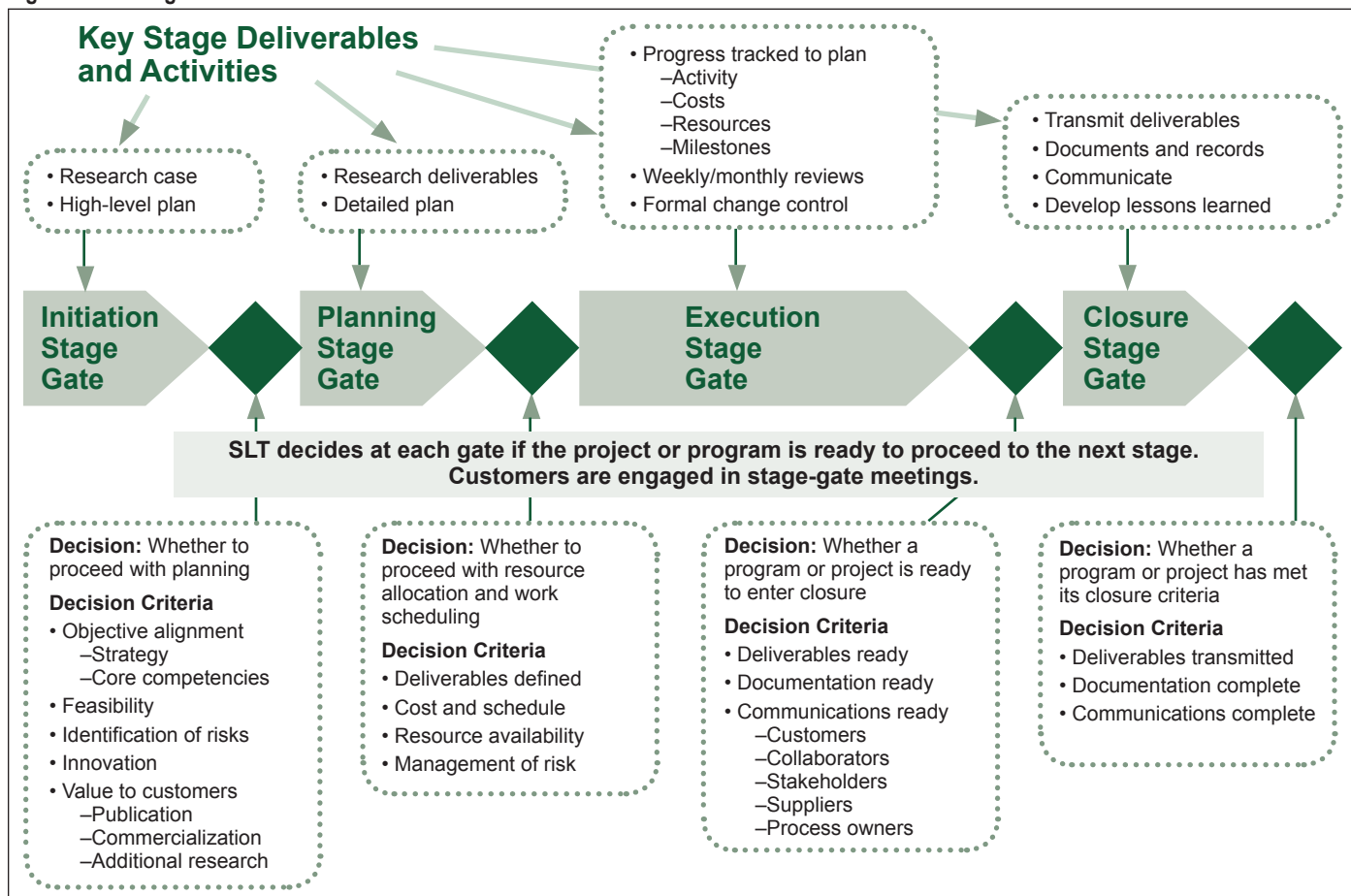
While innovation is triggered by customer demands during the define step of DMADV, innovation is actualized in the analyze step through the use of benchmarking and innovation brainstorming. To systematically incorporate new technology, NuGrain uses the analyze step to complete a technology review. NuGrain ensures the incorporation of cycle time, productivity, cost control, and other efficiency and effectiveness factors into the design of these processes through the measure, analyze, and design steps of DMADV.

A recent, annual PDP performance review performed by a process owner and process team determined that the standard design cycle time and post-90-day defects could be reduced and the cost savings increased if design teams had rapid and easy access to proven and innovative process solutions. NuGrain has many instances of improvement efforts deployed across the workforce, sites, and key processes, including the Idea Wells (e.g., an Idea Well for general organizational issues, one for IT-suggested improvements, and the Innovation Service Now program for stakeholder input). The searchable Idea Well knowledge bases, along with other knowledge bases such as PLANTS and RDIS (4.2a[3]), are available on the NuGrain intranet. Employees, collaborators, customers, and suppliers can submit ideas for process innovation to these knowledge bases. While the Well Team implements ideas considered quick wins, more complex ideas are shared with pro-

cess owners and process Yellow Belts to initiate rapid process innovations, if appropriate. All process design and improvement teams are required to search the Idea Well and other knowledge bases as part of their efforts, and they are required to submit any lessons learned from their efforts to the Idea Well and other knowledge bases so others can learn from them.

6.2b(1) Process implementation occurs as part of the PDP (see 6.2a). Day-to-day operation of key processes to ensure that they meet key requirements is built into the six-step PMP: (1) key process identified; (2) process owner selected, trained, and certified; (3) process Yellow Belt selected, trained, and certified; (4) process team, including members of the workforce, suppliers, customers, and stakeholders, as appropriate, chartered; (5) process control plan and standards and procedures created; and (6) process monitoring implemented. Process monitoring is performed by the process Yellow Belts, using process measures that are maintained in PLANTS and RDIS on daily, weekly, monthly, or quarterly intervals, depending on process volume. Careful process monitoring ensures that day-to-day operations meet key requirements. Control plan performance is reviewed monthly or quarterly, as appropriate, with process owners. When process measures indicate an out-of-control situation, the process Yellow Belts create improvement action plans with the help of their process teams. Once a plan is approved by the process owner, the Yellow Belt and his or her process team implement the action plan. Most process teams include customer and stakeholder representatives to ensure that their input is used to manage key

Figure 6.2-1 Stage-Gate Process



processes. Key measures and indicators used for the control and improvement of key processes are in Figure 6.1-4.

6.2b(2) Process cost control, defect prevention, and rework prevention are ensured through systematic deployment of the PDP (6.2a) and PMP (6.2b[1]). The control plan design step (Step 5) of the PMP is performed using a formalized procedure to ensure minimal costs of inspections and tests. For new processes, the first step of the PDP (the define step) is used to systematically identify compliance aspects of the process design in order to reduce audit time.

Cost control, defect and rework prevention, and performance-audit minimization are built into the NuGrain Program Management and Project Management Processes. These processes incorporate standards and procedures based upon the PCI and its *Project Command Guide*, which is designed to ensure that all programs and projects meet key requirements even though each is unique. To accomplish this, NuGrain uses trained program and project leads and formal program and project plans. Project planning and execution occur in stages, as represented by the key Program Management Processes and Project Management Processes. The Stage-Gate Process (Figure 6.2-1) is designed to reduce program uncertainty and risk before significant resources are committed. Each gate is designed to prevent rework costs in succeeding stages. The execution and closure stage gates are designed to ensure that the quality of data and information deliverables is high, so there are no customer productivity losses.

6.2c NuGrain uses four methods with different frequencies to improve its work processes to achieve better performance, reduce variability, improve products, and keep the processes current with business needs and directions. The first method, the Annual Process Performance Analysis, is part of the SPP. For this analysis, process owners use defined templates to systematically evaluate the performance of their processes against present and future requirements. The results are aggregated, and formal criteria are applied to prioritize processes for Yellow-Belt- or Black-Belt-led PIPs based upon strategic need. Since these PIPs are of strategic importance, Yellow and Black Belts rigorously follow the Six Sigma DMAIC Process, using prescribed tools and techniques (*define* project and current process; *measure* key aspects; *analyze* relevant

data and determine root cause; *improve* process; and *control* to permanently improve the process).

The second method is triggered by the monthly PEP Scorecard review. When these reviews identify process performance gaps that may result in less-than-desirable year-end outcomes, NuGrain initiates a Lean Kaizen Blitz. These events, typically two-to-five days in duration, are led by Black Belts or other trained personnel. They use an accelerated version of the DMAIC Process in which all individuals who need to be engaged to be successful are present for the entire event and participate in each step.

The third method is the PTP. Process teams follow a guide with an annual schedule, standard agenda templates, and supporting tools. The guide and tools ensure that teams can effectively monitor performance, quickly execute simple process improvements using a mini-DMAIC Process, and perform their annual process evaluations consistently. If the team agrees after the mini-define step that the improvement is within its capabilities, it proceeds to the next step; if the improvement is not within the team's capabilities, the assignment is passed to the process owner for disposition.

The fourth method consists of external program reviews. Each program has an external review board composed of leading researchers in the program area. Boards evaluate their assigned program annually, using a formal procedure that includes five quantitative criteria: technical quality; national relevance; innovation; delivery effectiveness; and the quality of the facilities, equipment, and staff. Board review results are aggregated by strategic thrust area for annual review by the Institutional Review Board prior to the SPP. NuGrain's external peer-review process, which has undergone multiple cycles of refinement, is now recognized as a model research peer-review process for national research centers.

All four process-improvement methods use the Idea Wells and other knowledge bases, as sources for ideas and repositories for lessons learned. NuGrain's process-improvement methods have all been through many cycles of refinement. Originally, only the Black Belt Six Sigma PIP was used. The other methods described above emerged from PMP improvement workshops that began in 2004.



7: Results

7.1 Product Outcomes

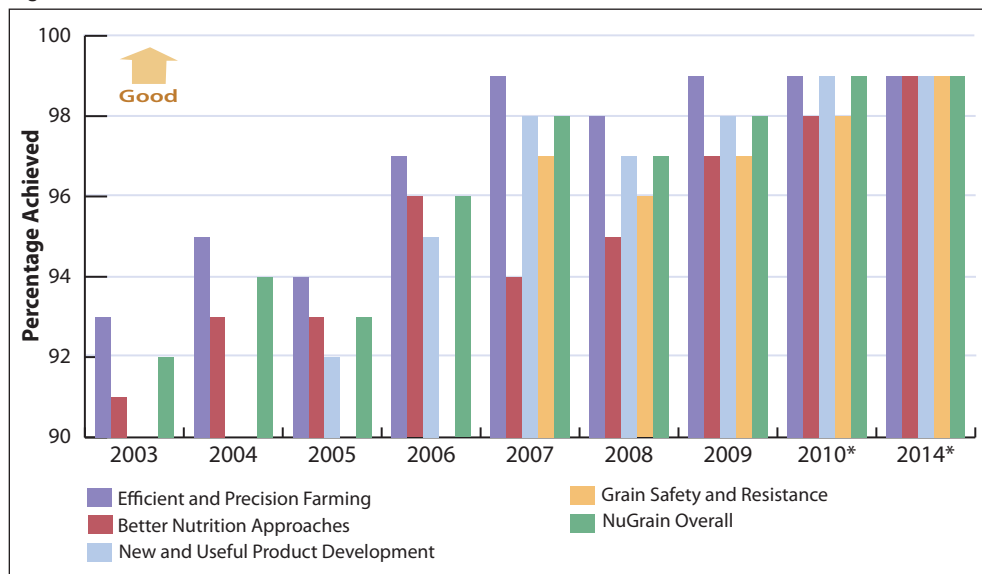
Results of the metrics used to track performance on customer and stakeholder requirements and expectations (Figure P.1-6) are shown in this Item and throughout Category 7. Projected results are marked with an asterisk.

Customer requirements and deliverables are captured in a PEP, which is agreed upon by NuGrain and each customer. The percentage of PEP contract deliverables achieved (Figure 7.1-1) is therefore an important outcome used to evaluate overall performance on customer requirements. Over the years,

the PEP deliverables have expanded to correspond to the growing number and range of projects awarded to NuGrain. Since 2006, NuGrain's performance has improved considerably due to improvements in standardizing research support processes and conducting more effective performance reviews.

The USDA contract provides for an incentive award fee that is paid if NuGrain achieves performance levels that meet or exceed USDA requirements. The maximum award fee, which the USDA began offering in 2003, is 10% of the dollar value for each contract year. Figure 7.1-2 shows the increasing award fee earned by NuGrain alongside the award fee earned by its best USDA competitor. In 2006, a change in rules for receiving

Figure 7.1-1 PEP Deliverables Achieved



the award fee accounted for a drop in the fee. However, NuGrain recovered and exceeded its prior levels in 2007. In 2009, NuGrain earned an award fee of 9.4%, and it is on track to earn the maximum 10% fee for 2010.

The number of patents awarded to researchers and adopted for commercial use (Figure 7.1-3) is a major indicator of the value of NuGrain’s research projects and, in particular, its ability to develop innovative, useful products. Since 2003, NuGrain has commercialized over 130 patents, and it has outperformed its top competitor the past two years.

The number of times NuGrain research is published in peer-reviewed journals and periodicals is a key indicator of quality. Figure 7.1-4 shows the total number of articles published by NuGrain’s researchers and scientists since 2003, the number related to specific strategic thrust areas, and the total number for the best USDA competitor.

Within the Efficient and Precision Farming Program, crop yields achieved through research are a key measure tracked.

Figure 7.1-2 Incentive Award Fees Earned

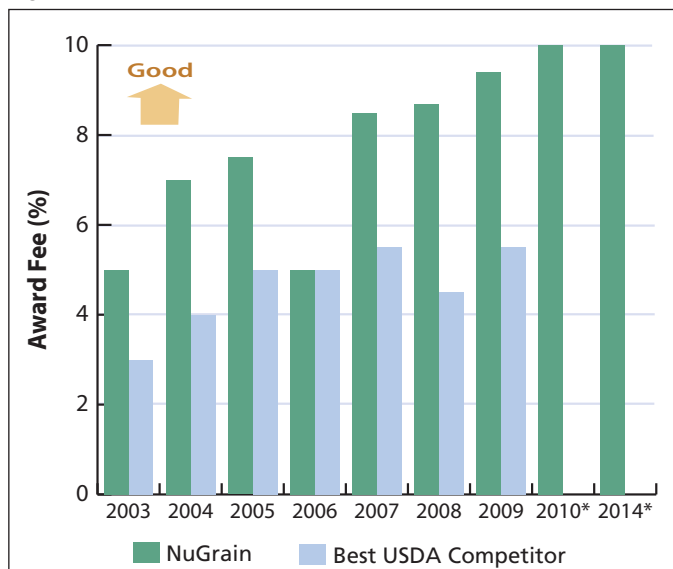


Figure 7.1-5 shows that crop yields and their related value have increased from 2003 to 2009. The rapid increase in yields in 2008 and 2009 is attributed to several breakthroughs in NuGrain’s GPS-related research programs, which have enabled NuGrain to outperform its best competitor in this area. For example, NuGrain can program planting equipment based on the most appropriate time for each elevation, as identified in the GPS. Another innovation uses GPS to remotely design the crop layout of a farm, enabling farm equipment to plant or harvest by remote control.

Another key benefit of GPS-related farming techniques is the precision

delivery of both fertilizer and pesticides. Through partnerships with a number of original equipment manufacturers of farm equipment, as well as farm implement manufacturers, since 2008 NuGrain has demonstrated savings exceeding \$20 per acre, which also exceeds the performance of its best competitor (Figure 7.1-6).

Another area of importance in the Efficient and Precision Farming Program is soil erosion. Figure 7.1-7 shows a reduction in soil erosion from 2003 to 2009. NuGrain has demonstrated steady improvement on this metric and results that exceed those of its best competitor from 2006 to 2009.

A key element in NuGrain’s research on better nutrition approaches is the grain protein content, which can be affected by climate, irrigation practices, and a variety of other factors. Figure 7.1-8 shows NuGrain’s increasing success in addressing these factors in its diverse locations.

