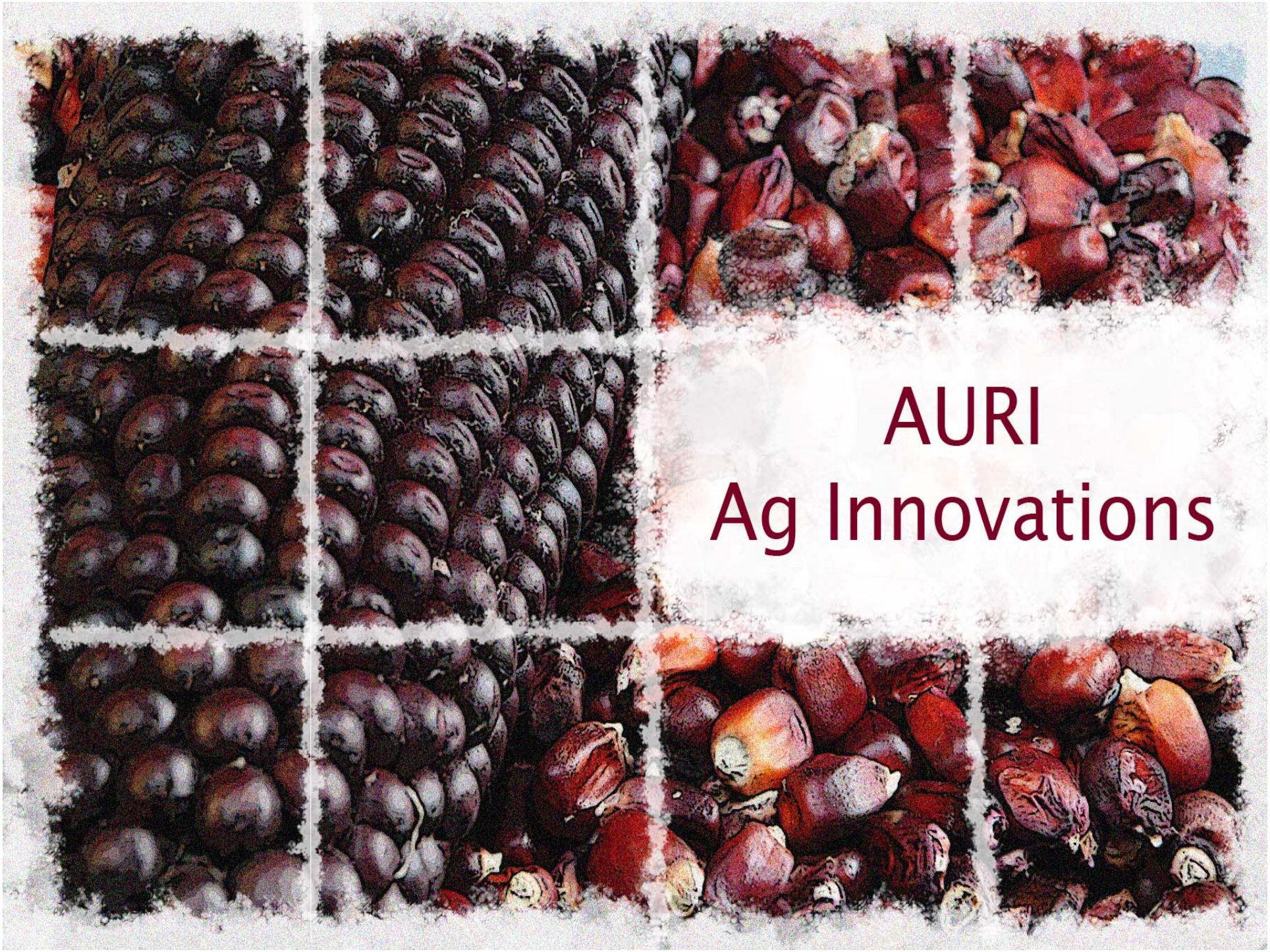
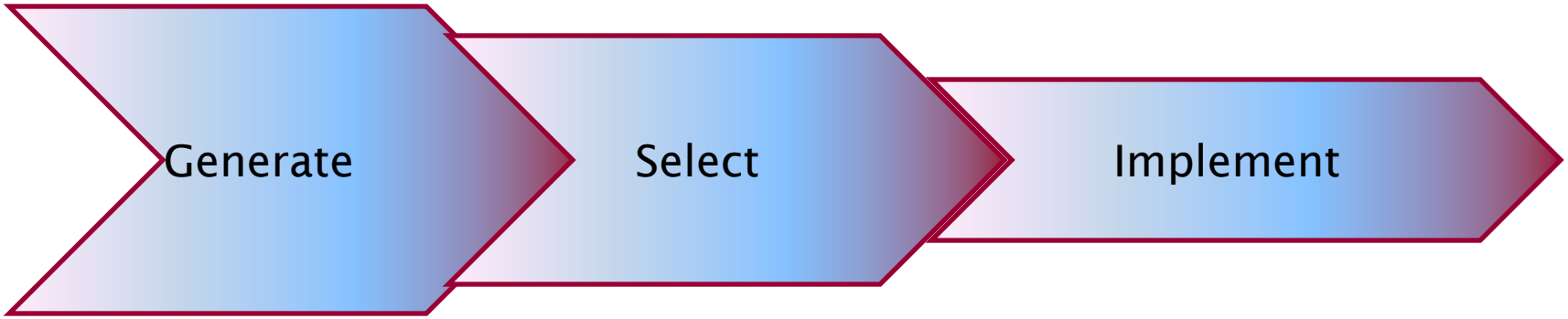

