ABE 20100 - Lab

Lab Expectations
and
StrengthsFinder 2.0

Lab Structure

- Teams fo 3-5 students
- Product Process Reviews
- Two Design Projects
  - Reverse Engineering
  - New Product Design
- Weekly Labs
  - Meet in DLRC 131 most weeks
  - New product production labs will be in STONE

Product/Process Reviews

- Due 9/29 and 11/14
- 1 page document, submitted individually through Blackboard (10 pts)
- Meet with your team and pitch your product or process.

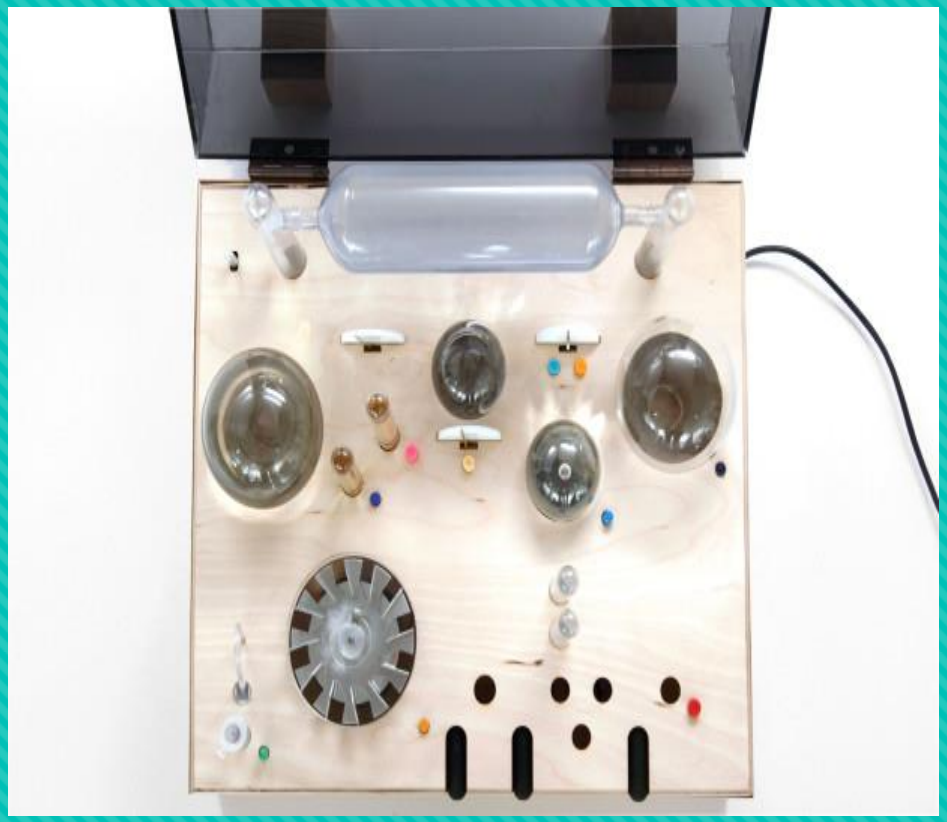
Product/Process Reviews

- As a team select representative to prepare 1 slide overview (additional 10 pts to individual)

- Each team representative presents overview. All teams vote for best presentation (additional 10 pts to whole winning team)

What Product or Process?

- Any new product or process that is related to biological engineering
- Must cite your source(s)!
- Must be a critical review!
  - How is this new?
  - How is this innovative?
  - Is this just hype? How soon will this be available?



- Water baths/Incubation stations with temperature controls (30 C - 42 C)
- Shaker incubation becomes continuous liquid growth with temperature & flow controls (flow & dimensions optimized)
- Real time data analysis in a browser
- Contained inactivation protocol (uses contained chemical inactivation)

Amino: Synbio for Everyone

Chicken Noodle Soup…for your Keurig!