Figure 7.1-3 Patents Awarded and Commercialized

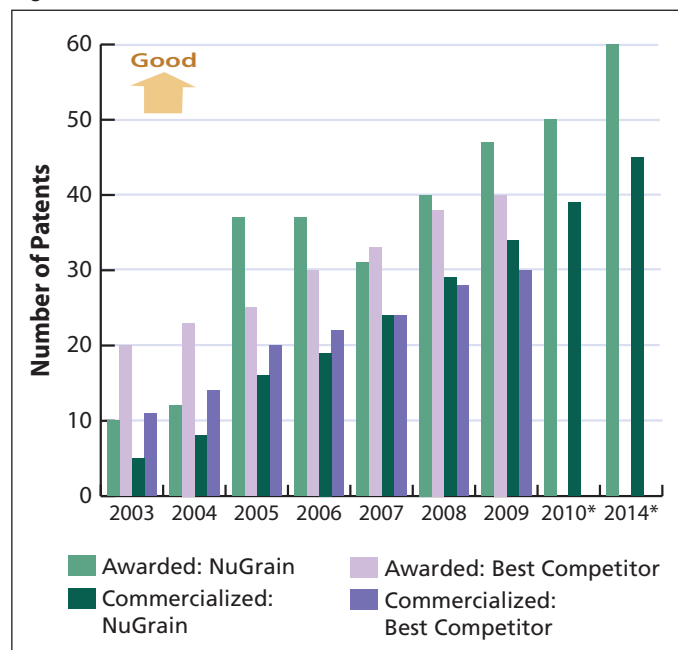


Figure 7.1-4 Published Articles

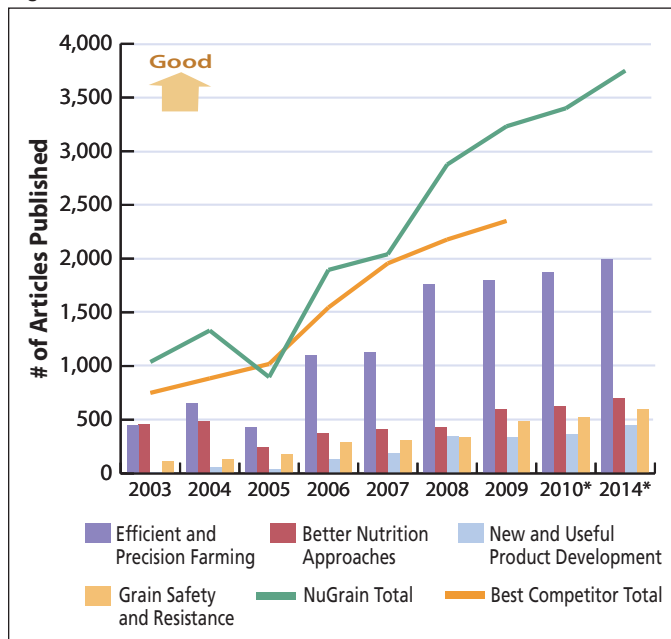


Figure 7.1-5 Crop Yields (Value Increase)

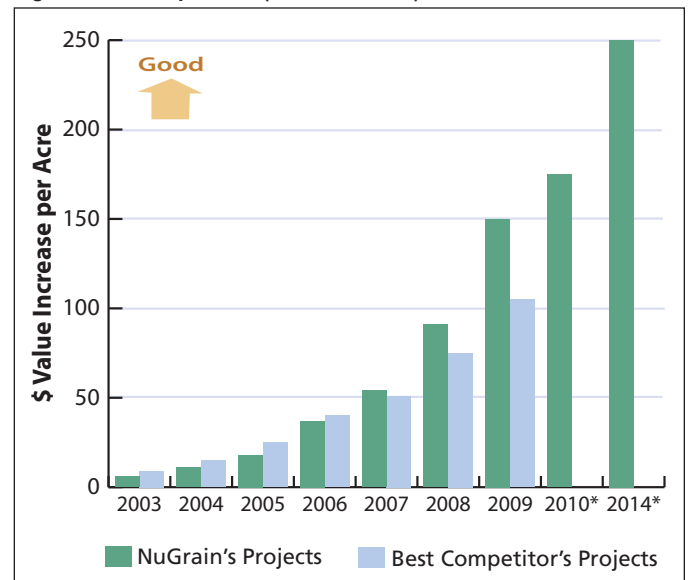


Figure 7.1-6 Fertilizer and Pesticide Usage (Savings)

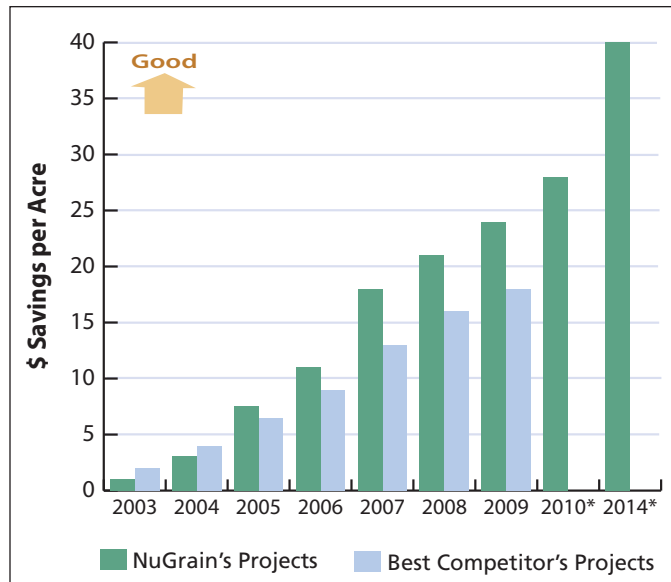
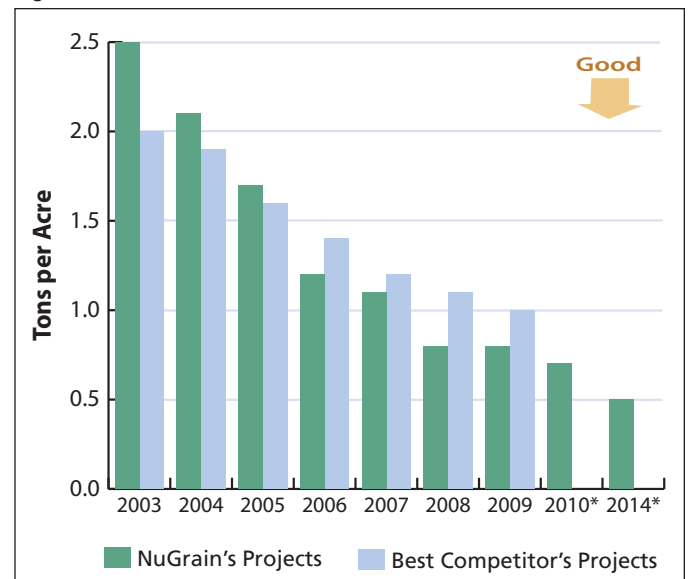


Figure 7.1-7 Soil Erosion



Identifying crop vulnerabilities related to pests, diseases, contamination, and extreme climates is a focus of the grain safety and resistance strategic thrust area. Finding solutions to address such vulnerabilities not only increases the safety of the grain products but also increases crop yields. NuGrain has increased both the number of crop vulnerabilities it has identified and the percentage of these vulnerabilities for which it has developed solutions (Figure 7.1-9). The award of additional related USDA research projects in 2005 has enabled NuGrain to expand its research and become a leader in this field.

7.2 Customer-Focused Outcomes

NuGrain's success over the years is due largely to its strong customer-centered culture. The results presented in Item 7.2 demonstrate the effectiveness of the customer satisfaction and engagement methods described in Category 3. Projected results are marked with an asterisk.

Figure 7.1-8 Increase in Grain Protein Content

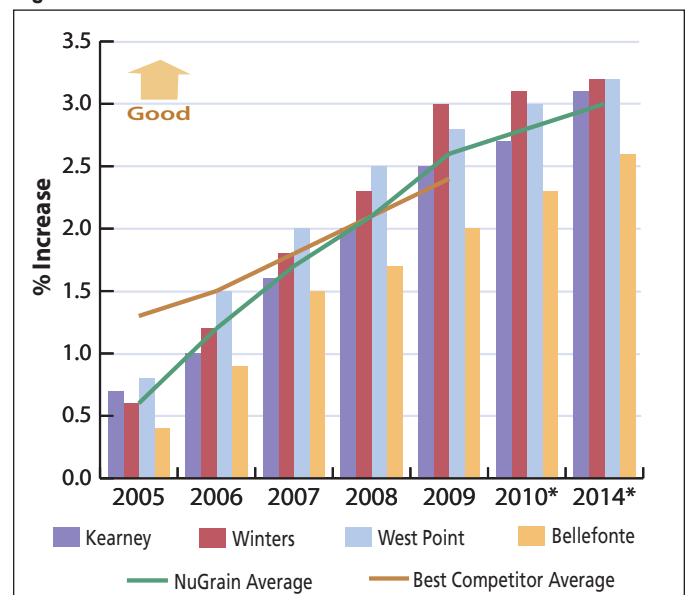
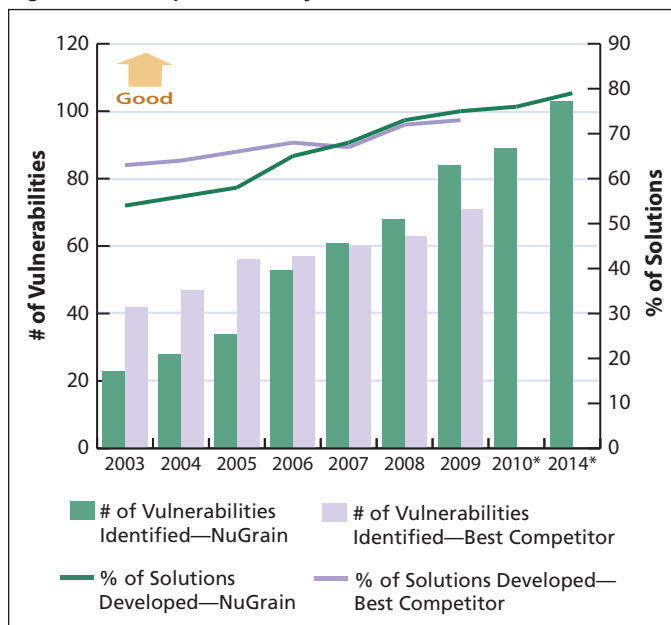


Figure 7.1-9 Crop Vulnerability Identification and Solutions



7.2a(1) The R-37 Satisfaction Survey is the primary means of obtaining customer satisfaction information. The USDA uses this quarterly survey for all GOCOs it works with, thereby allowing them to obtain comparative data. Survey questions are scored on a Likert scale (from 1, very poor, to 5, very good). All survey results report top-response percentages

Figure 7.2-1 USDA Satisfaction with Research Program Elements

	2005	2006	2007	2008	2009	2010*	2014*
Involvement in planning process							
NuGrain	78%	80%	86%	90%	95%	96%	99%
Tillmor	83%	82%	82%	87%	90%	91%	92%
Farmhand	73%	76%	80%	88%	90%	92%	93%
Best Score	83%	82%	86%	92%	95%		
Program execution							
NuGrain	80%	82%	88%	90%	95%	96%	99%
Tillmor	85%	80%	84%	81%	78%	81%	84%
Farmhand	73%	76%	77%	78%	79%	82%	83%
Best Score	85%	86%	90%	94%	95%		
Being informed of program progress							
NuGrain	80%	85%	89%	92%	95%	97%	99%
Tillmor	80%	80%	82%	87%	90%	91%	92%
Farmhand	73%	76%	80%	88%	90%	92%	94%
Best Score	80%	85%	89%	92%	95%		
Cost of research							
NuGrain	80%	82%	87%	90%	95%	96%	98%
Tillmor	82%	85%	80%	81%	81%	82%	84%
Farmhand	73%	75%	75%	76%	77%	79%	82%
Best Score	84%	85%	87%	90%	95%		
Research program closure/results							
NuGrain	75%	77%	85%	90%	95%	96%	98%
Tillmor	70%	75%	81%	82%	85%	87%	89%
Farmhand	65%	69%	77%	72%	74%	76%	78%
Best Score	80%	80%	87%	92%	97%		

(“good” or “very good”), which are a high predictor of future customer use and referral. Full survey results, segmented by site, are available on-site. NuGrain compares itself to its top competitors, Tillmor and Farmhand, and to the best score received for any of the R-37 survey questions from any GOCO; this score is considered the best-practice benchmark. Past R-37 survey results demonstrate that no single GOCO is an industry benchmark.

NuGrain also has steadily improved its performance on the multiple research program elements measured on the R-37 (Figure 7.2-1), and in 2009 it achieved best scores for four of these elements. Satisfaction with being informed of program progress demonstrates the effectiveness of NuGrain’s customer support, communication, and VOC Process (Figure 3.2-1), and satisfaction with NuGrain’s willingness to collaborate shows that it is a trendsetter in communication and collaboration.

Figure 7.2-2 shows the USDA’s high level of satisfaction with various elements of NuGrain’s research projects. NuGrain is performing better than its competitors and achieved the best score for several elements. These results demonstrate the effectiveness of NuGrain’s customer support and communication methods (Figure 3.1-3) and its VOC Process (Figure 3.2-1).

Non-USDA government customers, including WFOs (primarily CRADAs), account for 30% of NuGrain’s research funding. Results from the R-37 for these customers (Figure 7.2-3) show

Figure 7.2-2 USDA Satisfaction with Research Project Elements

	2005	2006	2007	2008	2009	2010*	2014*
Involvement in planning process							
NuGrain	75%	77%	80%	88%	90%	92%	94%
Tillmor	76%	80%	81%	79%	80%	82%	84%
Farmhand	55%	59%	67%	62%	64%	66%	69%
Best Score	79%	80%	87%	93%	97%		
Project execution							
NuGrain	75%	77%	80%	80%	86%	89%	94%
Tillmor	77%	74%	71%	72%	75%	77%	80%
Farmhand	70%	71%	75%	77%	74%	79%	83%
Best Score	77%	79%	83%	87%	91%		
Being informed of project progress							
NuGrain	75%	79%	85%	90%	95%	97%	99%
Tillmor	60%	65%	71%	72%	75%	77%	79%
Farmhand	55%	59%	67%	64%	67%	70%	90%
Best Score	80%	82%	85%	92%	95%		
Cost of research							
NuGrain	80%	80%	85%	90%	95%	96%	98%
Tillmor	60%	62%	65%	67%	67%	70%	73%
Farmhand	83%	79%	78%	80%	76%	81%	84%
Best Score	83%	84%	86%	90%	95%		
Research project closure/results							
NuGrain	75%	77%	85%	90%	95%	96%	98%
Tillmor	72%	68%	71%	72%	75%	77%	79%
Farmhand	55%	59%	67%	62%	64%	66%	68%
Best Score	80%	80%	87%	92%	97%		

their increasing overall satisfaction, as well as their satisfaction with the key project elements of planning, execution, and cost.

Customer complaints, a measure of customer dissatisfaction, are tracked through the CRM data system. NuGrain has received only nine formal customer complaints in the past eight years: four concerning research progress, two concerning access to research sites, and three concerning other minor issues. Within its four-hour target, NuGrain processed each of these complaints and reached agreement on a resolution with the customer. These results reflect the success of its complaint management process and its Irritant Program; NuGrain is the only GOCO that maintains a system to proactively capture customer “irritants” before they become complaints or lead to dissatisfaction.

NuGrain uses a variety of listening and learning methods to determine the satisfaction of its three key market segments: the funding, scientific, and agricultural communities. In addition to the quarterly POPs, NuGrain conducts an annual market satisfaction survey with eight questions for these segments. NuGrain is the only agricultural research GOCO that surveys its market segments/potential customers. The survey is scored on a 1–5 Likert scale, with 5 being the highest score. All survey responses report top-response percentage (good or very good), which is a high predictor of future customer use and referral. Due to space limitations, results presented below focus on the key drivers of customer satisfaction; additional survey data are available on-site.