AURI
Ag Innovations

Outline

- Innovation Overview
- AURI's Innovation Strategy
  - Research
  - Scientific Technical Assistance
  - Collaboration
- Examples
- Results

in·no·va·tion

Ideas + Implementation = Innovation



Innovation can be incremental or radical.

Today, firms compete less on the basis of price and more on the basis of their ability to design novel products or improve the quality management of their production…as well as the ability to anticipate demand and adapt to changes in demand or production. (World Bank, 2006)

R&D Investment

OECD countries spend $700 billion/yr on R&D.

More than 16,000 firms in the US currently operate their own industrial research labs, and there are at least 20 firms that have annual R&D budgets in excess of $1 billion.*

*Bessant & Tidd. Innovation and Entrepreneurship. 2007

R&D Investment

"In our industry, it takes an average investment of 13 years and $136 million to bring a new idea/product to the market."
(Tracy Linbo, Director of Biotech Affairs, Pioneer)

"John Deere's ability to keep inventing new products that are useful to customers is still the key to the company's growth."
(Robert Lane, Former CEO, John Deere)

Ideas

"An innovative business is one which lives and breathes 'outside the box.' It is not just good ideas, it is a combination of good ideas, motivated staff and an instinctive understanding of what your customer wants."

–Richard Branson, 1998

At AURI, we believe it takes good ideas, motivated entrepreneurs, and a support network of institutional assets to implement an innovation.

Luckily, in Minnesota, we are rich in both motivated entrepreneurs and a high quality service provider network.

MN Assets

According to a report released by the MN Science and Technology Authority:

- Minnesota ranked high on indicators related to a highly skilled and technical workforce.
- Minnesota also ranked relatively high in the ability of industry to generate new ideas through patents and R&D.

We have more Fortune 500 companies per capita than any other state. (DEED's Positively Minnesota Website)

And, of course, all of you in this room today.

Ideas

"I'll be happy to give you innovative thinking. What are the guidelines?"

Where do good ideas come from?

…market-pull, policy-push, creativity, tech transfer…

Even so…innovation is not just about good ideas or even good solutions.