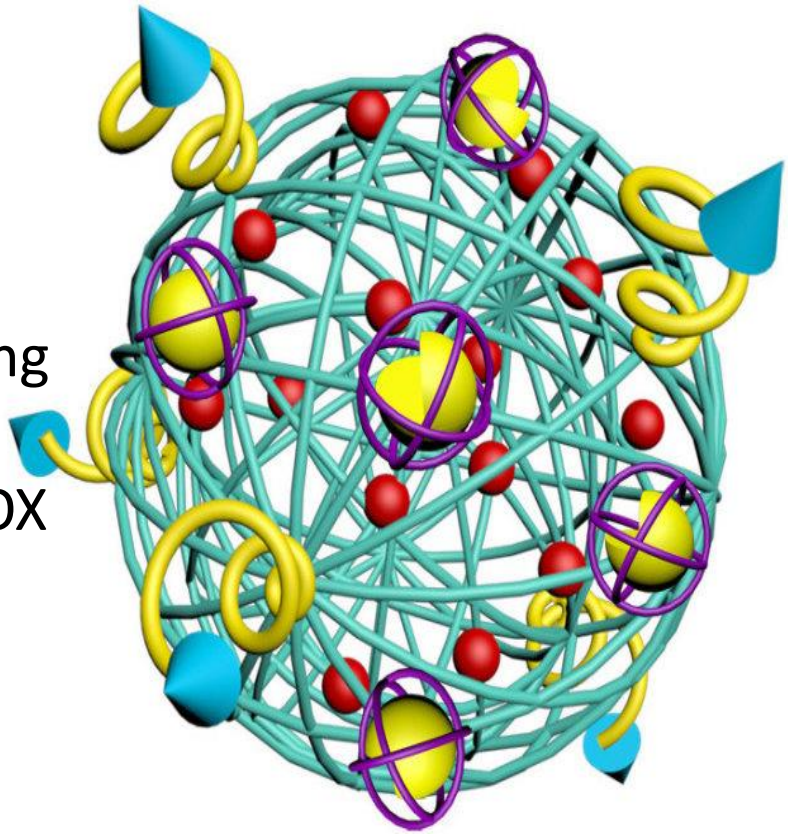
- Fast, easy way to prepare a meal.
- Comes with a noodle packet and the K-Cup.
- Convenient enough for even young children to make.

CelluComp: **Curran**

- Derived from waste product of sugar beets.
- 2x stronger than carbon fiber.
- Current uses: Fly fishing rods, additive in paint
- Future Uses: As a thread (similar to carbon fiber), airplane wings, car parts, additive in recycled paper.

Cocoon-Like Self-Degradable DNA Nanoclew for Anticancer Drug Delivery

- Strand of DNA shaped into a cocoon
- Contains Doxorubicin (DOX) and Dnase coated in a polymer to stop from slicing DNA
- Surface folic acid ligands bind to cancer cell receptors
- Cancer cell envelops cocoon
- Acidity eats away polymer covering Dnase
- Dnase slices DNA and releases DOX killing cell
- Biocompatible
- Preclinical testing



Projects

- Weekly activities culminate in final report due at end of project.
- Weekly check-in with TAs on progress and assignments for the week

Project 1: Reverse Engineering

- Each team given energy bar
- Using your ABE 20100 skills, reverse-engineer the exact recipe for making the bar!

Project 2: Novel Food Product

- Design ready-to-each, on-the-go food product.
- Must meet nutrition and manufacturing constraints.
- You will formulate recipe and how to make it.
- You will actually make it and refine it (design process).
- Culminates in final written report and poster symposium!

Raspberry Crumble Delight

Team 8: Lizzie Canida, Gytis Kriaučiūnas, Yu Hong Wang

Target Audience

- College students who want a snack

Competition

Raspberry Crumble Delight	Fiber One Strawberry Streusel	Special K Strawberry Pastry Crisps
		
Price:$ .74/bar (73g) Calories: 250	Price:$ .77/bar (40g) Calories: 150	Price: $.70/bar(25g) Calories: 100

- Raspberry Crumble Delight: 3.42 calories per gram
- Fiber One Strawberry Streusel: 3.75 calories per gram
- Special K Strawberry Pastry Crisps: 4 calories per gram
- Raspberry Crumble Delight: over 20% of the recommended Daily Values of Vitamin A & Iron
- Competitors: no vitamin A and only 2% of the recommended Daily Value of iron. The Raspberry Crumble Delight also packs a significant amount of protein.