Figure 7.2-4 shows the increasing satisfaction of NuGrain’s funding community, segmented by the four program/strategic thrust areas (P.1a[1]). Also showing improvement are the funding community’s overall satisfaction with NuGrain, as well as its satisfaction with collaborative relationships, technology sharing, and keeping the project cost within budget—three of this community’s key requirements (Figure 7.2-5). Results for the scientific community show improvement in both overall satisfaction and the key requirement of being informed of

Figure 7.2-4 Funding Community Satisfaction: Thrust Areas

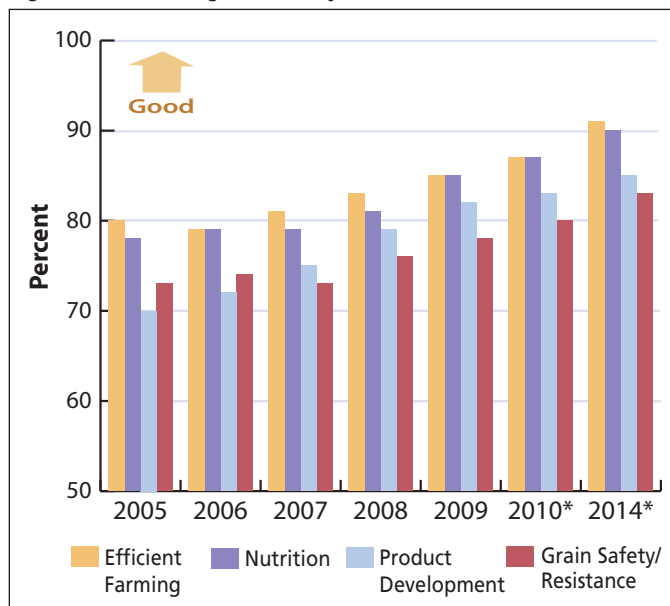


Figure 7.2-3 Non-USDA Government Customer Satisfaction

	2005	2006	2007	2008	2009	2010*	2014*
DOE							
Project planning	75%	74%	73%	75%	79%	80%	84%
Project execution	73%	71%	74%	77%	81%	83%	85%
Cost	74%	75%	74%	75%	79%	80%	83%
Overall	74%	73%	74%	76%	80%	82%	84%
HHS							
Project planning	71%	70%	71%	73%	73%	75%	78%
Project execution	68%	69%	72%	75%	74%	76%	80%
Cost	70%	70%	71%	76%	73%	75%	79%
Overall	69%	69%	71%	74%	73%	76%	79%
DHS							
Project planning	69%	72%	76%	76%	79%	80%	82%
Project execution	73%	75%	78%	75%	81%	82%	84%
Cost	71%	75%	78%	76%	80%	81%	83%
Overall	72%	74%	77%	76%	80%	81%	83%
WFOs							
Project planning	65%	66%	65%	67%	68%	69%	70%
Project execution	66%	67%	66%	69%	70%	70%	71%
Cost	64%	65%	66%	68%	69%	69%	70%
Overall	65%	66%	66%	68%	69%	69%	70%

research (Figure 7.2-6), reflecting NuGrain’s success in publishing numerous articles on strategic thrust areas (Figure 7.1-4).

NuGrain’s success in meeting the key requirements of its agricultural community (including increased crop yields [Figure 7.1-5], savings in reduced fertilizer and pesticide usage [Figure 7.1-6], and reduced soil erosion [Figure 7.1-7]) is reflected in its results for the satisfaction of this key market segment. To enhance satisfaction with the ease of applying the outcomes of NuGrain’s research to farming practices—a key satisfaction driver—the organization contracts with the

Figure 7.2-5 Funding Community Satisfaction: Requirements

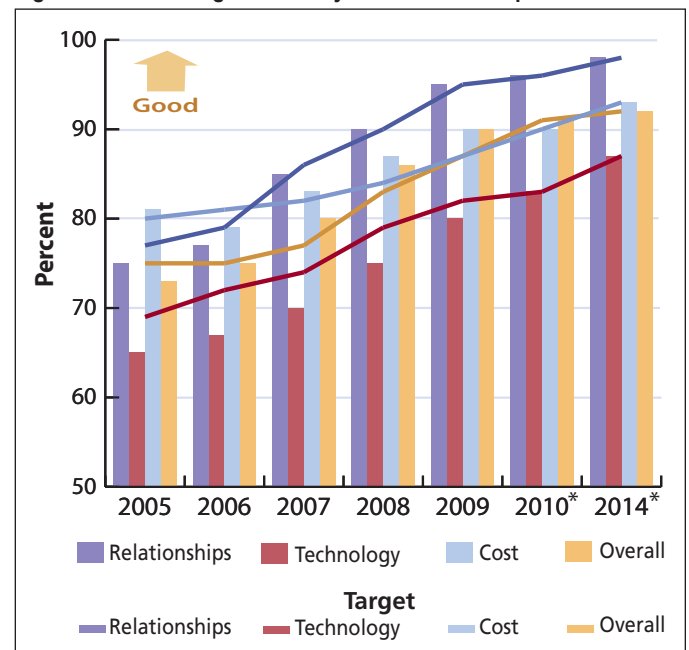
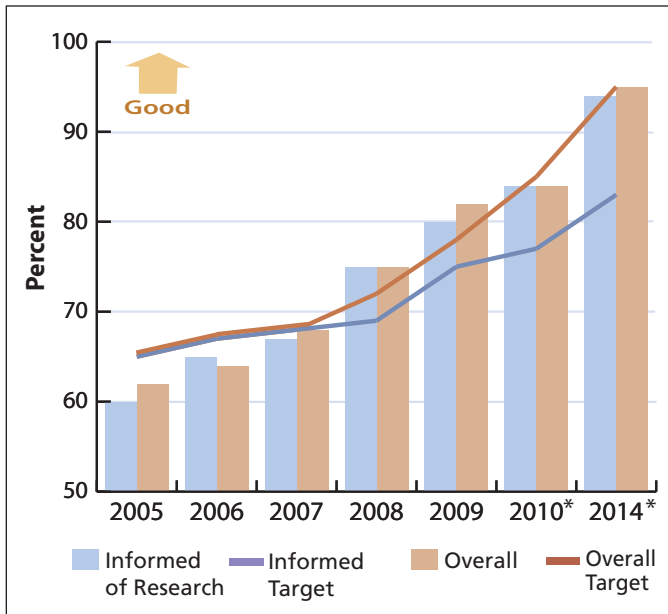


Figure 7.2-6 Scientific Community Satisfaction



Cooperative Extension System for education and grants to implement its research. It also uses a variety of mechanisms (Figure 3.2-2) to collaborate with the farming community on research project design and oversight and to keep it informed of research outcomes. Results in Figure 7.2-7 indicate the increasing satisfaction of the agricultural community with NuGrain’s assistance with education and costs associated with implementing new farming practices, as well as with its collaboration and communication approaches.

A key requirement of collaborating universities, a key stakeholder group (Figure P.1-6), is for NuGrain to provide opportunities for them to contribute to its research (e.g., through collaborative relationships, technology sharing, publications, and research and licensing opportunities). Figure 7.2-8 demonstrates continuous improvement on this requirement, as well as on overall satisfaction.

Figure 7.2-8 Collaborating Universities’ Satisfaction

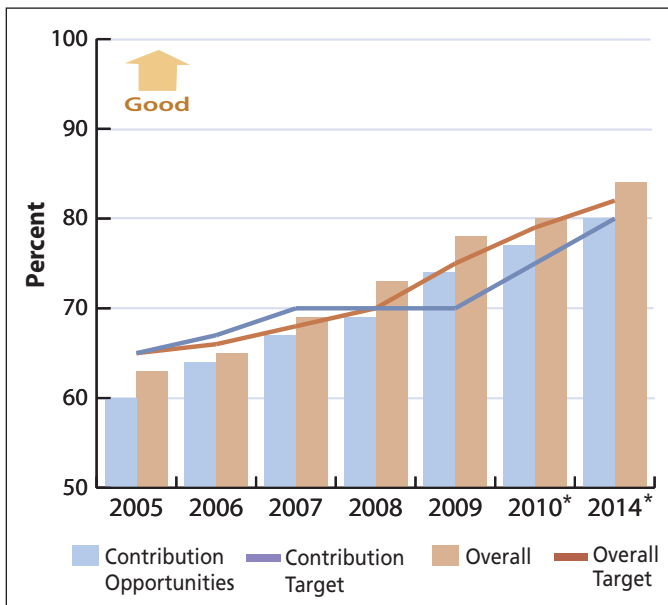
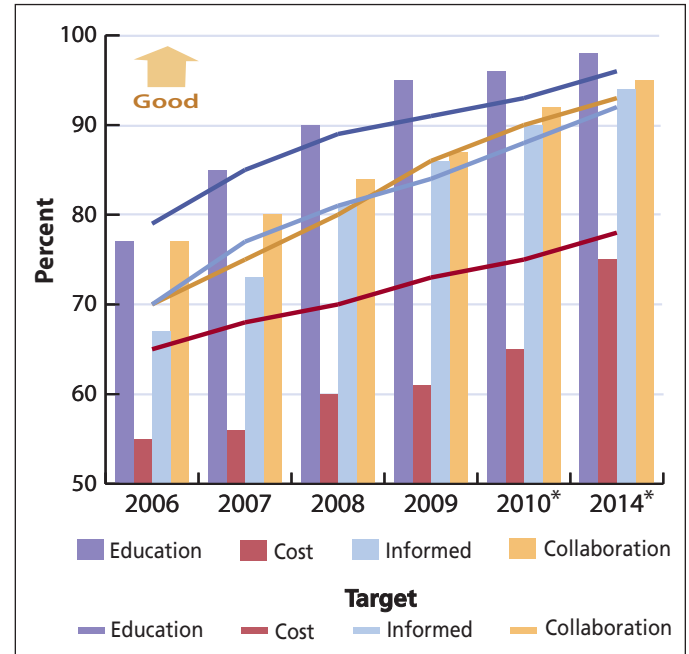


Figure 7.2-7 Agricultural Community Satisfaction



Students are a key stakeholder group, as well as members of NuGrain’s workforce. In addition to including students in its general measures of workforce satisfaction, NuGrain gathers information on satisfaction on specific student requirements (Figure 7.2-9): opportunities to learn from and contribute to research (including publications), as well as scholarship and training opportunities. NuGrain’s systematic integration of students into its research programs has resulted in continually improved satisfaction scores in these areas.

The key requirements of industry partners include shared research opportunities and an industry-friendly licensing/commercialization process. NuGrain involves these partners in determining research needs (through a PSOC), in overseeing

Figure 7.2-9 Student Satisfaction

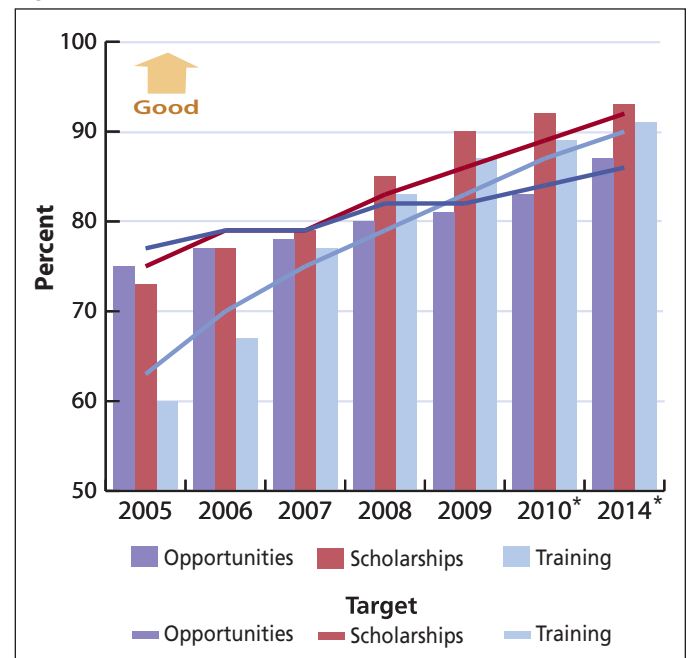
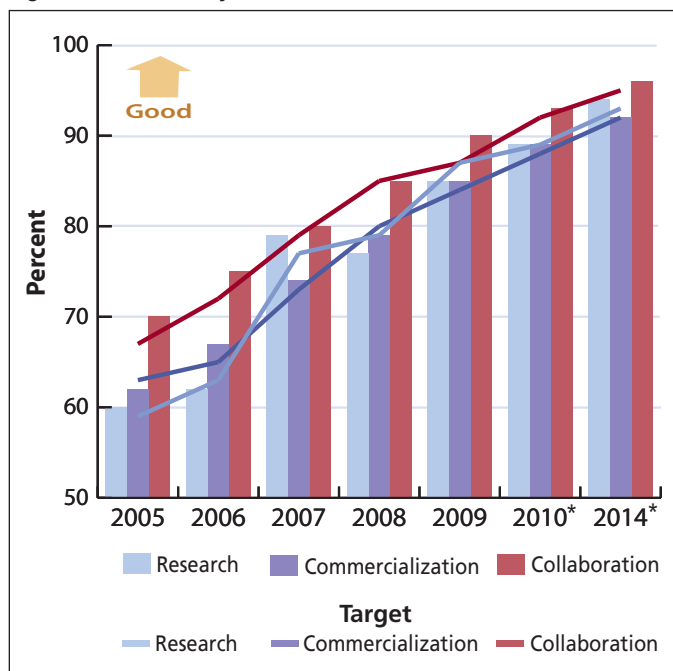


Figure 7.2-10 Industry Partners' Satisfaction



research (through a POP), and in tracking research progress (through communication means described in Category 3). Figure 7.2-10 shows improving satisfaction with these efforts.

7.2a(2) To assess its success in building relationships with its customers, as well as increasing their engagement, NuGrain uses the E-10 quarterly customer survey. All survey results report the percentage of “good” or “very good” responses, which is a high predictor of future customer use and referral. Full segmented survey results are available on-site. A key measure of customer engagement is customer loyalty. Figure 7.2-11 shows continuous improvement on two key components of customer loyalty: the USDA’s likelihood to renew its current contract (which is renewed annually) and its likelihood to contract for additional research. In 2009, NuGrain outperformed its two top competitors, achieved the best score on the first measure, and was only one point below the best score on

Figure 7.2-12 Other Customers' Loyalty

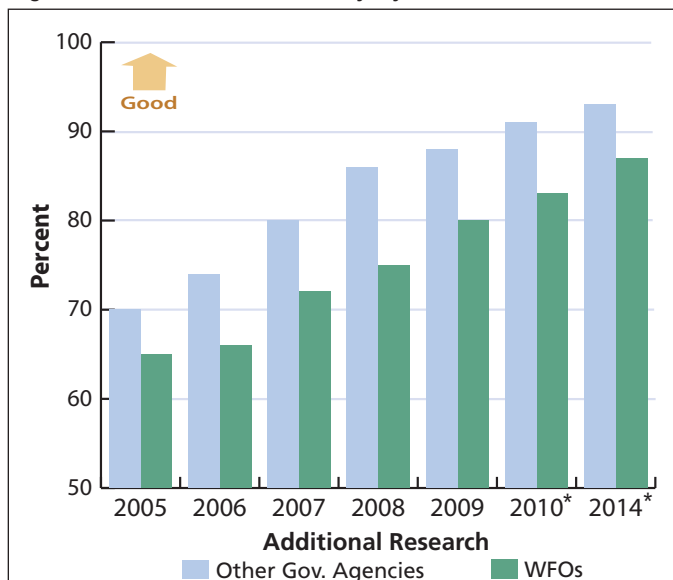
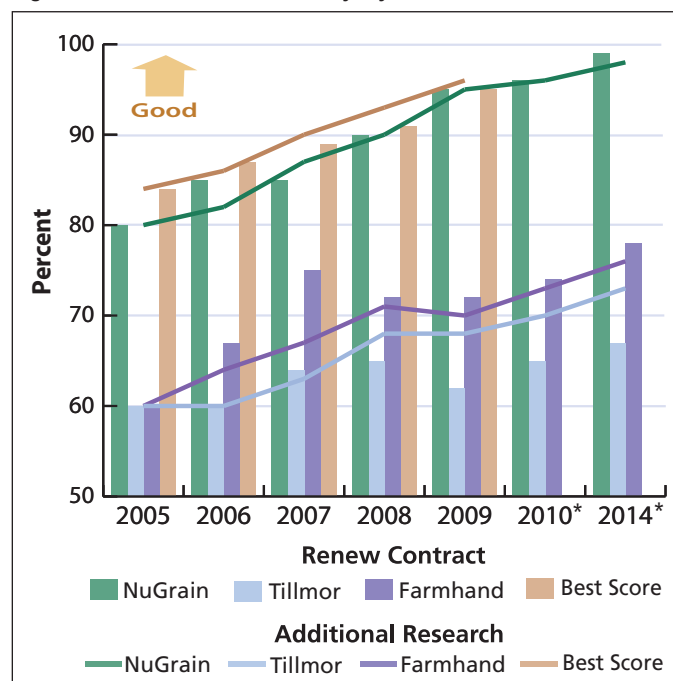


Figure 7.2-11 USDA Customer Loyalty



the second measure. Likewise, Figure 7.2-12 shows that the likelihood of other government agency and WFO customers to contract with NuGrain for further research has increased steadily during the past five years.

NuGrain’s customer-centered culture is based on engaging the customer throughout the customer life cycle. Figure 7.2-13 shows the overall levels of engagement for the USDA, other government agencies, and WFOs during the initial, or planning; midproject; and post-project, or closure, stages of relationships with these customers.

