

Nudge Innovation and Paths of Convergence for Agriculture, Food, Health, and Wealth

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CULTIVATING AGRICULTURE, FOOD, AND HEALTH

DALHOUSIE AGRICULTURAL CAMPUS

JUNE 20TH 2013

Overview

1

- **FOOD AND EATING: The behavioral frontier between agriculture, nutrition, health, and wealth**

2

- **Nudge Innovation, Pepsi case study, and small group/open discussion**

3

- **Paths of Convergence**

4

- **Convergent Innovation and small group/open discussion**

1

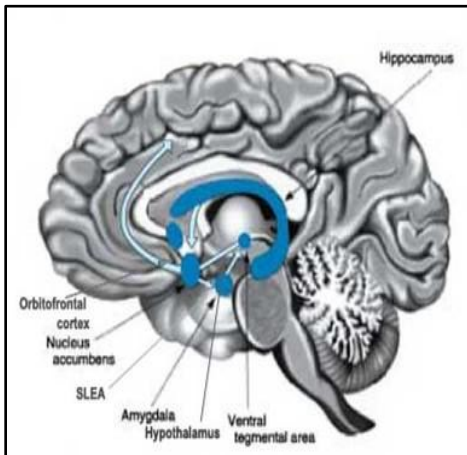
FOOD AND EATING: The behavioral frontier between agriculture, health, and wealth

“Eating is an agricultural and an industrial act.”

▀ Adapted from Wendell Berry (from E. Gustaffson presentation, Delhi, 2012, MWP/INCLLEN convergence workshop)



Eating and Many Other Everyday Behaviors are Also Neurobehaviors



×



Eating is a neurobehavior from birth on and whether you are on the under, neutral or over side of the nutrition and Caloric Balance



Motivated Choice in Neurobehaviors

- Tied to biological and/or overlearned tendencies
- Triggered by internal or external cues and modulated by social and cultural context
- Behavior result from a complex interplay between brain (perception, motivation, and executive control) and environmental triggers
- E.g., eating, smoking, drinking,

Can eating as a neurobehavior be better understood within social and cultural meanings and symbols to better address food insecurity, micronutrient deficiency, obesity and NCDs?



Why Changing Behavior and Transforming Agriculture, Food and Health Systems are Critical to Sustainable Development and Affordable Healthcare