Energy Balance

- **For 1 bar (Using Choi Okos Equation)**
- Cp = 2.26 kJ/kg*K
- ΔH = 26 kJ
- **Energy Production of the Oven Over the Baking Time**
- Q = 3600kJ
- Enough energy to produce about 11 batches of a dozen each

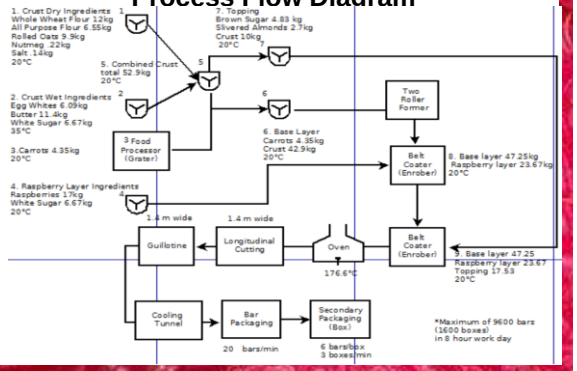
Potential Process Hurdles

- inconsistent texture when crust is mixed in large batches
- build up residue on mixer could have base and topping to have inconsistent ingredient amounts.
- When the rapsberry filling is deposited on top of the base layer, it could drip onto the belt and sides of the bar making it unsuitable for stores' shelves

Lessons Learned & Future Revisions

- coconut oil is often misrepresented for being healthy; however butter was more beneficial for our product
- Erythritol works well in the jam; however, sugar is better for the taste in the crust and topping.
- people prefer the sweeter version, and we have since added more sugar to our final product.
- different fruits could be used as raspberries are not ripe year round
- A jam mixture may be ideal because jams have a longer shelf life than mashed fresh fruit

Process Flow Diagram



Our Innovation

- One of the few readily available raspberry pastries on store's shelves
- Made with real raspberries
- Crust contains nutrient-packed carrot that is undetectable to consumers
- Use of natural whole foods supply the bar with important nutrients like calcium, iron, protein, fiber, vitamin A and vitamin C

Nutrition Facts

Serving Size 1 Bar (74g)
Servings Per Container 1

Amount Per Serving	
Calories 250	Calories from Fat 60
	% Daily Values*
Total Fat 12g	**18%**
Saturated Fat 6g	**30%**
Trans Fat 5g	
Cholesterol 0mg	**0%**
Sodium 80mg	**3%**
Total Carbohydrate 33g	**11%**
Dietary Fiber 5g	**20%**
Sugars 16g	
Protein 5g	**10%**
Vitamin A 21% •	Vitamin C 7%
Calcium 6% •	Iron 22%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Ingredient	One Bar Mass (g)
Whole Wheat Flour	10
All Purpose Flour	5.45
Rolled Oats	8.25
Butter	9.46
Nutmeg	0.18
Salt	0.12
Egg Whites	5.07
Carrots	3.62
Brown Sugar	4.03
Slivered Almonds	2.25
White Sugar	11.11
Raspberries	14.17
Total	73.72

Project Guidelines

Nutrient	Unit of Measure	Product Goal	Goal(DV)	% Daily Value
Dietary Fiber	Grams	≥5	≥20	20 %
Vitamin A	IU	≥1000	≥20	21 %
Iron	mg	≥3.6	≥20	22 %

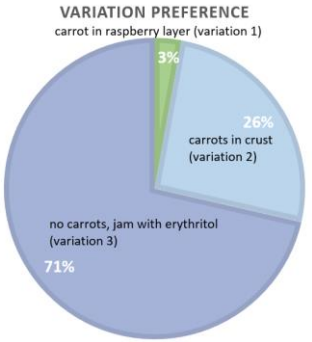
- 100% natural ingredients
- No synthetic oils or sweeteners.
- Product is 250 calories, optimal for a snack

Product Formulation

- initial lab product: coconut oil, erythritol
- second lab products: 3 variations
- first variation: carrots in raspberry layer, honey,
- second variation: carrots in base crust layer, white sugar in crust and raspberry layer, brown sugar in topping
- third variation: no carrots, used a raspberry jam made with erythritol, honey in crust

Sensory Analysis

- 35 taste testers sampled all three variations, chose which one they preferred, and finally rated the taste and texture of the preferred bar on a scale of 1 to 9.
- Those who chose variation 3 liked the sweetness. Those who preferred variation 2 commented about how they liked the texture.
- 31 out of 35 (89%) people liked the product at least moderately