The E-10 also asks customers to rate the effectiveness of NuGrain’s methods for fostering engagement and building relationships. Results in Figure 7.2-14 show the USDA and other government agency and WFO customers’ views of

Figure 7.2-13 Engagement through the Customer Life Cycle

	2005	2006	2007	2008	2009	2010*	2014*
USDA							
Initial	65%	68%	77%	87%	95%	96%	98%
Mid-Project	68%	73%	79%	92%	96%	96%	99%
Post-Project	68%	71%	78%	89%	94%	95%	97%
Overall	67%	70%	78%	89%	95%	96%	98%
Other Gov. Agencies							
Initial	63%	65%	72%	84%	87%	89%	92%
Mid-Project	67%	69%	75%	87%	88%	91%	93%
Post-Project	62%	67%	73%	85%	86%	90%	91%
Overall	64%	66%	73%	85%	87%	90%	92%
WFOs							
Initial	58%	60%	66%	73%	77%	82%	87%
Mid-Project	64%	66%	69%	74%	78%	83%	88%
Post-Project	58%	63%	69%	76%	76%	84%	86%
Overall	60%	63%	68%	74%	77%	83%	87%

Figure 7.2-14 Effectiveness of Engagement Methods

	2005	2006	2007	2008	2009	2010*	2014*
USDA							
POPs	88%	91%	93%	95%	97%	98%	99%
PSOCs	82%	84%	83%	86%	88%	90%	92%
Roundtables	79%	78%	82%	80%	85%	86%	91%
<i>Overall</i>	86%	88%	89%	90%	93%	96%	98%
Other Gov. Agencies							
POPs	63%	83%	85%	88%	90%	92%	94%
PSOCs	82%	82%	84%	87%	87%	90%	92%
Roundtables	72%	74%	75%	77%	82%	83%	85%
<i>Overall</i>	75%	79%	82%	85%	88%	90%	92%
WFOs							
POPs	80%	79%	83%	85%	90%	92%	94%
PSOCs	64%	86%	87%	90%	95%	96%	98%
Roundtables	58%	76%	79%	81%	84%	86%	88%
<i>Overall</i>	74%	81%	84%	88%	90%	92%	95%

several key engagement methods, as well as their overall view of NuGrain’s engagement approach.

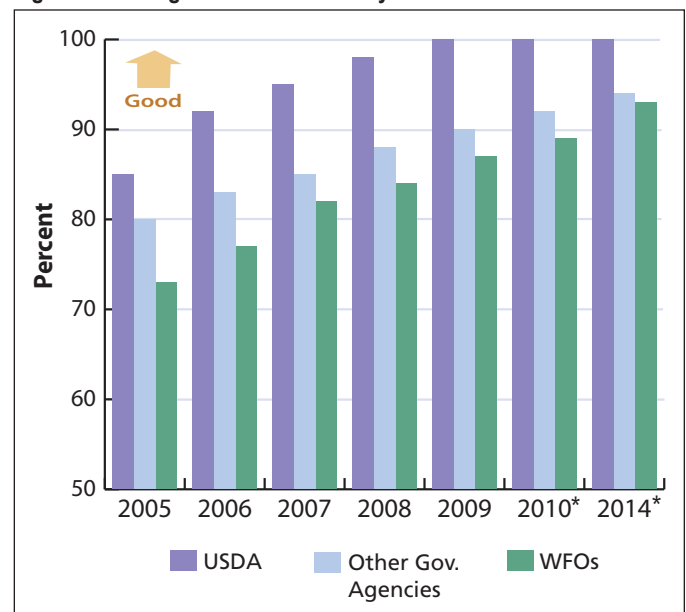
NuGrain makes every effort to engage its end-users—the agricultural community—in research process design, as well as actual research. Figure 7.2-15 shows that the USDA, other government agencies, and WFOs rank NuGrain as excelling in its efforts to collaborate with and engage this community.

7.3 Financial and Market Outcomes

7.3a(1) NuGrain’s funding has increased rapidly since it was instituted in 1995 and won its first contract with the USDA. As a result of NuGrain’s solid research findings, the USDA expanded the organization’s contract to 20 new projects in 1997. Three years later, NuGrain’s contract was expanded again and required the purchase and establishment of research sites in three additional states. As a result, NuGrain’s funding has increased from \$20 million in fiscal year (FY) 1997 to nearly \$2.4 billion in FY2009 (Figure 7.3-1). In 2009, NuGrain experienced its first-ever budget cut due to the temporary reallocation of funds during the economic crisis; however, NuGrain cut expenses to meet its reduced budget. Also, it had taken steps in 2008 to develop the skills of the workforce in new target activities. As can be seen in the projected results (marked by an asterisk), these actions have contributed to a good outlook for resuming the rapid increase in funding beginning in 2011.

As a GOCO, NuGrain is a nonprofit organization. Therefore, success in financial management revolves around the fiscal stewardship of taxpayers’ money and growth targeted where customers want the organization to grow. NuGrain’s performance to budget (Figure 7.3-2) has been consistently high. The slight dip in FY2006 reflects an unusual—but not unfavorable—situation in which the budget expanded before expenses were incurred. FY2010 and FY2014 performance is projected based on

Figure 7.2-15 Agricultural Community Collaboration



year-to-date data and a business model that has driven expenditures to budget to 99% since 2008.

Figure 7.3-3 demonstrates performance to budget by location. Managers are expected to manage to budget and to fully allocate funds. Due to higher-than-expected new-skill training costs, the Winters, California, site exceeded its budget allocation for FY2008. However, NuGrain was able to reallocate funds from the West Point, Mississippi, facility to cover the expenditures. Likewise, the effect of these training costs is seen in results for performance to budget by program area (Figure 7.3-4) related to the Better Nutrition Approaches Program, because research at the California site is heavily concentrated in this program.

In light of constrained USDA budgets, NuGrain seeks to increase funding from non-USDA sources (Figure 7.3-5). NuGrain has received funding from HHS and DHS since 2005 and from DOE beginning in 2007. WFO projects also play

Figure 7.3-1 Funding Growth

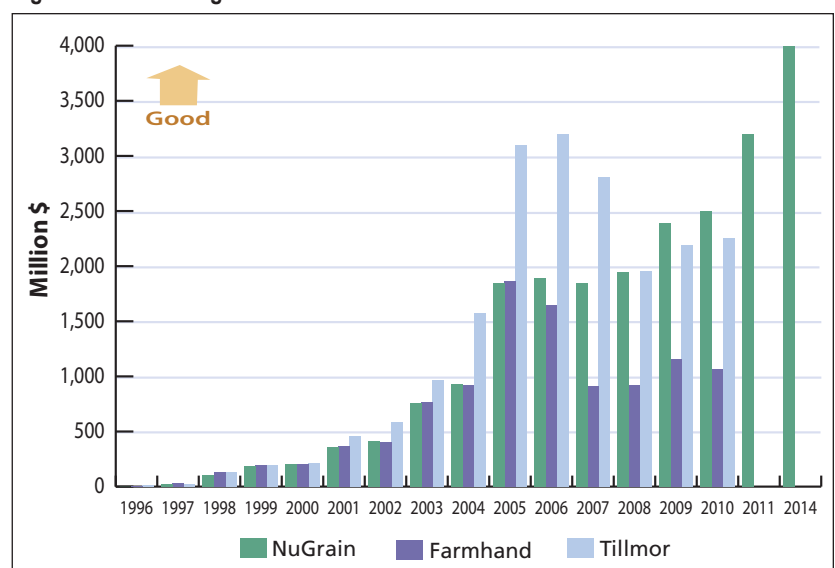


Figure 7.3-2 Overall Performance to Budget

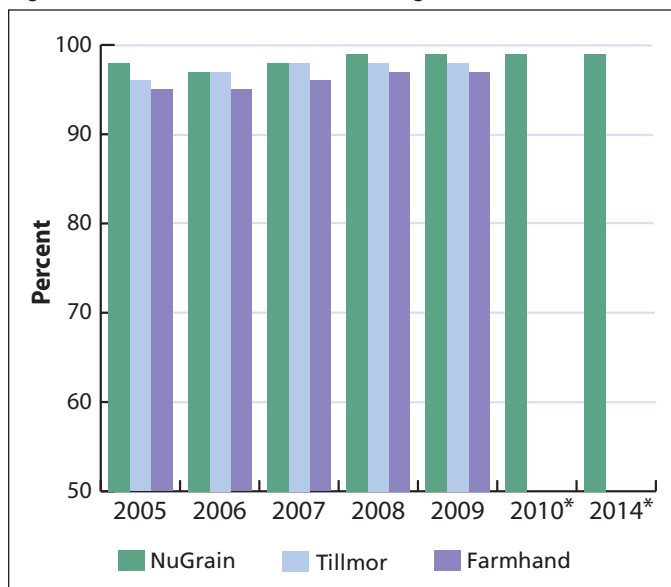


Figure 7.3-3 Performance to Budget by Location

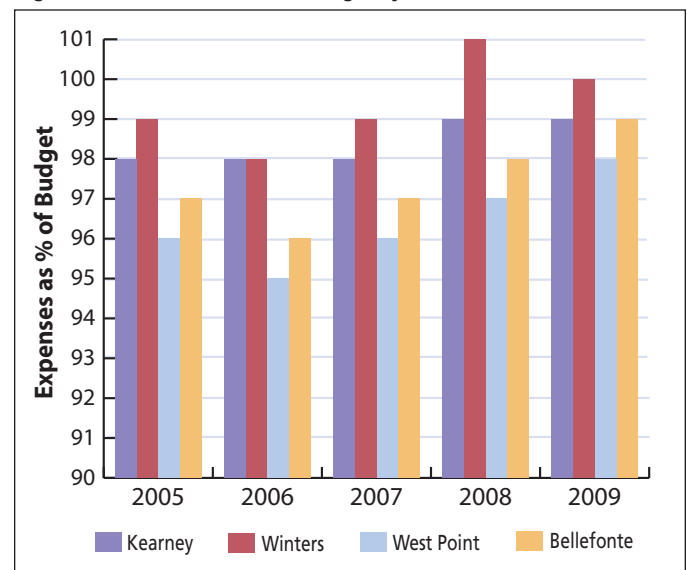


Figure 7.3-4 Performance to Budget by Program Area

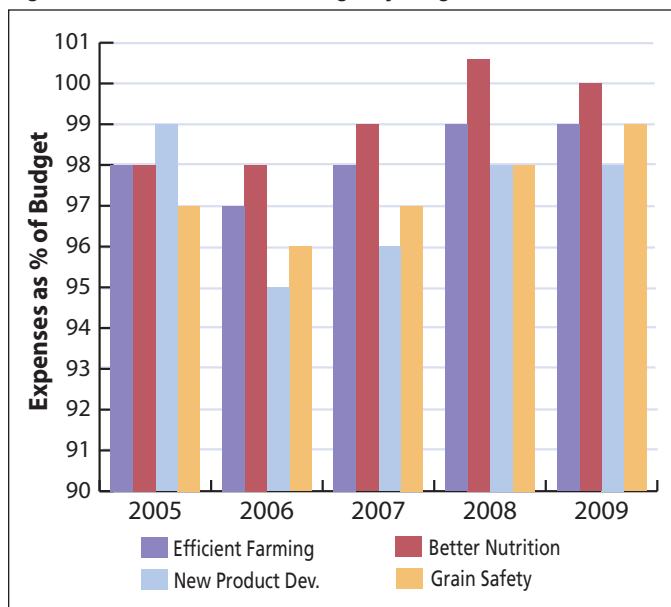
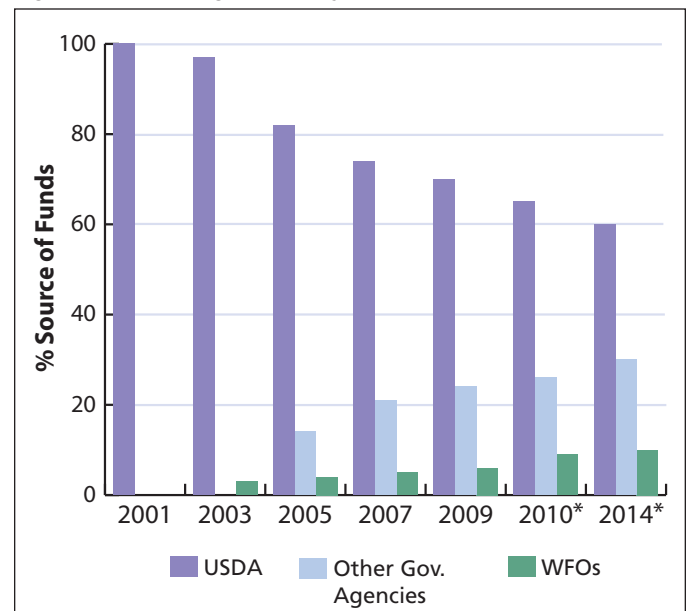


Figure 7.3-5 Funding Sources by Customer Group



small but increasing roles as sources of revenue. Since one of NuGrain’s strategic objectives is to “become indispensable to the USDA and other funding agencies in their strategic research efforts,” the organization has planned some key changes in its products, customers, and markets, including increasing the level of its research related to health and nutrition funded by HHS; these key changes are reflected in the 2014 projection.

NuGrain demonstrates industry leadership in project overhead costs (Figure 7.3-6), with performance that has consistently improved and has surpassed that of Tillmor, its top competitor, since 2007. These results illustrate that NuGrain performs more research for each funding dollar than its competitors and indicate the organization’s agility in the case of federal budget reductions.

Figure 7.3-7 demonstrates the amount of contract fees normalized as a percentage of the budget. Contract fees are

discretionary funds provided to the contractor in addition to reimbursement for incurred costs and are similar to profits that commercial contractors can earn. This figure shows that NuGrain’s efficient processes and strong communication methods continue to drive these fees down, giving it a competitive advantage.

NuGrain provides exciting opportunities for students in high school (beginning at age 16) through graduate school. In 2004, NuGrain launched a foundation with an endowment donated by members of the agriculture industry and universities with agriculture education programs. For example, the NuGrain Foundation raises money and provides scholarships to students in master’s and doctoral degree agriculture programs (Figure 7.3-8). Although the foundation’s investments took a hit during the 2008–2009 financial crisis, they began to rally in late 2009. Awards are projected to begin increasing substantially in 2011.

Figure 7.3-6 Project Overhead Costs

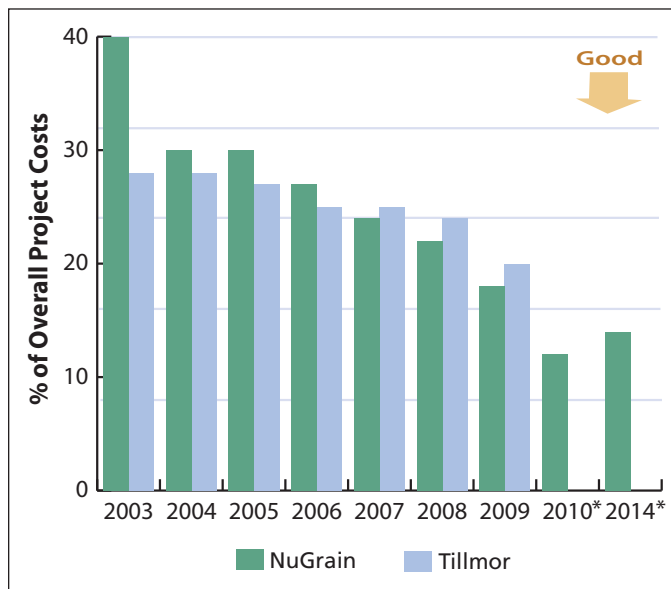


Figure 7.3-7 Contract Fees

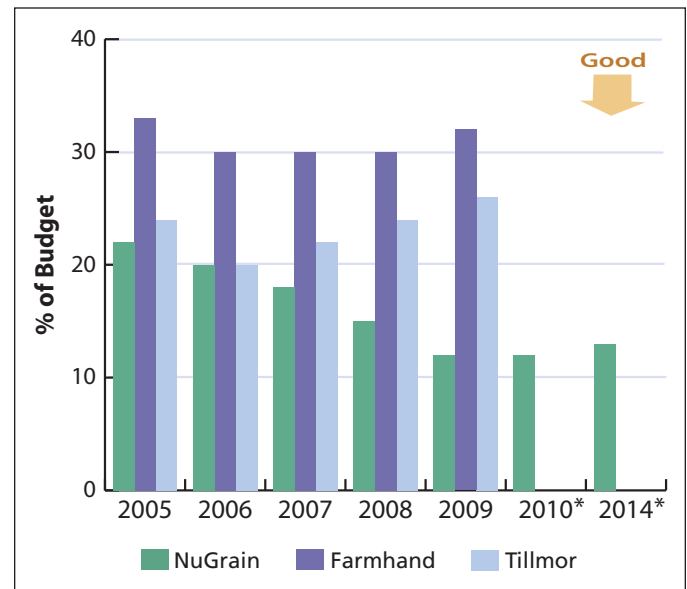


Figure 7.3-8 Scholarships to Graduate Students

Fiscal Year	# Awarded	Total \$
2004	30	\$63,048
2005	55	\$121,880
2006	95	\$238,925
2007	120	\$332,000
2008	84	\$191,000
2009	89	\$198,000
2010*	98	\$241,000
2011*	122	\$340,000
2014*	150	\$424,000

Figure 7.3-9 Market Share: Percentage of USDA GOCO Research

GOCO	Fiscal Year						
	2005	2006	2007	2008	2009	2010*	2014*
NuGrain	20%	26%	32%	37%	40%	41%	45%
Farmhand	20%	16%	18%	19%	16%		
Tillmor	48%	48%	43%	37%	36%		
GrowGrain	12%	10%	7%	7%	8%		

Figure 7.3-10 Market Share: Percentage of USDA Overall Research Funding

	Fiscal Year						
	2005	2006	2007	2008	2009	2010*	2014*
NuGrain	5%	8%	9%	10%	10%	10%	11%
Farmhand	5%	5%	5%	5%	5%		
Tillmor	12%	15%	12%	10%	9%		
GrowGrain	3%	3%	2%	2%	2%		

7.3a(2) NuGrain is the USDA’s largest GOCO. Its USDA market share has doubled from 20% in FY2005 to 40% in FY2009 (Figure 7.3-9), growth that NuGrain attributes to its core competencies of systematic agricultural research, full life-cycle management of agricultural research contracts, development of close collaborative relationships, and its specialized research competencies (Figure P.1-1).