Many (baby) steps

COMMERCIALIZATION ACTIVITIES ROADMAP

	STAGE I Investigation	STAGE II Feasibility	STAGE III Development	STAGE IV Introduction	STAGE V Growth	STAGE VI Maturity
RISK PROFILE	The innovator has a new product or technology advancement with seemingly positive market potential. However, the innovator has the combination of limited financial resources and business expertise to commercialize the product.	At this stage the company's management team is incomplete with no product revenues. The final design of the product is complete and an initial business plan is developed.	At this stage, the company continues to develop the product prototype with the goal of completion. Significant expenses are incurred at this stage with no product related revenues. This stage is usually at the deepest point in the "valley of the death".	At this stage, the company has limited product revenue and the product is being introduced into the market.	At this stage the company is in full production with the main product and expanding distribution. The management is in transition to a formal organizational structure.	The company is now well established in the market place and must continually innovate to stay competitive.
PRODUCT	**PRODUCT ASSESSMENT** • Define concept • Confirm critical assumptions • Survey state of the art • Identify critical barriers • Evaluate applicability • Determine technology	**PRODUCT FEASIBILITY** • Develop working model • Test technical features • Assess preliminary producibility • Conduct mfg. assessment • Assess safety & environmental features • Finalize designs	**PRODUCT PROTOTYPE** • Develop prototype • Identify materials and processes • Conduct tests • Implement development methods	**PRE-PRODUCTION PROTOTYPE** • Develop production prototype • Determine production process • Select equipment • Design field support system • Demo product features	**PRODUCTION** • Prepare commercial design • Establish quality control • Construct facilities • Conduct full production • Finalize internal distribution system	**PRODUCTION SUPPORT** • Maximize production • Establish after market support, repairs and spares • Warrantee service • Implement training program
MARKET	**MARKET NEEDS ASSESSMENT** Conduct market overview & identify: • Pricing structure • Market barriers • Risks • Distribution channels • Trends and competitors	**MARKET STUDY** Identify and quantify: • Market size • Customers • Volume • Prices • Distribution • Competitors	**MARKET PLAN** • Identify marketing team • Define target market • Select market channels • Field test	**MARKET VALIDATION** • Establish market relationships • Conduct limited sales • Analyze sales • Survey customers • Refine marketing plan	**SALES AND DISTRIBUTION** • Expand distribution • Analyze competitor response • Assess customer satisfaction • Assess distributor satisfaction • Refine product features	**MARKET DIVERSIFICATION** • Develop market retention • Establish market scan • Identify new markets • Identify new products
BUSINESS	**BUSINESS ASSESSMENT** • Estimate profit potential • Conduct self, enterprise and commercialization assessments • Identify professional needs • Identify capital needs	**ECONOMIC FEASIBILITY** • Formulate financial assumptions • Develop pro forma • Identify seed capital • Form advisory team	**STRATEGIC BUSINESS PLAN** • Decide venture or license • Finalize intellectual property • Identify management team • Select organization structure • Write business plan	**BUSINESS START-UP** • Establish business function • Hire staff • Execute contracts • Secure first-stage financing	**BUSINESS GROWTH** • Monitor enterprise position • Hire and train personnel • Execute contracts • Arrange financing • Institute vision, mission and management policies	**BUSINESS MATURITY** • Establish SWOT process • Invest profits • Monitor product life cycle • Monitor business trends • Monitor mgmt. technologies • Implement innovations

Source: Goldsmith, H. Randall (1996). The Commercialization Process. http://www.venturecapitaltools.com.

Where does AURI fit?

COMMERCIALIZATION ACTIVITIES ROADMAP

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Risk

COMMERCIALIZATION ACTIVITIES ROADMAP

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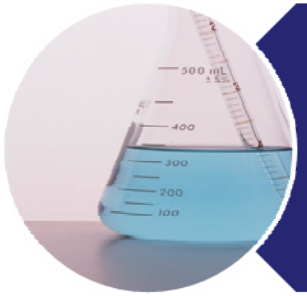
	Limited Financial Resources & Business Expertise	**Incomplete Management Team & Zero Revenues**	**Significant Expenses & No Revenue**	**Limited Revenue & Question of Product Success**	**Formalized Business Structure & Commitment of Capital**	**Need New Ideas!!!**

AURI's role is to reduce risk for its clients and industry, while making ideas more bankable.