Final Product Selection

- combined the best aspects of variation 2 & 3
- final product contains carrots and sugar in the base layer for the smooth texture and necessary nutrients, raspberries along with sugar in the raspberry layer in order to make it sweeter, and brown sugar in the

Altillas

Almond Tortilla Crackers

Sam J. Adrian Ortiz Velez, Austin Canella, Jill Osterhus, Samantha Kowalski
ABE 201
December 7, 2015

Target Audience

- College-aged students
- Quick and easy snack for on-the-go people
- Those looking for a more nutritious tortilla chip

Competition and Nutrition

Blue Diamond Nut Thins
$2.99/4.5 ounces
130 calories for 16 crackers

Altilla Crackers
$1.53 per serving
300 Calories for 16 crackers

	Altilla	Nut Thins
Calories	300	130
Potassium	204 mg	0 mg
Total Carbohydrate	26.9 g	23 g
Dietary Fiber	5.9 g	<1 g
Protein	8 g	3 g
Vitamin A	0.10%	0%
Vitamin C	1.20%	0%
Calcium	24.60%	0%
Iron	20.60%	2%

Nutrition Facts

Serving Size (60.5g)
Servings Per Container 1

Amount Per Serving

Calories 300 — Calories from Fat 171

	% Daily Values*
Total Fat 19g	**29%**
Saturated Fat 2.2g	**11%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Potassium 220mg	**6%**
Sodium 845mg	**35%**
Total Carbohydrate 23.2g	**8%**
Dietary Fiber 6.4g	**26%**
Sugars 0.6g	
Protein 8.7g	**17%**

Vitamin A 0.1% • Vitamin C 1.3%
Calcium 26.5% • Iron 22.2%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Product Formulation

- Started brainstorming an almond cracker seasoned with honey and various seeds
- Honey softened the texture too much and only added sugar
- Decided to include chia and sesame seeds for texture and nutritional benefits
- Finalized our product as a lime flavored tortilla cracker that would have a new flavor and be a novel cracker with its own distinct triangle shape

Innovation & Novelty

- Adds new flavor variety to a product niche lacking exciting flavors and textures
- A healthy twist on tortilla chips using almonds and seeds instead of corn meal
- Almond crackers can be topped with fresh salsa or cheese for a southwestern inspired snack

Potential Process Hurdles

- Cutting the chips into triangle shapes could result in batches that do not line up evenly, leaving some chips a different shape
- Cutting the crackers could also result in uneven separation after baking
- Excess cracker residue from previous cuts may lead to uneven cuts
- Cooking large batches in an oven could lead to uneven baking if temperatures vary within the oven

Project Guidelines

- Only contains 3.1 g of saturated fat from the sesame seeds and almonds.
- Does not contain any refined sugar
- Altillas are also very high in calcium and iron
- 97.3% whole ingredients

Lessons Learned & Future Revisions

- Creating an entirely innovative product not already available on the market is difficult
- Current market for almond crackers is small, leaving room to innovate
- Lime-flavored almond crackers could expand to barbecue, chili, or other unique flavors
- Look into milling the seeds for a more consistent texture
- Collect as much data as possible in the future

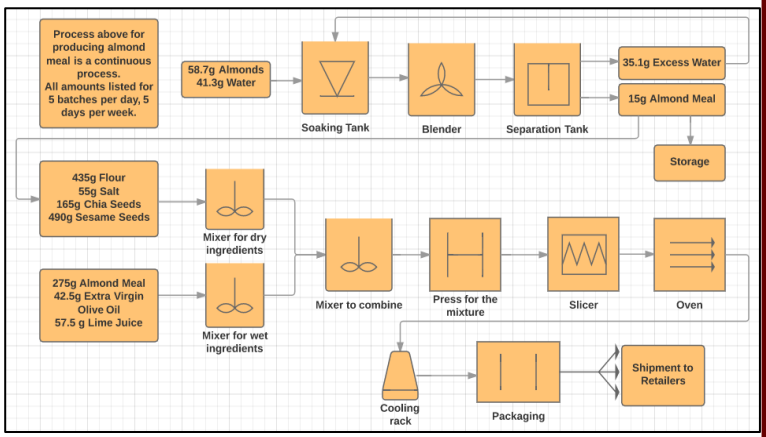
Industrial Scale Process Flow Diagram with Mass and Energy Balances