In addition to contracting with GOCOs like NuGrain, the USDA funds research through its own GOGOs. It also awards research contracts to private industry. NuGrain’s share of USDA research funding has doubled since 2005 (Figure 7.3-10). NuGrain credits this growth to its strengths in an uncertain funding environment. Specifically, those strengths are (1) the USDA’s long-term relationship with NuGrain,

which has enabled the federal agency to see first-hand NuGrain’s strong results and efficiency; and (2) NuGrain’s established facilities and strong reputation for success, which help address the high cost of initiating new research. NuGrain now conducts about 10% of the USDA’s research projects.

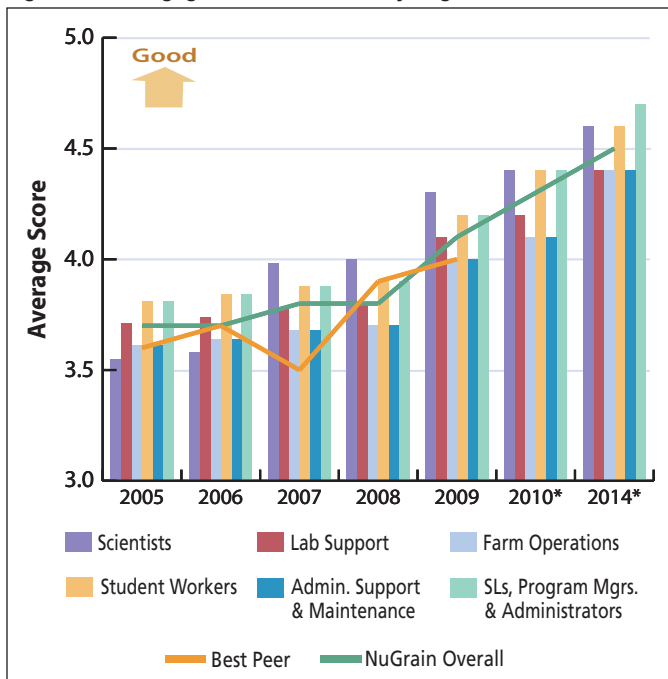
7.4 Workforce-Focused Outcomes

7.4a(1) NuGrain’s EWA measures workforce engagement and satisfaction using a 1–5 Likert scale, with 5 the best level. As shown in Figures 7.4-1 through 7.4-3, the workforce expressed a high degree of engagement (a composite measure for responses related to engagement factors) over the past five years. NuGrain compares itself to its top peer organization, and additional segmented survey results are available on-site. Projected results are marked by asterisks.

Figure 7.4-1, which illustrates the average of scores for each workforce segment, shows increasing levels of engagement, with NuGrain’s 2009 overall performance exceeding the performance level of its top peer organization. Figures 7.4-2 and 7.4-3 show how engagement levels have evolved according to work location, years of service, ethnicity, and education levels.

NuGrain’s results from the EWA on engagement factors that relate to organizational health (Figure 7.4-4) have improved for all factors and in 2009 equaled or surpassed the level of its top peer organization for all but one factor.

Figure 7.4-1 Engagement Overall and by Segments



Results from the EWA related to satisfaction factors (Figure 7.4-5) show NuGrain’s success in addressing these factors. The decrease in satisfaction with compensation in 2009 reflects NuGrain’s first-ever budget cuts; however, a recovery is projected to begin in 2010.

7.4a(2) As shown in Figure 7.4-6, NuGrain has increased its investment in employee and student training over the past five years. Expenditures for employee training are higher than the best-in-class benchmark of the U.S. Business Coaching and Development Association (BCDA) and the best GOCO competitor. Although economic concerns led to a dip in the training investment for 2009, NuGrain projects this line item will resume its growth in 2010.

NuGrain provides a range of training and development opportunities for all its staff members. Figure 7.4-7 shows increasing

Figure 7.4-4 Engagement on Elements of Organizational Health

	2005	2006	2007	2008	2009	2010*
Teamwork	4.1	4.3	4.2	4.5	4.6	4.7
<i>Best Peer</i>	4.5	4.6	4.5	4.5	4.6	
Knowledge Sharing	3.7	3.6	4.1	4.3	4.5	4.6
<i>Best Peer</i>	4.4	4.3	4.5	4.4	4.4	
Feedback	3.8	3.9	3.8	4.0	4.0	4.1
<i>Best Peer</i>	4.2	4.3	4.2	4.4	4.3	
Goal Alignment	3.9	4.0	3.9	4.1	4.2	4.3
<i>Best Peer</i>	4.1	4.2	4.2	4.1	4.2	
Strategy Awareness	3.8	3.9	4.1	4.0	4.2	4.3
<i>Best Peer</i>	4.2	4.1	4.3	4.2	4.1	
Culture	4.0	4.2	4.1	4.4	4.4	4.5
<i>Top 10%</i>	4.3	4.3	4.2	4.2	4.3	
Leadership	3.7	3.9	4.0	4.0	4.2	4.3
<i>Best Peer</i>	4.0	4.1	4.2	4.1	4.2	

Figure 7.4-2 Engagement by Location and Years of Service

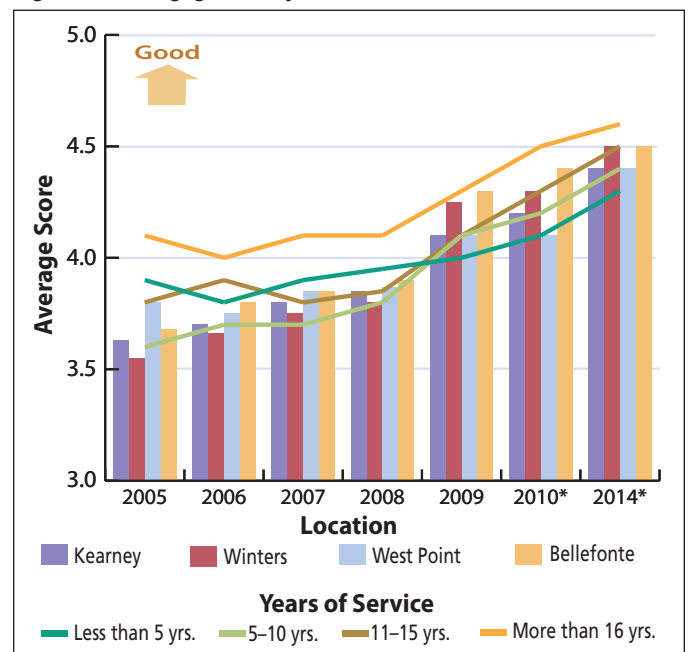
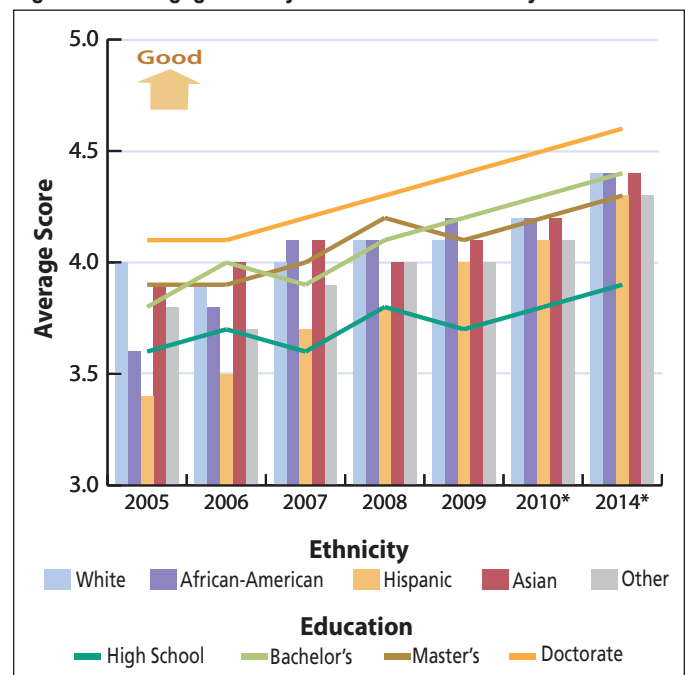


Figure 7.4-3 Engagement by Education and Ethnicity



participation in many activities, with the substantial growth in e-learning reflecting NuGrain’s efforts to increase the range and user-friendliness of online courses. Results from the Ebonywood Assessment Model reflect NuGrain’s continuously improving training method. Figure 7.4-8A shows combined results from all four assessment levels for training delivered to specific workforce segments and to all staff members, and Figure 7.4-8B results for each assessment level and overall. The comparison is a top GOCO competitor.

7.4a(3) As a GOCO, NuGrain’s staffing needs change based on the requirements of the contracts it wins. Therefore, NuGrain carefully monitors its workforce capability and capacity and tracks related measures. An important measure is hiring

Figure 7.4-5 Workforce Satisfaction

	2005	2006	2007	2008	2009	2010*
Communication	3.7	3.6	3.8	3.9	4.0	4.1
<i>Best Peer</i>	3.9	4.0	4.1	4.0	4.0	
R&R	3.8	3.9	4.1	4.3	4.3	4.2
<i>Best Peer</i>	4.2	4.3	4.1	4.1	4.2	
Training	4.0	4.1	4.1	4.2	4.1	4.2
<i>Best Peer</i>	4.1	4.1	4.2	4.1	4.0	
Compensation	3.7	3.8	3.9	3.9	3.6	3.7
<i>Best Peer</i>	3.9	4.0	3.9	3.7	3.8	
Benefits	4.1	4.1	4.2	4.3	4.2	4.3
<i>Best Peer</i>	4.3	4.2	4.3	4.2	4.2	

cycle time (Figure 7.4-9), a key focus of its HR Planning Process and the R&S Team. Since 2001, NuGrain has steadily reduced the time it needs to fill positions, helping to ensure that positions will be filled quickly. In 2009, its hiring cycle time dropped below that of its top GOCO competitor for the first time. At the same time, NuGrain significantly decreased its hiring costs. Since 2005, it has filled 98% of critical open positions within contract requirements.

From 2001 to 2009, the number of days needed to complete workforce PPs decreased 33%, and the percentage of PP objectives completed successfully increased from 75% to 90%. In addition, NuGrain has sustained a 96% achievement rate for all learning and development objectives, which are part of PPs, for the past three years. These measures demonstrate the effectiveness of its WPM Process.

A strategic challenge for NuGrain is the declining number of agriculture graduates (Figure P.2-1). In addition to providing scholarships through its Foundation (Figure 7.3-8), NuGrain provides internships to high school, college, and graduate students that include participation in innovative research, the SPRR

Figure 7.4-7 Participation in Training and Development Activities

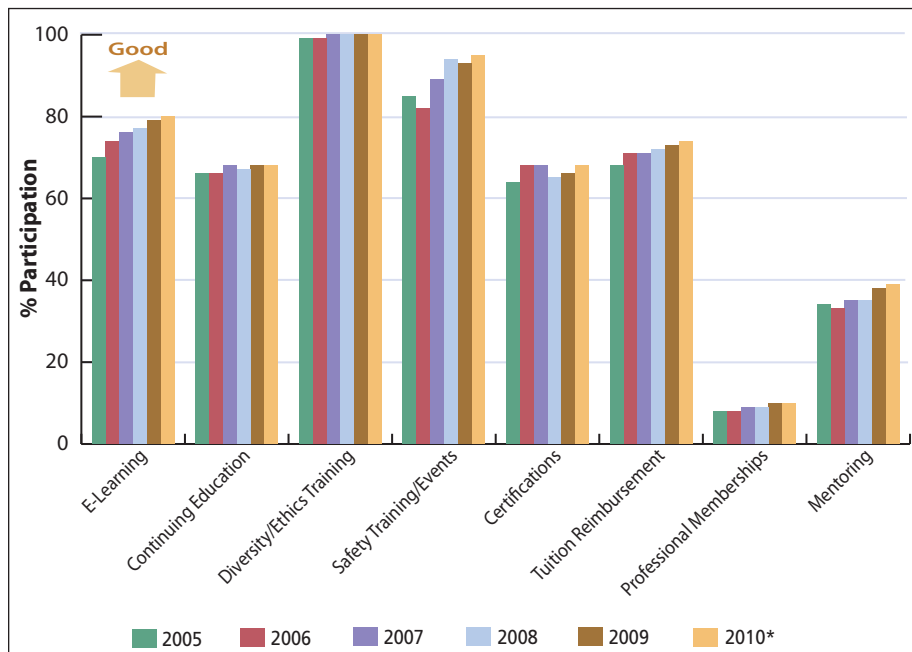
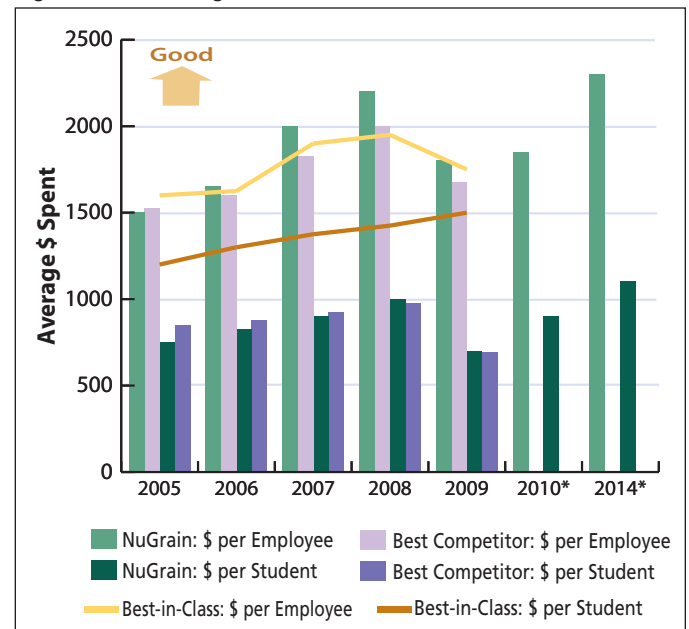


Figure 7.4-6 Training Investment



Process, monthly operational information-sharing forums, PP meetings with NuGrain supervisors, mentoring, and proctoring. The percentage of interns who join NuGrain's staff (Figure 7.4-10) increased by nearly 10% from 2005 through 2009, with the current rate of 35% significantly higher than those of its key competitor GOCOs. The number of NuGrain interns who have chosen to work elsewhere in the agricultural industry also has increased, adding to industry resources.

NuGrain recognizes that workforce retention is key to meeting workforce capacity and capability needs. Reflecting the success of its workforce retention approaches (5.2a[2]), NuGrain's voluntary turnover rates (Figure 7.4-11) are showing ever-better levels; in 2009, its results outperformed those of its best competitor, Tillmor, and approached those of the 2009 Baldrige Award recipient benchmark.

7.4a (4) NuGrain strives to sustain an environment of safety excellence (see 5.2b[1]). Its success is demonstrated by its low rates for TRC and DART (Figures 7.4-12 and 7.4-13), which outperform the OSHA 80th percentile level and are at or near the best GOCO competitor's level. Also, Figure 7.1-14 shows the decreasing number of specific workforce health, safety, and security incidents.