Risk

- "You can't make an omelette without breaking a few eggs and you can't innovate without taking risks."
- But, you need a way to mitigate this risk.
- Innovation requires a strategy.

AURI's Innovation Strategy



Research

Scientific Technical Assistance

Collaboration

Research

On an ongoing basis, AURI identifies research initiatives that achieve one or more of the following objectives:

- Develop new products and processes that create new uses for Minnesota ag commodities.
- Applied research and technology transfer
- Emerging trends and opportunities
- Public domain feasibility studies and economic analyses

AURI is currently conducting 70+ research initiatives.

Research

AURI initiatives are a result of an annual scanning the environment, in which AURI staff poll stakeholders.

Moreover, staff analyze the environment to identify the most important emerging trends.

Often, AURI initiatives become the basis of client-specific research projects, as well as our collaborative events.

Research

2010 Research Initiatives

- Biomass lignin content effect on densification
- Natural and organic meat product requirements
- Agricultural industry and urban outreach
- Oligosaccharide assessment validation
- Assessment of carbon sequestration
- BQ-9000 certification of biodiesel laboratory testing
- Sustainable switchgrass and cordgrass
- Lactose analytical quality testing methods
- Membrane biofilms
- Local foods distribution systems
- Organic and natural feed markets
- Investigating drying technologies for post-digester solids
- Summary of the state of biofuel production technology in Minnesota
- Butanol diesel blends
- Farm-scale energy generation with hydrous ethanol
- Crop residue valuation template
- Biomass air emission profile
- Biomass crop establishment

Research

2011 Research Initiatives

- Benefits of Biochar in Livestock Production
- Barley Straw Control
- Feasibility of Meat & Dairy Goats & Other Small Ruminants in Minnesota
- Poultry feeding trials and affect on meat quality
- Salt Reduction in Processed Meats
- Ethnic Meat Market Development
- Application of Green Chemistry technology to MN bio-based products
- Biomass Crop Establishment
- Sustainable Switchgrass and Cordgrass
- Separation of Potassium Sulfate from Sludge
- Importance of Value Added Agriculture
- Industry Value Chains
- Membrane Biofilms - Phase II
- Low Sodium Cheeses
- Spontaneous Oxidation of Milk
- Scaling up Regional Food Systems
- Gasification as a value-added technology for wet biomass feedstocks.
- Identifying Granulation Processes
- Scale Analysis of Biofilters for Drainage Water
- Gasification for Heat

Research

Proposed 2012 Research Initiatives

- SME Food Safety Industry Specific Forums
- PESTEL Analysis for MN's Renewable Energy Industry
- Market Demand for Biomass Pellets in North Central MN
- Specialty Meat Processing Map
- Food Safety Interventions
- Making better use of seconds
- Biodiesel Troubleshooting and BQ-9000 Laboratory Certification
- Identification of Value-added Opportunities/Alternative Uses for Wheat and Barley
- Biochar in Swine Nursery Diet
- Solids Separation in a Liquid Flow
- Midwest Biomass Resource Inventory
- Biobased Pest Deterrents
- Biomass Heating Feasibility Guide
- Fungal Processing of Thin Stillage
- Food Business resources
- Development Biobased Materials Profile
- Alternatives to BioDiesel Production
- Biogas Research
- Farm-scale Gasification of Poultry Litter
- Wet Catalytic Gasification

Scientific Technical Assistance

AURI Capabilities and Expertise

In addition to project management expertise, innovation management experience, and in-depth industry knowledge offered by AURI's professional staff, our organization provides businesses access and assistance through the following specialized laboratories and pilot plants:

Food
Shelf-Life, Sensory Evaluation, Nutritional Assessment, Regulatory Assistance, Packaging
Assistance, Recipe Formulation and Scale-Up

Analytics
Microbial, Gas Analysis and Chemical Analyses

Fats and Oils
Fat / Oil Analysis; Biomass Analysis; Food, Feed, Meat Analysis

Meats
Smoking, Packing, Processing, And More

Co-Product Utilization
Fertilizers, Sorbents, Renewable Fuels, Energy,
Animal Feeds, Soil Amendments, Biodegradables

Pilot Lab
Grinding, Milling, Size Reduction, Blending, Pelleting, Drying

Scientific Technical Assistance

- AURI works with 4 industry sectors.
- We believe these sectors drive MN's innovation economy.