Batch Information

- 90 min per batch
- 16 crackers and 300 calories per serving
- One batch is one serving
- Shipments of all batches will occur at the end of a shift

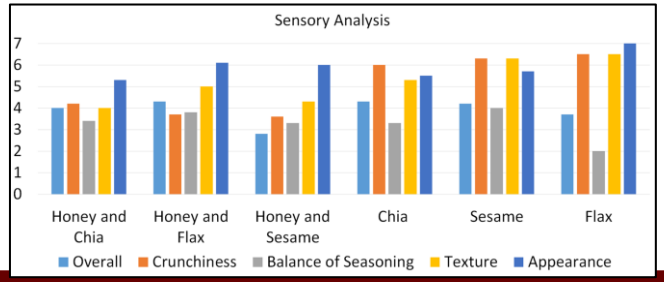
Energy Balance

Oven
Baking crackers
-2.400kW * 0.2hr = **480kJ**
-m * Cp = 4.18*.0299 + 1.55*.2378 + 1.98*.19 + 2.00*.087 + 1.85*0.0637
-m * Cp = **1.037 kJ / C**
-dH = (1.037 kJ / C)*(450*C-25*C)
-dH = **440.64 kJ**
-Thermal Efficiency 440.64/480 * 100 = **91.80%**



Sensory Analysis & Final Product Selection

- Tasted and rated over crunchiness, balance of seasoning, texture, appearance, and an overall liking
- In the next batch: ¼ of the salt previously needed, no sugar, chia and sesame together, lime
- A general consensus was that this batch was too salty and the honey was unnecessary
- Sugar didn't contribute to the texture and deemed unnecessary to our southwestern style
- Due to flavor and nutritional requirements both chia and sesame will be used
- We think the addition of lime will add to the uniqueness



Raw Ingredients per Serving	Amount (g)
Total	60.8
Almond meal	11
Flour	17.4
Extra Virgin Olive Oil	1.7
Lime Juice	2.3
Chia Seeds	6.6
Sesame Seeds	19.6
Salt	2.2

Potential Competitions

Product	Price	Nutrition	Variety
Fruitylicious	$1.57/106g	300 Cal Vit A : 24% Vit C : 34 % Sodium : 6%	Plaintain & Apple Chips with Strawberry and Chocolate DIp
Sabra Humus/Pretzels 	$3.14/129g	338 Cal Vit A : 2% Vit C : 3% Sodium : 7%	Pretzel with Hummus
Lunchables Nachos Cheese/Salsa 	$2.70/125g	520 Cal Vit A : 15% Vit C 100% Sodium : 38%	Nachos with Salsa

Final Product Selection

From the sensory analysis, we Decided to use Apples and Plantains as chips And strawberry yogurt and Chocolate as the dips.

Masses for 1 serving size.

Ingredients	Mass(g)
Apples, Raw	91.000
Plantain, Raw	89.500
Sugar	3.840
Brown Sugar	3.200
Salt	0.830
Honey	2.740
Cinnamon Powder	4.007
Whipped cream	26.300
Strawberry yogurt	11.300
Sugar	11.060
All purpose flour	0.470
Cocoa	4.030
Full cream milk	1.340
Salt	0.010

Nutrition Facts

Serving Size 1 (257g)
Servings Per Container 1

Amount Per Serving
Calories 299

	% Daily Values*
Total Fat 5.44g	8%
Saturated Fat 2g	10%
Trans Fat 0g	
Cholesterol 1.6mg	1%
Potassium 66.4mg	2%
Sodium 34.4mg	1%
Total Carbohydrate 72.18g	24%
Dietary Fiber 7.7g	31%
Sugars 20g	
Protein 4.98g	10%

Vitamin A 24.7% • Vitamin C 34.8%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

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Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Strengths
1. New
2. Unique

Weaknesses
1. Low shelf stability
2. Fresh pre-packaged that Limits the production per day

Opportunities (Future Revisions)
1. Organic Ingredients
2. Different chips/dips for special season edition (Pumpkin chips for Thanksgiving)

Threats
1. New product sometime are hard to survive in market

Process Hurdles

- It is necessary to make sure fruits are of roughly same size and quality to achieve consistency.
- Continuous slicing of fruits may lead to buildup on blades, resulting in poor cuts.
- Creating chocolate dip in large batches could result in burnt spots due to uneven heating.