NuGrain's benefits and services (Figure 5.2-2) are available to all members of the workforce and are prorated to students based on the number of hours worked. Workforce members can tailor their benefit packages according to their individual needs, preferences, and coverage from other sources.

Figure 7.4-8A Training Effectiveness by Workforce Segment

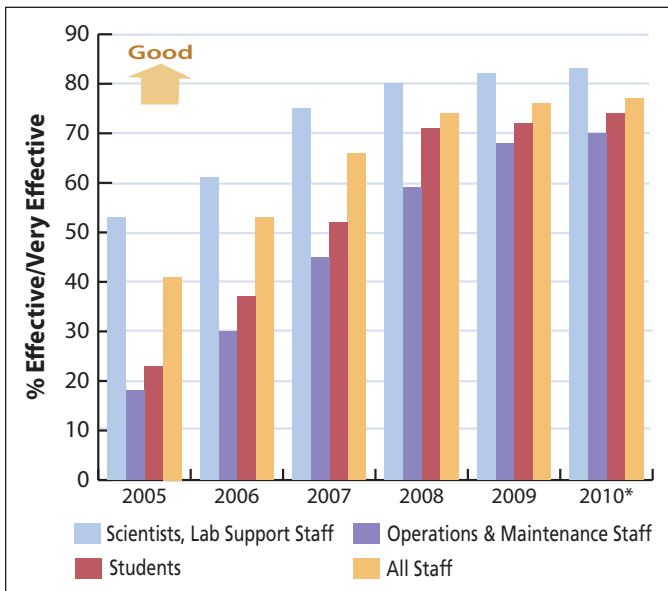


Figure 7.4-8B Training Effectiveness by Assessment Level

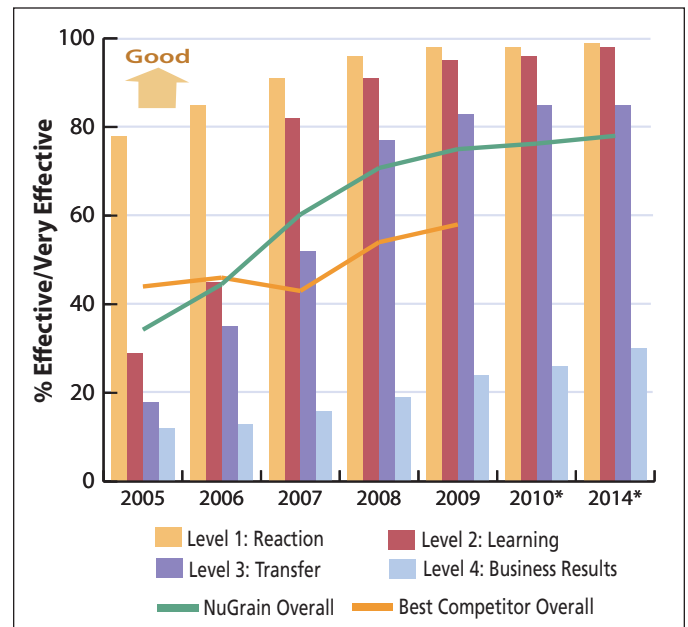
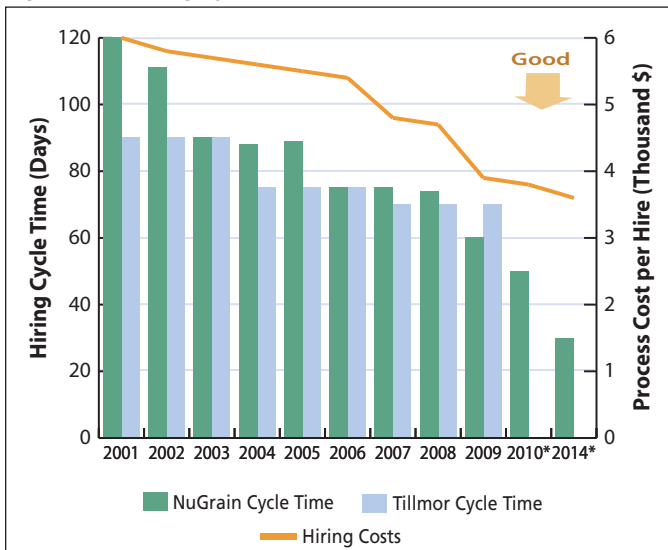


Figure 7.4-9 Hiring Cycle Time and Costs

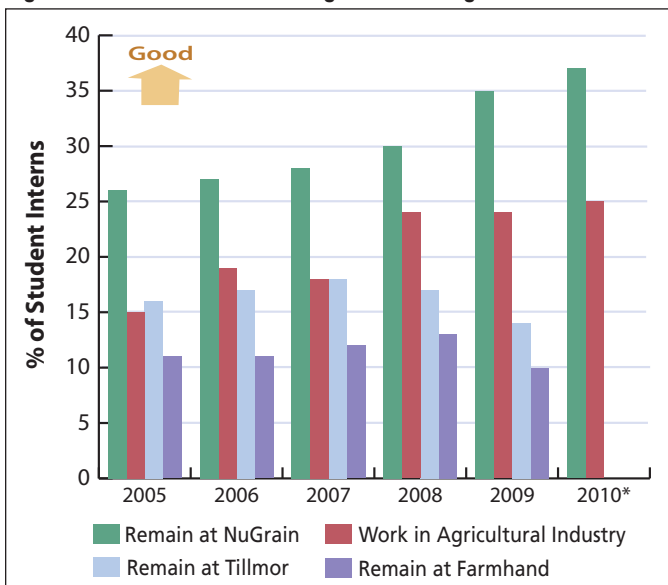


7.5 Process Effectiveness Outcomes

Results for most of the key measures and indicators used to track and manage key processes (Figure 6.1-4) are shown in this Item. The outcome (end-of-process) measures for work system performance are found in Items 7.1, 7.2, and 7.3 and most notably in Figures 7.1-1 (PEP Deliverables Achieved), 7.1-2 (Incentive Award Fees Earned), 7.1-3 (Patents Awarded and Commercialized), and 7.1-4 (Published Articles).

Key leading indicators of work system operational performance are found in Figures 7.5-1 through 7.5-10. “Best competitor” comparisons are to the GOCO with the best results that competes for the same research dollars, and best-in-class for national research laboratories (NRLs) comparisons are to laboratories with the best results, independent of whether they are competitors. Projected results are marked by asterisks.

Figure 7.4-10 Students Choosing Careers in Agriculture



7.5a(1) Figure 7.5-1, which shows the average time from the initiation of research projects to commercialization of resulting products, demonstrates NuGrain’s increasing success in reducing research total cycle time, resulting in its current industry leadership on this measure. New and Useful Product Development lags somewhat behind the other areas because it is an emerging strategic thrust area (see P.1a[1]).

NuGrain also demonstrates industry leadership in its Research Program Management Processes (see Figure 6.1-1), as indicated by scores from program peer reviews aggregated by strategic thrust area and overall (Figure 7.5-2). Reviewers use ratings ranging from 0 to 100 for key elements of work system performance: technical quality; national relevance; innovation; delivery effectiveness; and the quality of the facilities, equipment, and staff. For example, NuGrain’s scores for innovation increased by more than 5% from 2005 to 2009. These ratings are important to NuGrain’s strategic objective for developing a research reputation, since the researchers on the peer-review boards are themselves members of the research community.

Figure 7.4-11 Employee Voluntary Turnover

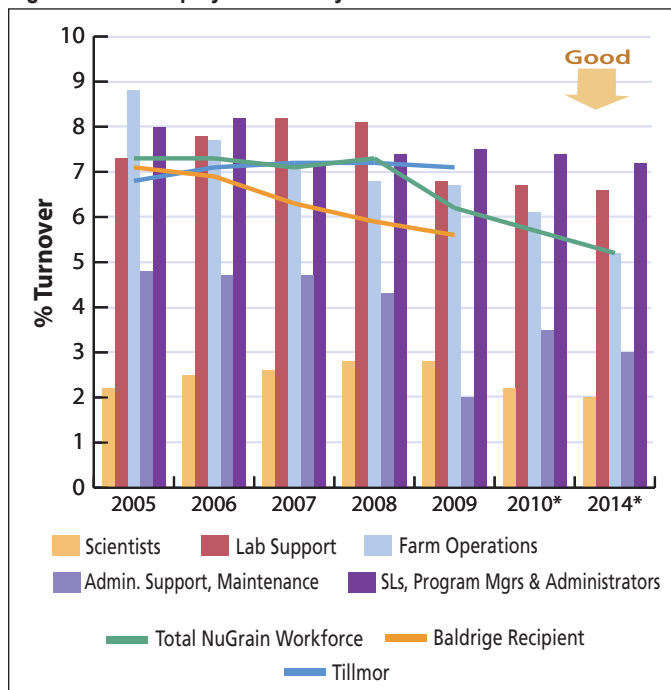


Figure 7.4-12 Total Recordable Cases (TRC)

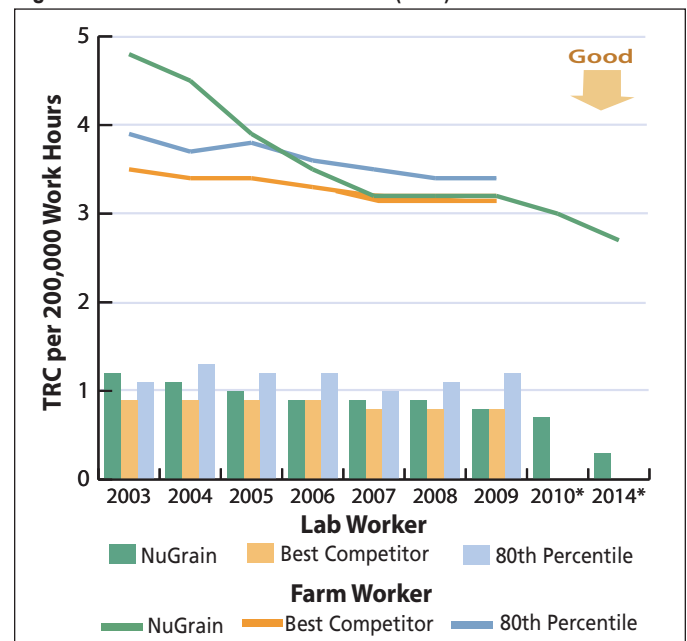


Figure 7.4-13 Days Away Restricted Time (DART)

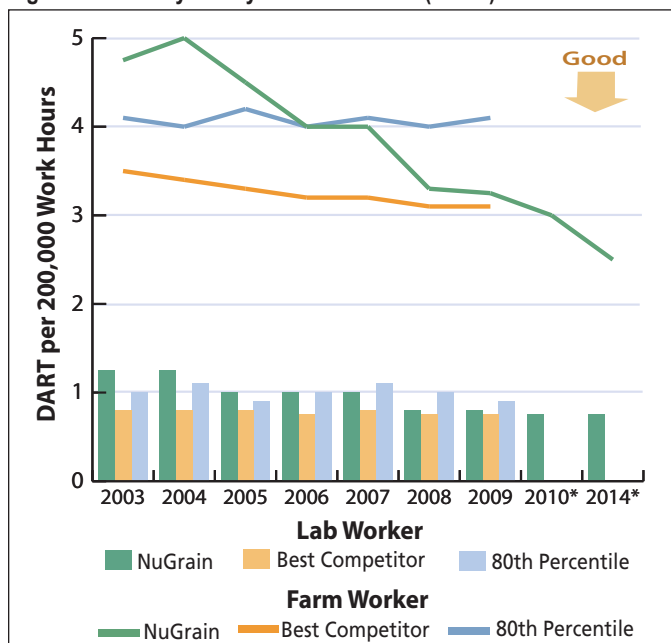


Figure 7.4-14 Workforce Health, Safety, and Security: Reported Incidents

Issues and Affected Workforce Segments	2005	2006	2007	2008	2009	2010*
Chemical and electrical hazards Scientists, laboratory support staff, farm operations staff, maintenance staff	5.5	3	2.8	1.5	1.2	1
Ergonomic issues All workforce members	6.4	7	5.3	4	5.1	4.2
Strains, sprains, trips, and falls All workforce members	4	6.1	3.5	4.2	3.6	3
Incidents from operation of machinery Farm operations staff, maintenance staff	7.2	5.5	7	5.2	6.8	5.1
Incidents related to lab equipment use Scientists, laboratory support staff	4.3	3.6	2.4	1.3	1.1	.9
Security incidents All segments	4.5	5	3.7	1.2	.75	.5

Figure 7.5-3 shows the rate of stage-gate approvals on the first attempt. Increases in this rate reflect reduction in rework due to improved effectiveness for planning and execution. The value will never be 100% since research is performed in a dynamic environment subject to changes beyond NuGrain’s control. Segmentation by program and project stages is available on-site. Because organization stage gates are unique, no useful comparisons are available for these or other stage gate results.

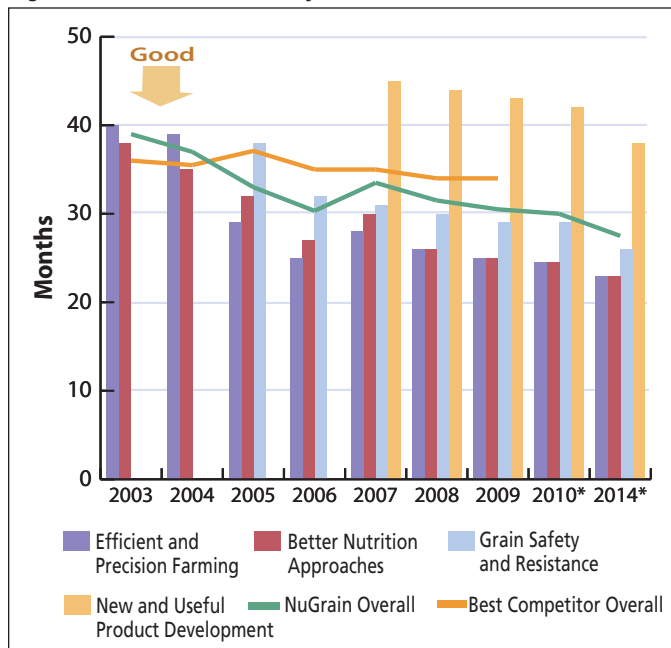
Results in Figure 7.5-4 reflect NuGrain’s increasing success in process management and in the productivity of its PMP. The Process Management Efficiency Ratio is process cost savings divided by total labor and training costs for Six Sigma activities (e.g., for process owners, Black Belts, Yellow Belts, and

process teams). The capacity and capabilities needed to sustain the productivity are being increased and sustained through the growing percentage of processes with certified Six Sigma Black Belts and Yellow Belts (Figure 7.5-5).

Results for NuGrain’s emergency exercises (Figure 7.5-6) reflect continuous improvement in its emergency preparedness approaches, resulting in its individual locations—and the organization overall—performing above the best competitor.

7.5a(2) This section contains results for key process measures. Due to space limitations, it is not possible to include all process measures referenced in Figure 6.1-4; however, all measures (overall and segmented) are available on site.

Figure 7.5-1 Research Total Cycle Time



NuGrain has substantially improved the average number of days to implement collaborative agreements (Figure 7.5-7), and projections indicate it will sustain its leadership position on this measure. Results for Research Project Stage-Gate Cycle Time (Figure 7.5-8) demonstrate NuGrain’s increasing efficiency in research project management. Despite the 2007 increase in cycle time due to the growing complexity of its research projects, NuGrain has decreased the average cycle time for all stages, and the total cycle time has been lower than that of its best competitor since 2005 (see Figure 7.5-1). Likewise, NuGrain has achieved significant reductions in program management cycle time (Figure 7.5-9).