Scientific Technical Assistance

Food – Projects in the labs:

- Snack products – 50% target healthy lifestyle market
- Nutritional analyses/Nutrition Facts Panels
- Regulatory Compliance – FDA, school lunch revisions, HACCP
- Sodium reduction
- Gluten-free products
- Local foods

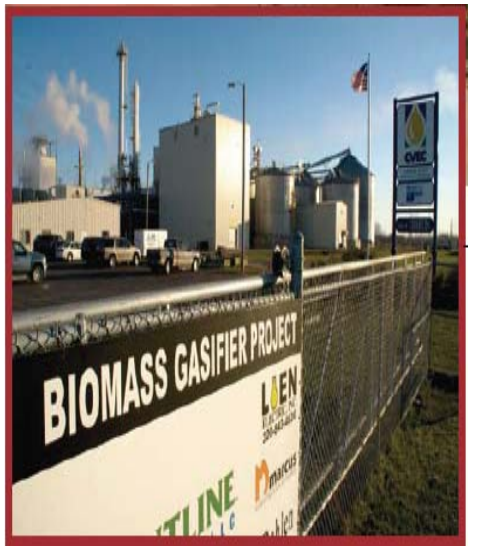
What's the next bi g?

- Clean Label Trends
- Designer Enzymes
- Fortified Foods
- Designer Infant Formula
- Milk Alternatives

Scientific Technical Assistance

Renewable Energy – Projects in the labs:

- Biomass to Heat = propane and fuel oil replacement
- Improving bottom line of ethanol facilities
- Anaerobic digestion
- Biodiesel technical assistance
- Alternative crops for biofuels



What's the next big thing?

- Butanol/Iso-Butanol
- Bio-oil from pyrolysis/microwave
- Bio-Refineries
- Engineered enzymes
- Biomass to Energy – faces increasing competition from Municipal Solid Waste

Scientific Technical Assistance

Co-Products – Projects in the labs:

- Densification
- Assisting with permitting processes
- Product improvement and reformulations
- Expanded uses
- Feed trials

What's the next big thing?

- New technologies
- New protein and energy sources for animal feeds
- Engineered enzymes
- Synergies among processing facilities

Scientific Technical Assistance

Biobased Products – The next big thing!

- AURI/MN Soybean Growers study on the Biobased Materials Market
- Bioplastics, coatings, lubricants
- Construction materials
- Specialty Chemicals –bio-butanol, acryllic
- More durable bioplastics – new formulations, fiber blends

Collaboration

The final component of AURI's innovation strategy is Collaboration.

Why?

Our research is valuable, but not if it is sitting on the shelf gathering dust.

Our goal (and that of our partners) is to get this information into the hands of entrepreneurs and small/medium-sized businesses.

Collaboration

How does AURI tackle this?

- Coordinated matchmaking with MN based clients, AURI and other service providers
- Industry Specific Forums
- Community of Innovation Events

Action Planning

Collaboration

All of the activities on the previous slide make up AURI's **Rural Innovation Network Model** (RIN Model)