Project Guidelines

- 85% whole foods (by mass)
- The macronutrient requirements are met by exceeding 5 grams of fiber per serving.
- The micronutrient requirements are met by providing 24% DV Vit. A and 34% daily DV Vit. C

FRUITYLICIOUS

Fresh pre-packaged fruit chips with dips that is a healthier alternative to every day-college snacks.

CHEAP

INNOVATIVE
Combination of nachos chip & dip with healthier chips for students

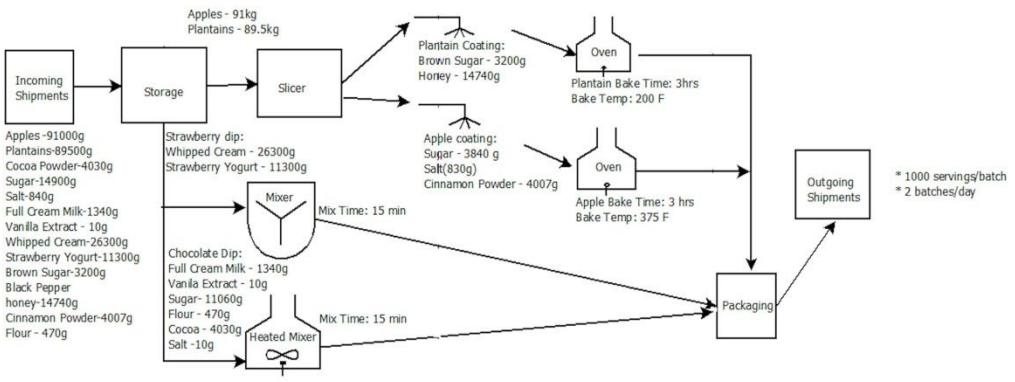
AUDIENCE
Targeted to College students but can appeals to all age.

VARIETY
Plantains and Apple Chips with Chocolate & Strawberry Yoghurt Dip

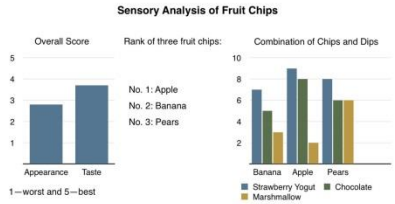
HEALTHY

Team 6:
Qiuwen Wei,
Sharifah Omar,
Adam Kissel
ABE 201
12/02/2015

Process Flow Diagram



Sensory analysis



Conclusion:
- Low appearance mark
- Apples and Banana are most voted chips
- Strawberry and Chocolate are most voted dips.

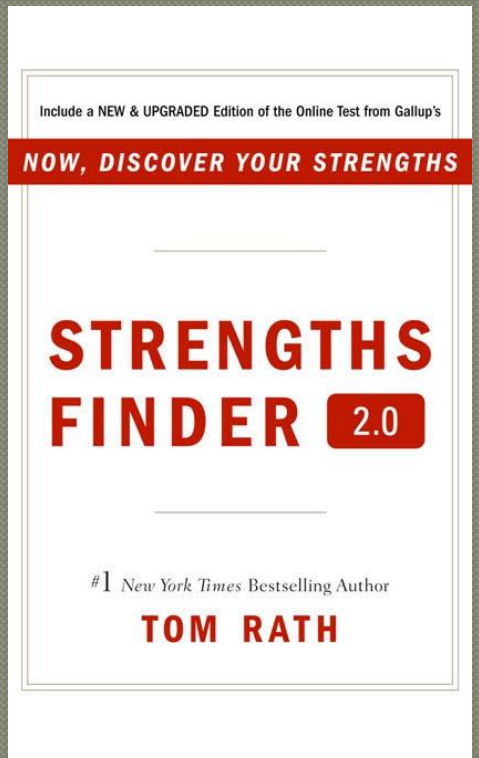
Iteration	Solution
Appearance	Fix baking time and baking method.
Texture	Change Banana to Plantains for better looking chips
Nutritional Value	Too many calories, decided to choose top 2 fruits and dips

Why 2 Food Projects?