Figure 7.5-10 shows project outcome costs compared to the initial baseline cost, a key measure of effectiveness for

Figure 7.5-3 Stage-Gate Approval Rate

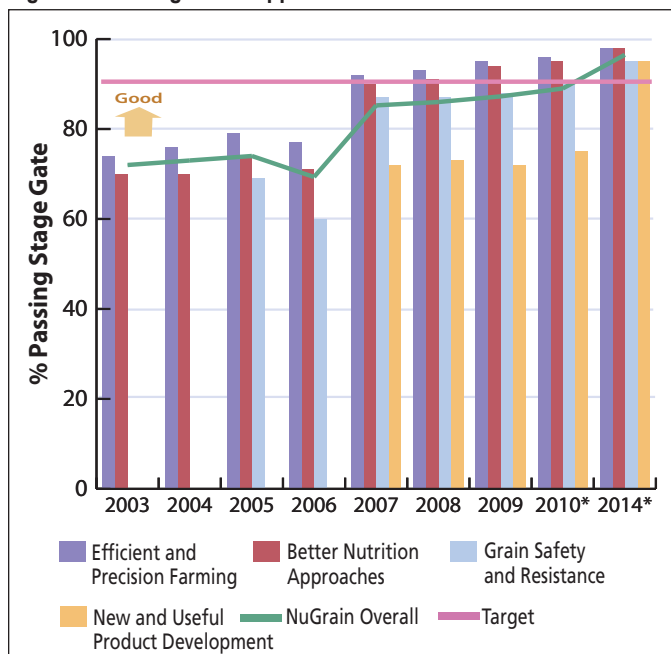
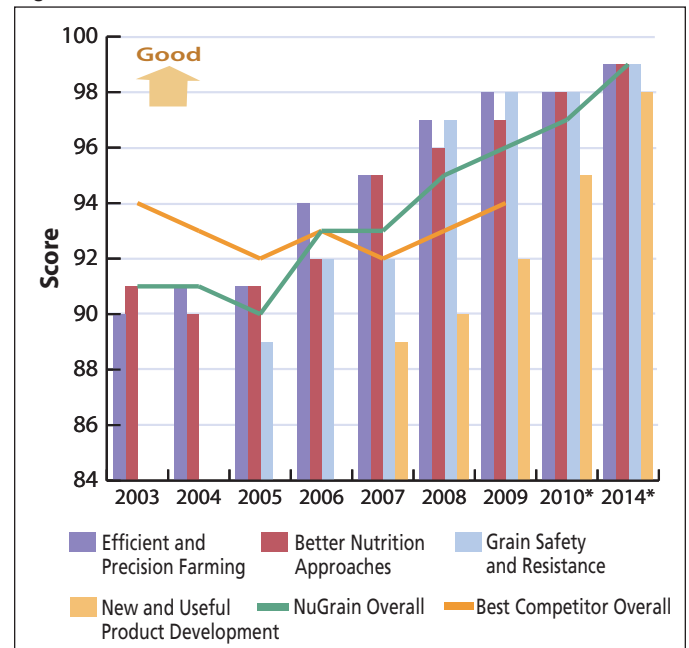


Figure 7.5-2 External Peer Review Scores



NuGrain’s Project Planning Subprocess. Results for in-process measures, such as monthly project and program Schedule Performance Index (SPI) and Cost Performance Index (CPI) scores are available on-site and segmented by program, strategic thrust area, and site. From 2004 to 2009, the percentage of projects outside the nominal CPI range at quarterly reviews decreased from 12% to 1%, and the percentage of projects outside the nominal SPI range at quarterly reviews decreased from 14% to less than 2%. Both results represent best-in-class levels for NRLs. Program SPI and CPI performance, aggregates of project performance, also demonstrate improvement over this period.

Figure 7.5-11 shows continually improving performance on key Prime Contract Management Process measures. Since 2001, NuGrain has significantly outperformed the GOCO average for on-time delivery of PEP milestones and for timely implementation of contract modifications. NuGrain has action

Figure 7.5-4 Process Management Efficiency Ratio

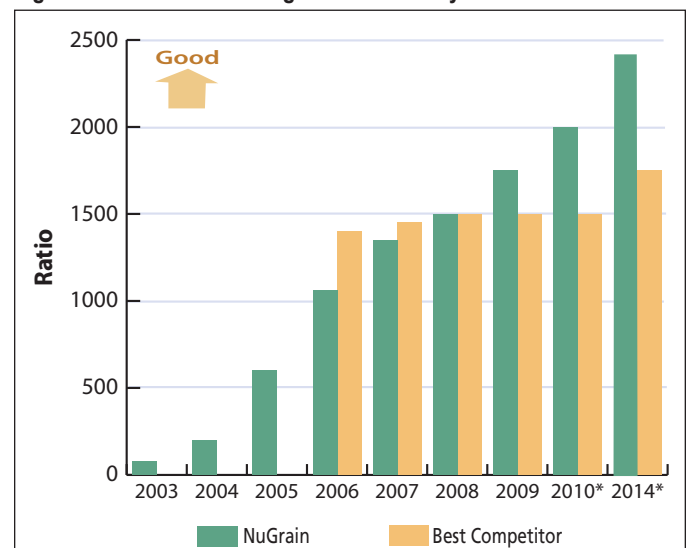


Figure 7.5-5 Key Processes with Certified Black/Yellow Belts

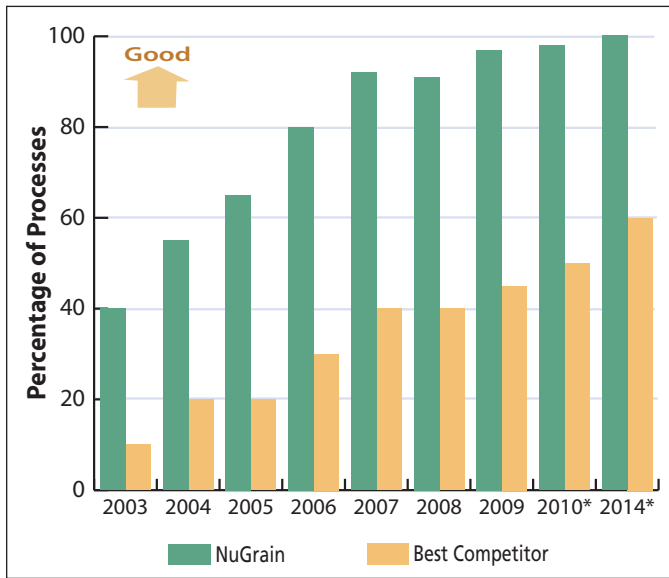


Figure 7.5-6 NuGrain Emergency Readiness Rating

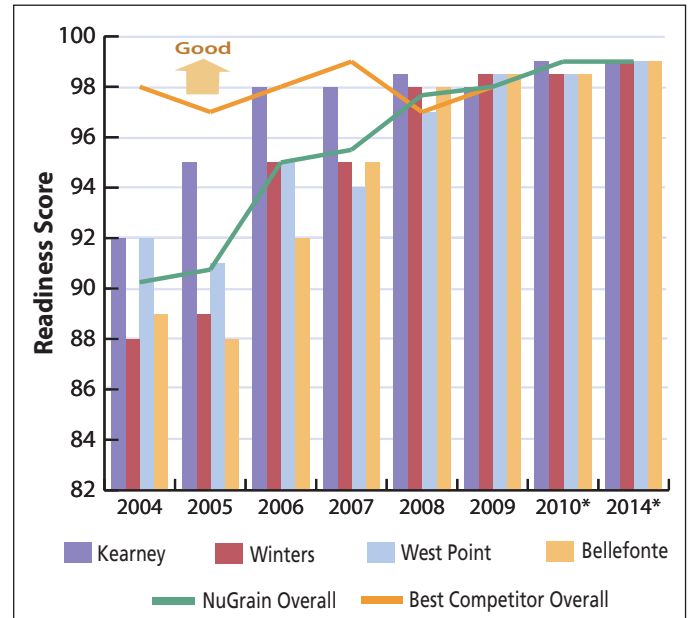


Figure 7.5-7 Collaborative Agreement Cycle Time

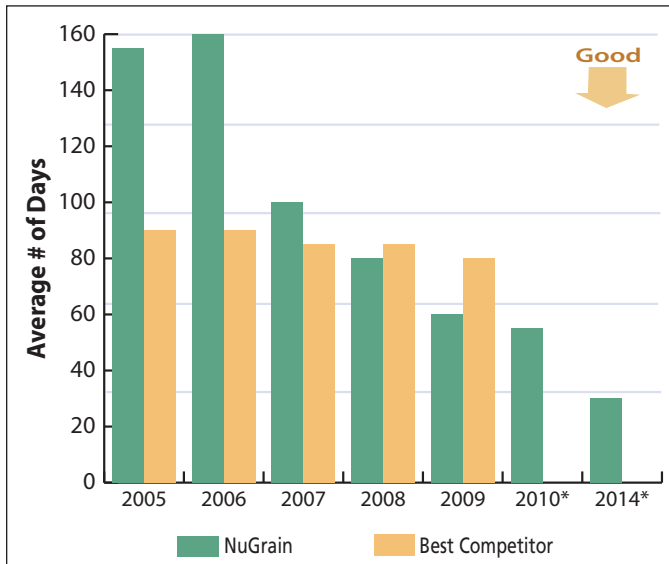


Figure 7.5-8 Research Project Stage-Gate Cycle Time

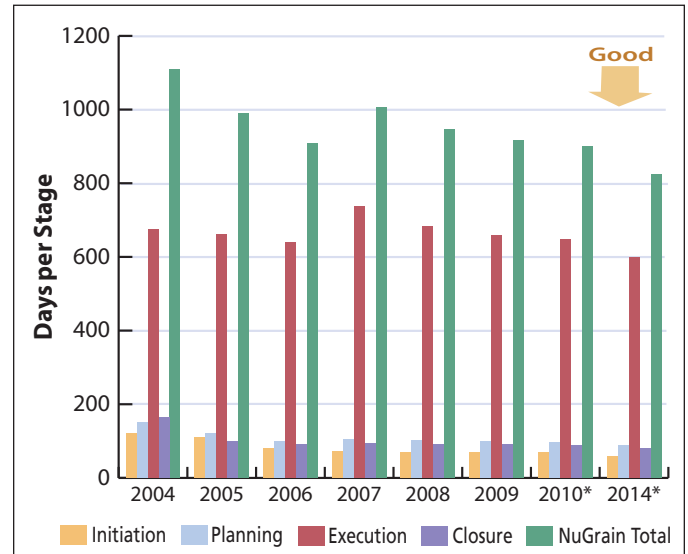
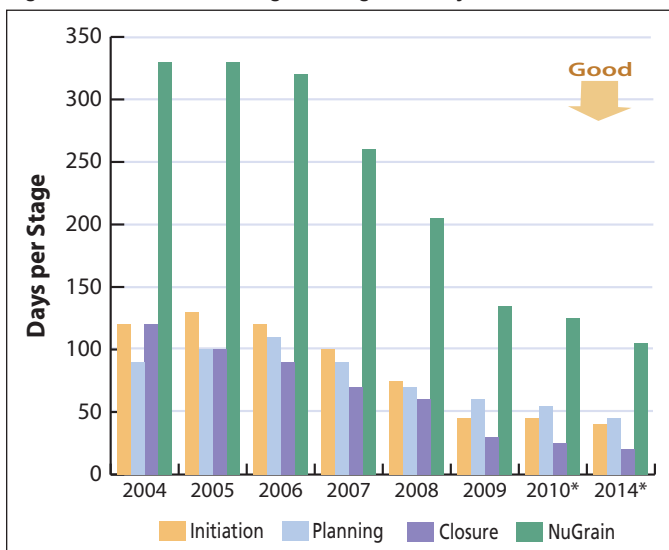


Figure 7.5-9 Research Program Stage-Gate Cycle Time

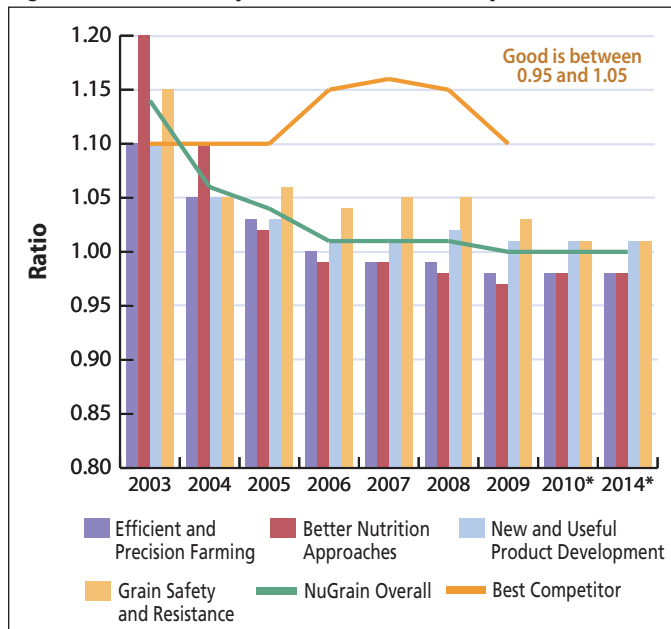


plans in place (Figure 2.2-1), in collaboration with the USDA, to achieve role-model levels by 2014. In addition, overall Prime Contract Management Process costs decreased by 20% between 2007 and 2009 as the result of a Yellow-Belt-led improvement project.

Figure 7.5-12 shows the increasing efficiency and effectiveness of NuGrain’s WFO Research Proposal Development Process. Additionally, overall WFO proposal acceptance rates have increased by 15% from 2005 to 2009 and are now above average for NRLs. Likewise, Figure 7.5-13 shows the improving efficiency and effectiveness of NuGrain’s Commercialization Process. A Black-Belt-led PIP currently is under way to reengineer the process so that it can be executed within 12 months while also increasing efficiency.

Figure 7.5-14 shows results for two key measures of the effectiveness of NuGrain’s Information Management Process: increasing information system availability and decreasing

Figure 7.5-10 Total Project Cost vs. Baseline Project Cost



system vulnerabilities. Additionally, internal customer satisfaction for information management services has been sustained above 4.5 (very satisfied) on a 5-point scale for the past four years. Results segmented by service and customer type are available on site.

Figure 7.5-15 shows beneficial trends for the Procurement and Subcontracting Process cycle time and efficiency measures. NuGrain is the leader in materials and subcontract procurement cycle time. Results segmented by procurement and subcontract type are available on site.

The Idea Wells' success as a source of process and system improvement ideas and innovative approaches is demonstrated by NuGrain's high levels of staff input (Figure 7.5-16).

7.6 Leadership Outcomes

7.6a(1) Using a variety of organizational performance reviews and information from the PLANTS and RDIS, NuGrain regularly tracks progress on its strategic objectives and action

Figure 7.5-12 WFO Proposal Development Performance

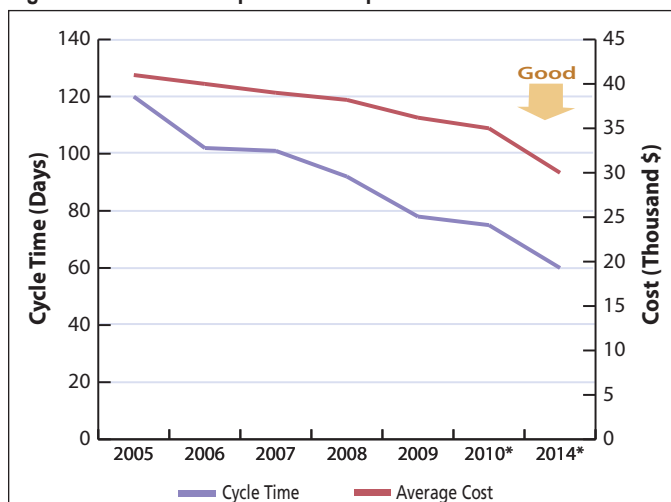
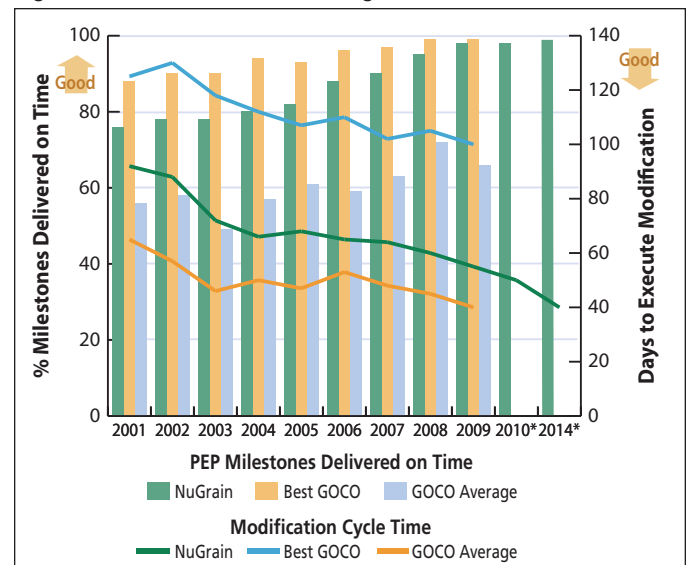


Figure 7.5-11 Prime Contract Management Performance



plans to facilitate any needed adjustments. Figure 7.6-1 demonstrates NuGrain's current progress on its strategies and action plans. Additional information is reported in Figure 2.2-1 and elsewhere in Category 7. Performance projections in figures are marked with an asterisk.

7.6a(2) NuGrain exceeds the USDA contract requirements for all fiscal accountability measures. Its performance on these measures is shown in Figure 7.6-2. The 2008 increase in internal audits and findings was related to a corresponding increase in research projects that year.