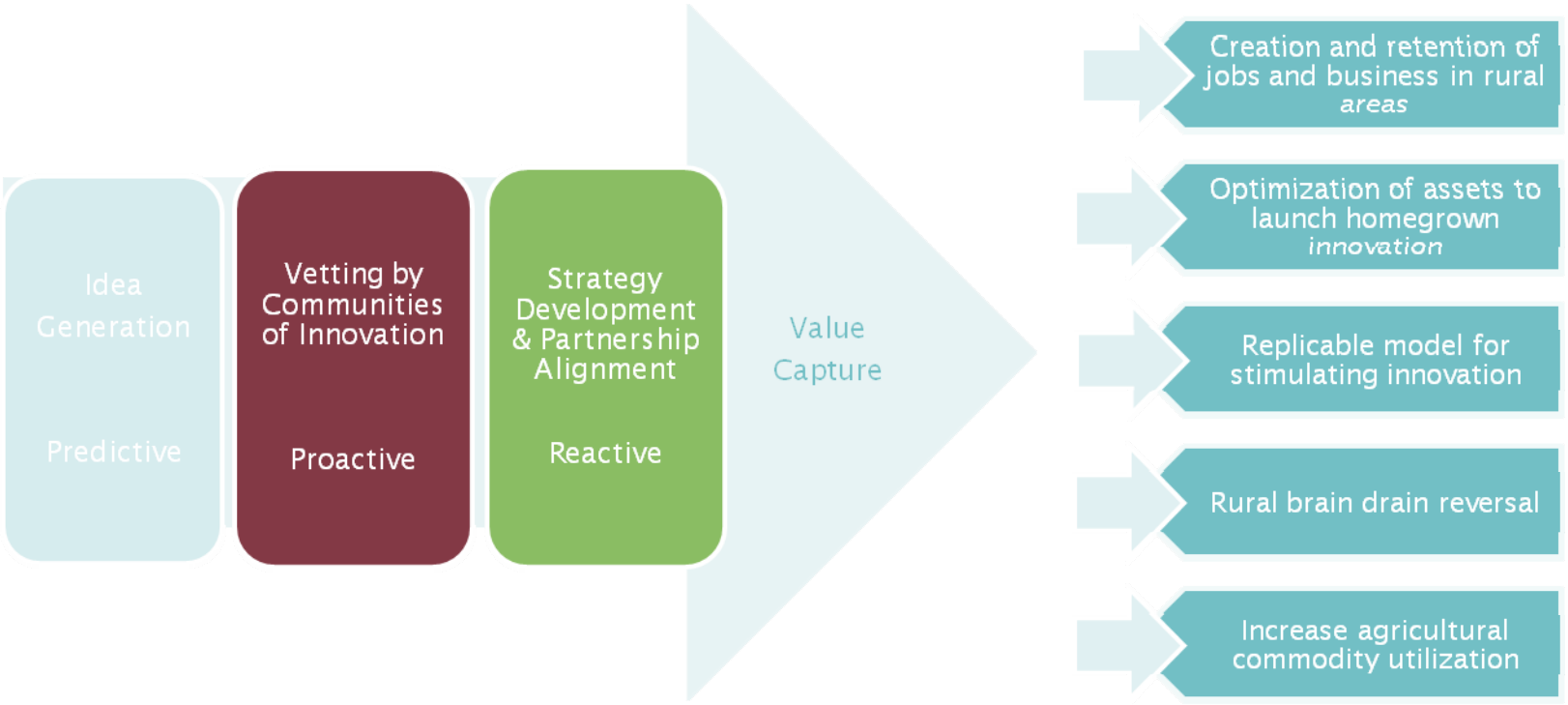
The purpose is to align real opportunities with Minnesota's assets – this takes collaboration and cooperation from the entire innovation ecosystem.

Keyword = NETWORK

Our research of innovation theory and entrepreneurship has shown that "networks" are THE MOST IMPORTANT tool in an entrepreneur's toolbox.

Collaboration

The RIN Model…



The RIN Model provides a systematic method to generate, select, and implement innovation. The network manages innovation to support economic development beginning with research and technology.

Collaboration

Examples:

Industry Specific Forums:

-Dryer Technologies

-Reclaimed Wastewater in Value-Added Ag Processing

Communities of Innovation:

-MN Renewable Energy Roundtable

-MN Biobased Products Connect the Dots Conference

Results

In the last two years, AURI has:

- Assisted in the development of over **325 unique projects and** initiatives;
- Brought **143 new or improved ag based products to the** market;
- Leveraged **$2.478 million of outside funds for projects; and**
- Helped bring **$123.075 million in capital investment to** Minnesota.

Questions?

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AURI Ag Innovations