- Food is a biological product and a interacts with a biological system (you)
- All aspects of biological engineering readily applies to food (biochemistry, physics processes, thermodynamics, economics).
- All of you have eaten food and are familiar with food! (easy place to start)

Strengths Finder

What are your strengths and how do you use them?



Leadership & Professional Development Initiative

About

Working Groups

Competencies

myStrengths

Roger C. Stewart LEAP-Leadership Experience at Purdue

*my*Strengths

As a part of the Roger C. Stewart LEAP, the Clifton StrengthsFinder assessment will be offered to all undergraduate first-year and transfer students starting Fall 2016.

*my*Strengths Web Portal: www.purdue.edu/mystrengths

*my*Strengths Web Portal Instructions: .pdf

Two Approaches to Improving

THE WRONG ASSUMPTIONS!

WEAKNESS FIXING

- All behavior can be learned
  - If you try hard enough, you can do it
  - If you want it bad enough, you can do it
  - If you dream it, you can achieve it
- The best all achieve success in exactly the same way
- Weakness fixing leads to excellence
- Anything can be learned

THE RIGHT ASSSUMPTIONS!

STRENGTHS BUILDING

- Some behaviors can be learned. Many are near impossible to learn.
  - There is a difference between skills, talents and knowledge.
- The best all deliver the same outcomes, but use different behaviors to achieve success.
- Weakness fixing prevents failure. Strengths building leads to excellence.

Nobody can be the best at everything. Trying to achieve this goal leads to….

Anger!

Depression

Fear

Confusion

Frustration

What if we focus on our strengths?

Not just the things that we're good at…

… but the things that make us feel

STRONG!

Where does this idea come from?

- The Gallop Organization studied the best organizations and high achieving individuals.
- After compiling the data three important themes emerged:

1. The best build upon their talents.
2. They manage their weaknesses.
3. They find creative ways to use their talents to succeed in new areas and get better at what they're already doing.

The approach is "positive psychology"

- Focus on what's right!
- Don't try to "fix" what's wrong, weak, or inadequate.

The Strengths Building Equation

Talent x **Investment**

A natural way of thinking, feeling, or doing.