7.6a(3) NuGrain is proud of its Internal Audit Office Inspection Process. Its ability to identify potential regulatory issues facilitates the organization's regulatory and legal compliance (Figure 7.6-3). Since FY2003, NuGrain has averaged 0.3 EEOC complaints per 1,000 employees (compared to the EEOC national average of 0.4 per 1,000 employees), and 100% of complaints were resolved, with no findings of discrimination. Allegations of plagiarism and falsification of data are the cause of the majority of the legal actions; however, to date, NuGrain

Figure 7.5-13 Commercialization Process Performance

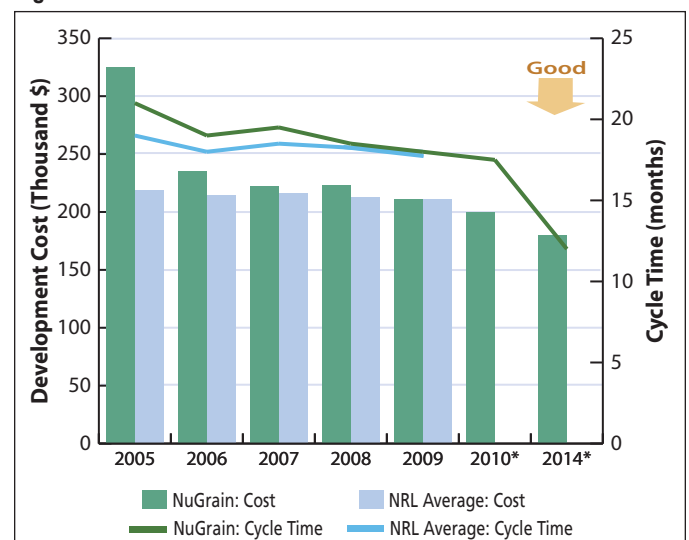


Figure 7.5-14 Information Management Performance

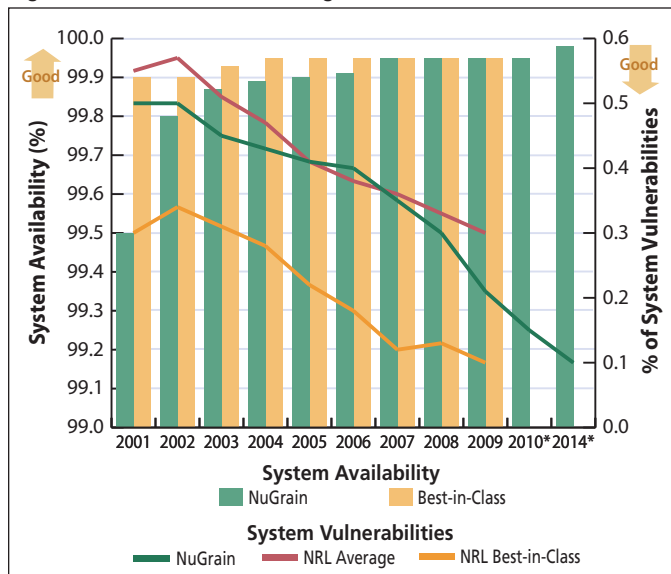


Figure 7.5-15 Procurement and Subcontracting Performance

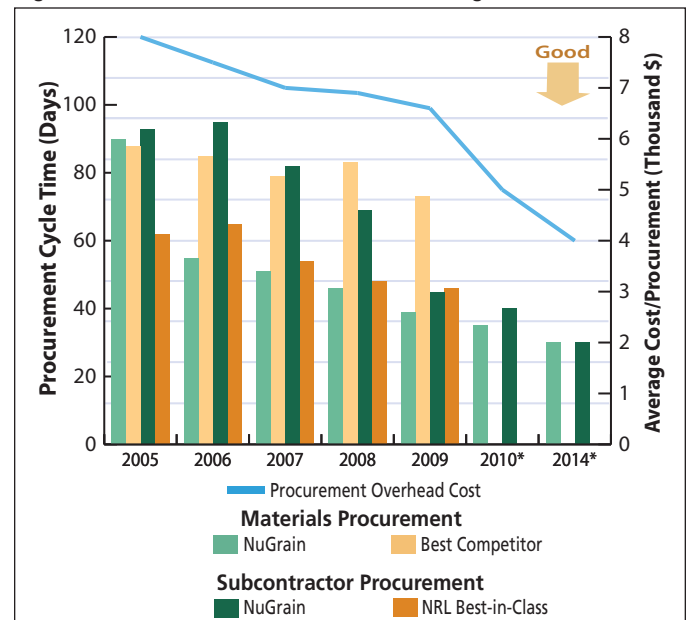


Figure 7.5-16 Idea Well Suggestions

Year	Idea Well Submissions	Idea Well Implementations
2005	586	92
2006	653	206
2007	749	364
2008	985	453
2009	1,129	564
2010*	1,200	620

has not lost a lawsuit. The three cases from 2008 and 2009 are not yet resolved. In addition, the success of NuGrain’s proactive Environmental Protection Process is reflected in the favorable results for EPA/state environmental audit findings. Results related to OSHA workforce safety measures are shown in

Figures 7.4-13 and 7.4-14, and results related to OSHA emergency readiness standards are shown in Figure 7.5-6.

7.6a(4) NuGrain’s reinforcement of its value to operate with high ethics and integrity through SL modeling, ethics training, and the sharing of results has helped it achieve excellent results, as shown in Figure 7.6-4 (Figure 1.2-2 shows NuGrain’s ethics processes, measures, and goals). Likewise, results from several surveys demonstrate stakeholders’ high levels of trust in SLs and the governance of the organization. On this critical issue, NuGrain includes its workforce and its customers in its stakeholder groups. Students are both an important stakeholder group and a workforce segment. Results from the EWA (ranked on a five-point scale with five the most favorable) for an item on this topic added in 2006 show

Figure 7.6-1 2009 Accomplishment of Strategy and Action Plans

Strategic Objectives	Related Strategies	% Near-Term Action Plans Completed	% Long-Term Action Plans Completed	Reference
Become indispensable to USDA and other funding agencies in their strategic research efforts	Develop and implement Agricultural Strategic Research Plan	98%	90%	Figures 7.1-1, 7.3-1, and 7.2-1
	Produce innovations for which no one else has the capability	89%	85%	Figures 7.2-1, 7.1-3, 7.5-1, 7.1-5, 7.1-6, 7.1-7
	Identify opportunities for related research	94%	87%	Figures 7.3-5, 7.2-1, 7.2-2, 7.2-4
Develop a reputation for outstanding, innovative research	Increase publications in peer-reviewed journals	88%	85%	Figure 7.1-4
	Communicate accomplishments to customers/policymakers	100%	92%	Figure 7.5-2
Operate using a strong business model (efficient, focused, quality directed)	Meet contract requirements better than anyone	92%	87%	Figures 7.1-1, 7.2-1, 7.2-2, 7.2-11
	Obtain third-party certifications for major compliance areas	94%	91%	Figures 7.4-12 and 7.4-13, 7.6a(5)
Build capability and capacity of workforce	Focus on 10-year Capability and Capacity Plan	100%	93%	Figures 7.2-9, 7.2-10, 7.3-8, 7.4-1, 7.4-4, 7.4-5, and 7.4-6
Implement industry-friendly research collaboration methods and technology-transfer mechanisms	Focus on results	89%	85%	Figures 7.2-5, 7.2-7, 7.5-1, 7.1-3

Figure 7.6-2 Fiscal Accountability Performance

Measure	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010*
# Credit card abuse/fraud occurrences	2	2	1	0	0	0
# Internal audits completed	43	64	58	71	49	52
# Internal audit findings	34	47	18	42	16	15
# Internal audit material weaknesses	1	1	1	0	0	0
# External audits completed	1	3	1	1	5	2
# USDA and OMB external fiscal and project audit findings	0	1	0	0	0	0
# USDA and OMB external audit material weaknesses	0	0	0	0	0	0
% Conflict of Interest forms signed	100%	100%	100%	100%	100%	100%
% Sarbanes Oxley/IRS 990 compliance	100%	100%	100%	100%	100%	100%

Figure 7.6-3 Regulatory/Legal Findings

Measure	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010*
# EEOC validated complaints	0	0	0	0	0	0
EPA/state environmental audit findings	1	0	1	0	0	0
USDA inspections	3	4	6	6	3	3
USDA findings	0	0	0	0	0	0
USDA assistance requests	154	198	161	210	178	181
USDA assistance recommendations/percentage implemented	122/100%	153/100%	133/100%	161/100%	152/100%	154/100%
Legal actions	3	2	1	2	1	1
Adverse legal findings	0	0	0	—	—	0

Figure 7.6-4 Ethical Behavior

Measure	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010*
% attendance at new hire orientation ethics training	100%	100%	100%	100%	100%	100%
% attendance at annual ethics training	95%	98%	100%	100%	100%	100%
% signing general Code of Conduct	100%	100%	100%	100%	100%	100%
% signing research Code of Conduct	100%	100%	100%	100%	100%	100%
% compliance with America COMPETES Act regulations (plagiarism or falsification of data)	—	—	—	100%	100%	100%
Ethics hotline calls	20	31	18	29	22	20
Ethics investigations	1	3	0	2	2	1
Ethical violations	0	0	0	0	0	0

favorable responses from students and other workforce segments (Figure 7.6-5). In 2007, NuGrain switched its measurement of customers' trust in SLs and governance (Figure 7.6-6) to the "top box" ("strongly agree") responses to the related item on the R-37, allowing comparison with two comparable research organizations for the DOE. Likewise, NuGrain tracks the "top box" responses to a similar item on surveys of its other stakeholders: NFU and collaborating universities (Figure 7.6-7).

7.6a(5) In its commitment to sustaining and improving the environment, NuGrain goes well beyond Resource Conservation and Recovery Act (RCRA) and other guidelines. Figure 7.6-8 shows the amount of recycling NuGrain is accomplishing. General recycling is decreasing due to the success of going paperless in 2007. Green waste is decreasing due to composting and research to utilize the nonedible parts of the wheat and corn plants.

Figure 7.6-5 Workforce Members' Trust in Senior Leaders/Governance

Workforce Segments	2006	2007	2008	2009	2010*	2014*
Scientists	4.5	4.3	4.7	4.8	4.8	4.9
Laboratory support staff	4.2	4.4	4.5	4.5	4.6	4.7
Farm operations staff	4.4	4.4	4.3	4.6	4.7	4.8
Administrative support/maintenance staff	4.6	4.7	4.6	4.7	4.8	4.8
Program leads	4.6	4.8	4.7	4.8	4.8	4.9
Program administrators	4.6	4.5	4.7	4.7	4.8	4.8
Students	4.5	4.7	4.8	4.8	4.8	4.8
Overall average	4.49	4.54	4.61	4.70	4.75	4.81
<i>Top peer</i>	4.58	4.60	4.57	4.56		
<i>National top 10%</i>	4.53	4.52	4.51	4.52		

Figure 7.6-6 Customers' Trust in Senior Leaders/Governance

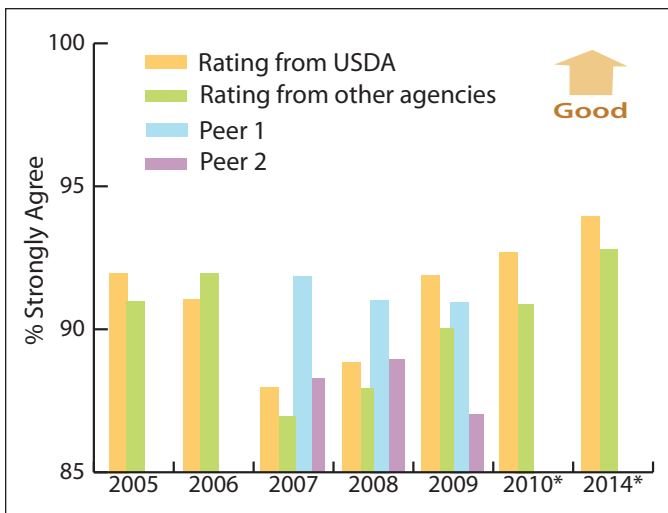


Figure 7.6-7 Other Stakeholders' Trust in SLs/Governance

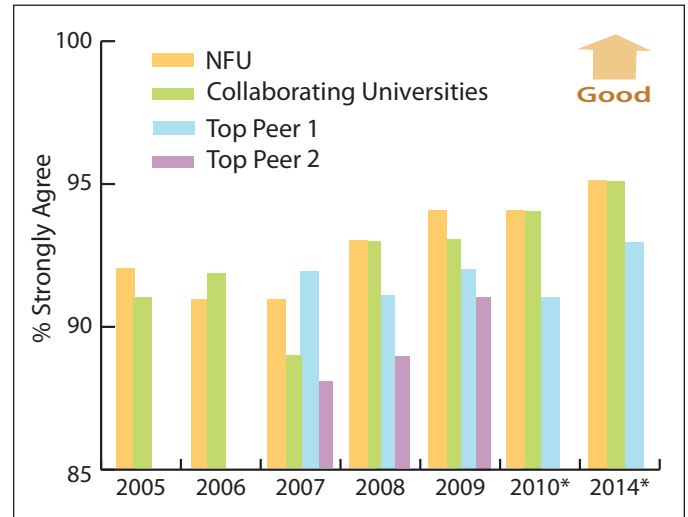


Figure 7.6-8 "Greening" the Environment

	2005	2006	2007	2008	2009	2011*
General recycling (paper, bottles, cans) in tons						
Kearney	8.3	8.4	8.8	8.6	8.5	8.4
Winters	8.4	8.5	9.1	8.9	8.8	8.7
West Point	8.5	8.7	9.2	9.1	9.0	8.9
Bellefonte	8.7	9.0	9.3	9.1	9.1	8.9
NuGrain Average	8.5	8.6	9.1	8.9	8.8	8.7
<i>Top Peer</i>	8.9	8.8	8.7	8.8	8.6	
Electronics Recycling in tons (▲= good)						
NuGrain	.23	.26	.26	.27	.28	.30
<i>Top Peer</i>	.27	.28	.28	.29	.30	
Green waste in tons (▼= good)						
NuGrain	80	78	78	75	72	70
<i>Top Peer</i>	78	77	76	74	75	
Safe disposal of hazardous materials						
NuGrain	95%	98%	97%	100%	100%	100%
<i>Top Peer</i>	96%	97%	95%	98%	100%	
Gasoline usage in tons (▼= good)						
NuGrain	11.5	10.9	10.3	9.7	9.1	8.9
<i>Top Peer</i>	9.9	9.7	9.8	9.5	9.1	

Figure 7.6-9 Community Service

Measure	FY2005	FY2006	FY2007	FY2008	FY2009	FY2011*
# General volunteer hours	19,231	23,411	23,533	23,531	23,652	23,800
# Educational support hours	21,859	27,102	27,707	27,822	28,003	28,300
# Total volunteer hours NuGrain <i>Peer</i>	41,090	50,513	51,240 48,530	51,353 46,542	51,655 49,667	52,100
% Workforce maximizing community service benefit	15%	18%	19%	19%	21%	23%
# Members of 500-Hour Club	9	13	13	15	17	20

Other environmentally friendly results include the following:

- (1) Composting saved more than \$40,000 in soil conditioner expense in 2009.
- (2) Working with NFU and the custodial services contractor, NuGrain has been able to convert all of the cleaning supplies used to nontoxic products and totally transition to 100% environmentally safe toilet paper and paper towels.
- (3) Gray water is collected and filtered for all landscape usage.
- (4) Solar panels have been installed in three of the four sites, providing 85% of the electrical needs at these sites. Plans are in progress to expand this solar capability to cover 118% of the electrical requirements. The fourth site will be completed in June 2010. By 2013, NuGrain anticipates revenue from sales of excess electricity generation to exceed \$60,000 per year.
- (5) ISO 14001 certification has been maintained since 2006.

NuGrain continues to study the best type of alternative fuel for its business. The organization is converting all vehicles from gasoline to alternative fuels, including electronic, propane, and hydrogen fuels; so far, the number of vehicles using gasoline has decreased from 421 in 2005 to 383 in 2009. Due to the life span of some of the farm equipment, NuGrain anticipates another ten years before all of its farm vehicles are transi-

tioned. When NuGrain can replace vehicles early, the "old" vehicles are rented to local farmers at a minimal cost. A plan and timeline to certify all existing buildings as consistent with LEED certification has been proposed to the USDA with approval anticipated in FY2011.

NuGrain aggregates volunteer hours (Figure 7.6-9) by its support of (1) general programs and (2) education programs. Workforce members who volunteer 500 or more hours in one year receive an award and join the 500-Hour Club. The comparison is a GOCO with a similar-size workforce.

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