Time spent practicing, developing skills, gaining new knowledge

= **Strength**

Ability to consistently provide near-perfect performance

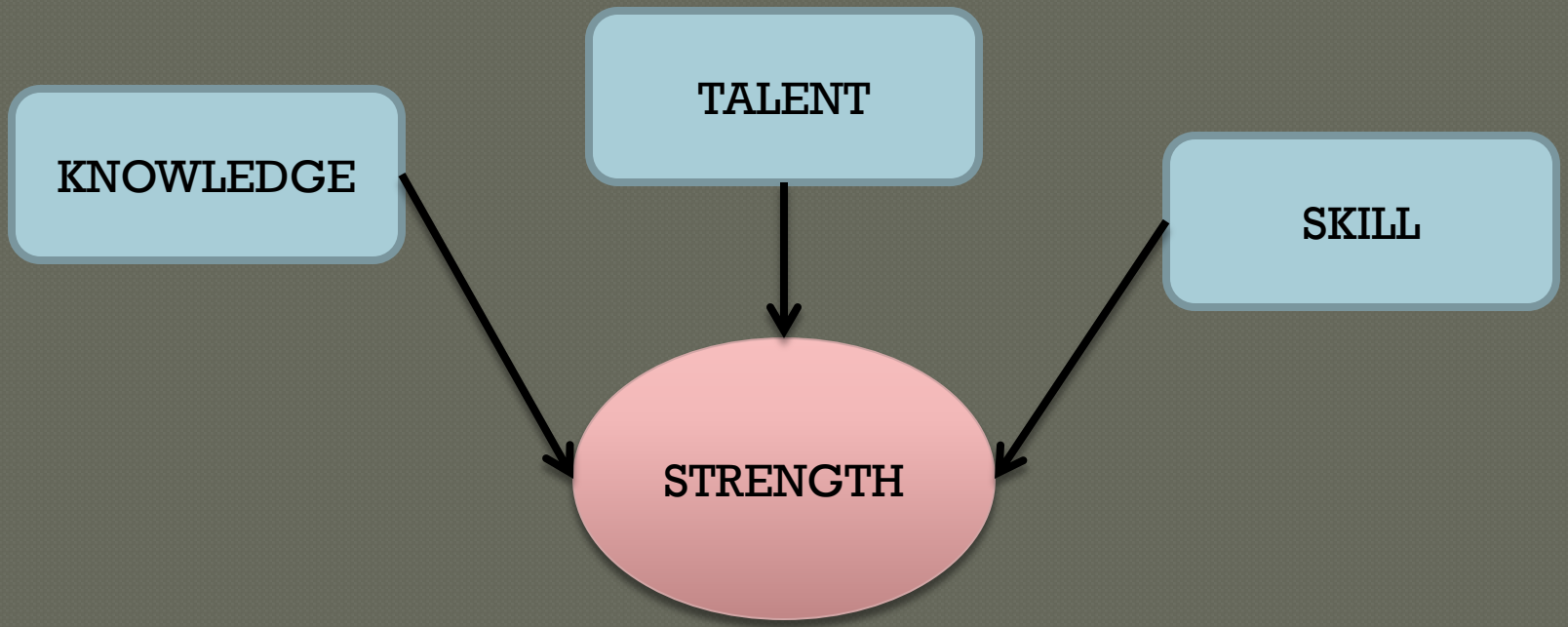
Where do we start

Transforming talents into strengths involves

- Acquiring knowledge
- Learning experiences
- Acquiring skills
- Critical thinking
- Reflection

Talent vs. Skill

- Handwriting Activity



- A strength is the ability to provide consistent, near-perfect performance in a specific activity.

The Highest Achievers

- Spend most of their time in their areas of strength
- Focus on developing and applying their strengths and managing their weaknesses
- Know the strengths of people around them
- Empower the people around them to use their strengths

More About the Highest Achievers

- Excel because they more fully develop and apply their strengths and talents
- Find ways to apply their strengths to their tasks
- Use their strengths to overcome obstacles
- Build their lives around their strengths

How do I find my Strengths?

- Using Strengthsfinder
  - Identifies top 5 themes
  - Six-month test-retest reliability across all populations ranges from .60 to .80
  - Three-month test-retest reliability among college students ranges from .70 to .76

What makes you unique…?

- The combination and the order of the 34 themes of talent measured by StrengthsFinder lead to more than 33,700, 000 possible unique sets of Signature Themes

- Among the first 800,000 people who took Strengthsfinder, less than 20 people had the same top five themes, without considering the order of the themes

But What About My Weaknesses?

- The beauty of the strengths approach is that by developing your strengths, you have a new approach for managing your weaknesses
- Apply your strengths to challenging tasks or areas in need of improvement
- Partnering with others who have overlapping or complimenting strengths

4 Themes of Strengths

- Relating themes (working with people)
  - Harmony, Communication, Empathy, Includer, Individualization Relator, and Responsibility
- Impacting themes (influencing people)
  - Command, Competition, Developer, Positivity, Maximizer, and Woo
- Striving themes (working harder)
  - Achiever, Activator, Belief, Significance, Discipline, Adaptability, Focus, Restorative, and Self-Assurance
- Thinking themes (working smarter)
  - Analytical, Arranger, Consistency, Connectedness, Deliberative, Futuristic, Ideation, Input, Intellection, Learner, Context, and Strategic

These aren't the Only Possible Themes

- After you complete your assessment, think about your "Signature Strengths" = top 5
- Is there a common theme?
- Does this tell you something about yourself?
- How do you use your strengths and theme to excel?

Exercise: Your Greatest Hits

- Think about your greatest successes and triumphs. Briefly write down the answers to the following three questions:

1. What has been your most successful experience in an employment, service, or volunteer work setting?
2. What has been your most successful experience in an academic, learning, or athletic setting?
3. What has been your greatest success in an interpersonal relationship, leadership role, club, team, or organization?

Putting it all Together

- What are the patterns between your greatest successes and your themes?
- Do your themes shed light on fit—or lack of fit—in your life?
- How can your themes inform your development?

References

- StrengthsFinder 2.0 by Tom Rath
- Jeremy David Jones, Southwestern Oregon Community College