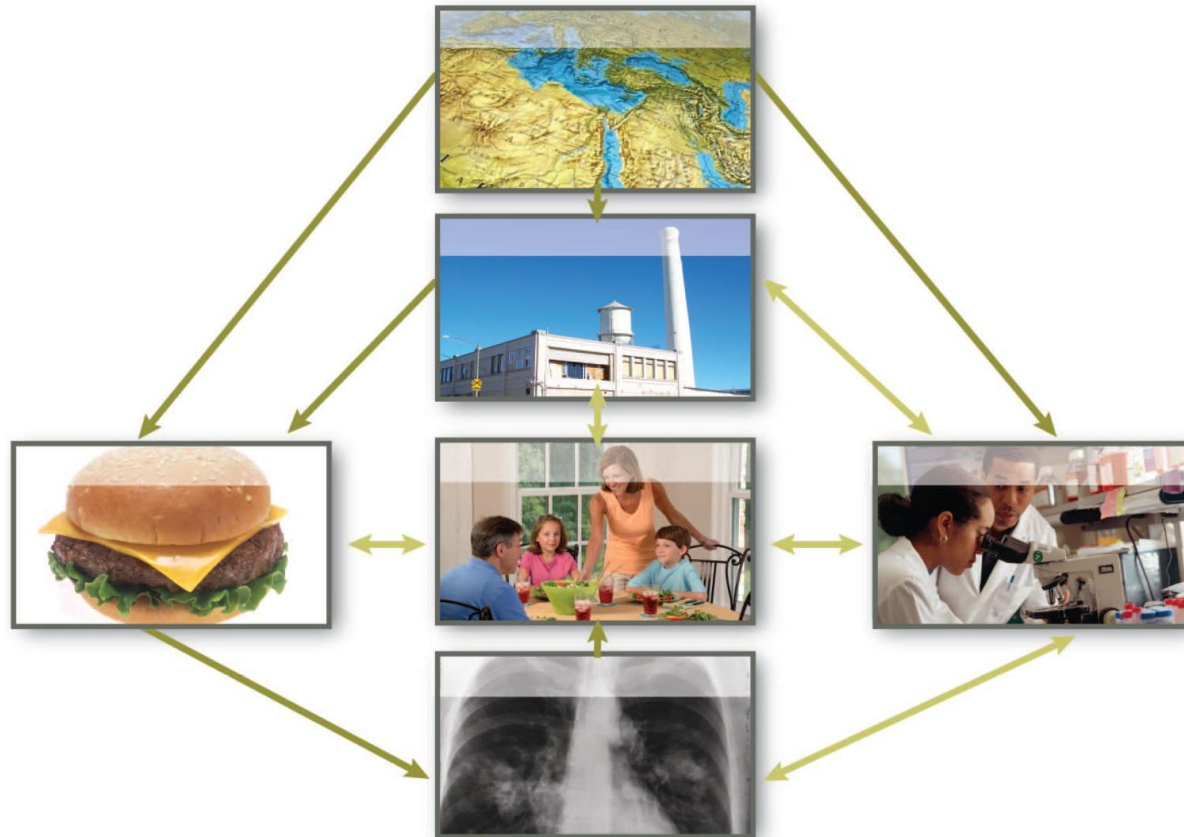
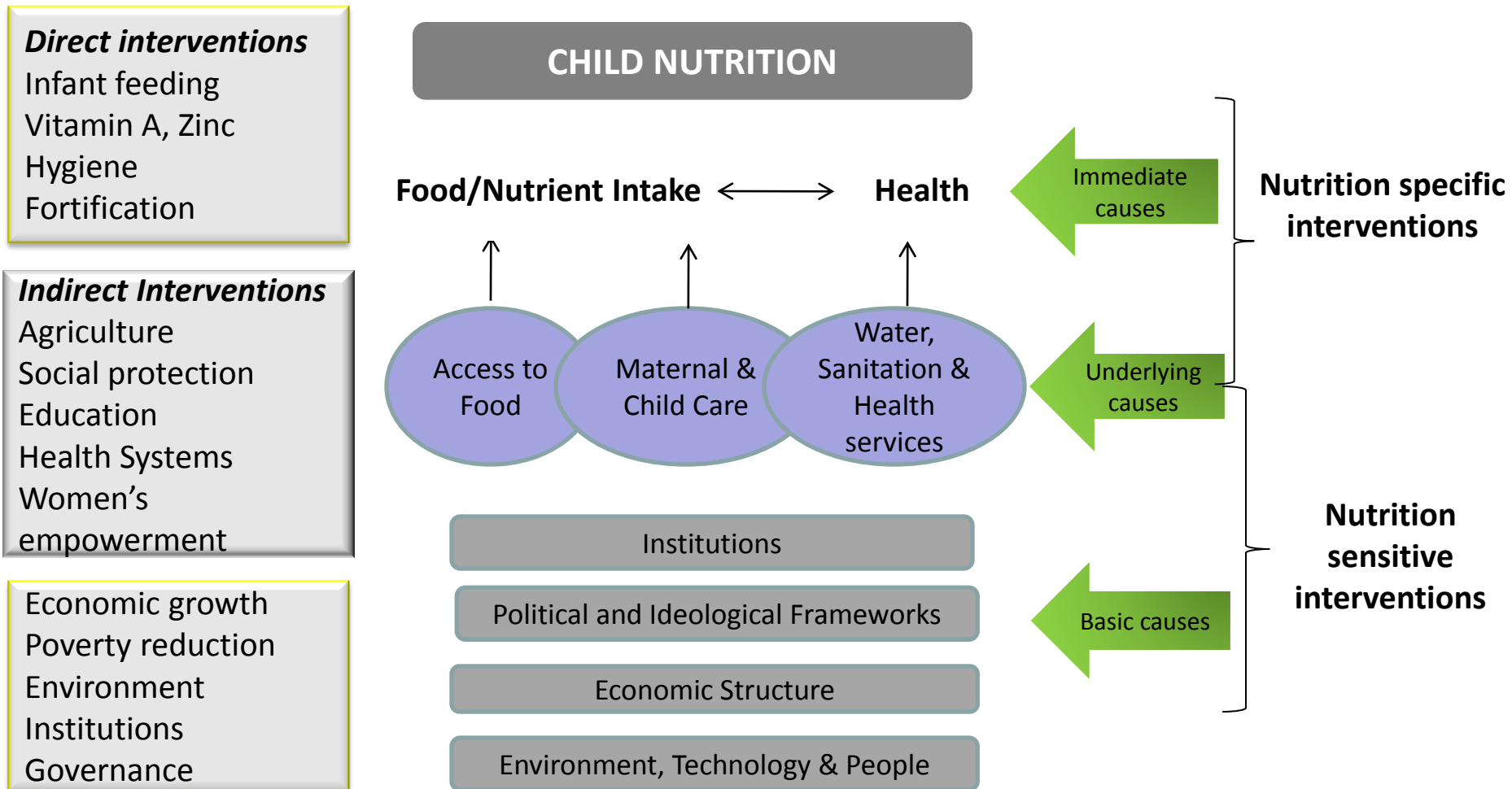


Fig. 1. Noncommunicable diseases and the macroeconomy (Smith, Science 2012)

The Causes and Consequences of Complex World's (Food) problems Cut Across Sectors and So Do the Solutions

(adapted from S. Kadiyala Presentation, Delhi, June 2012)

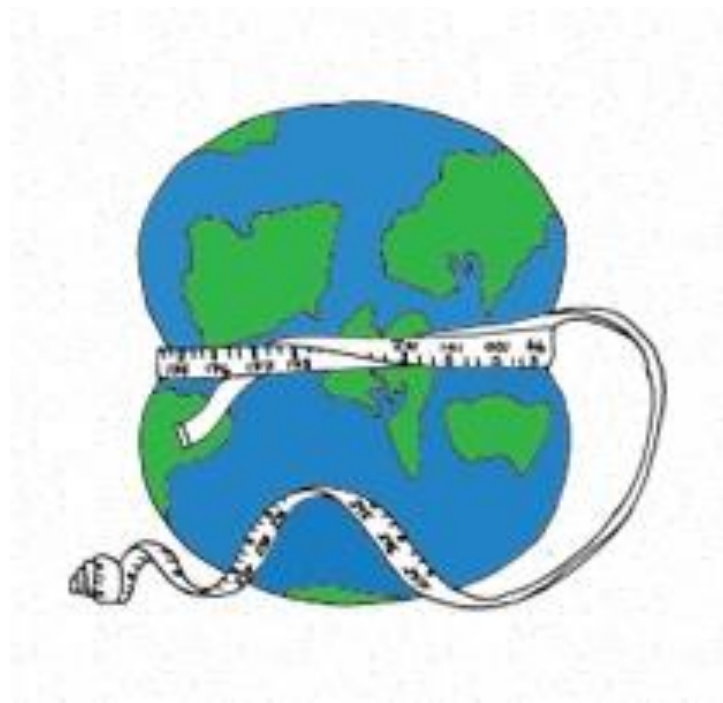


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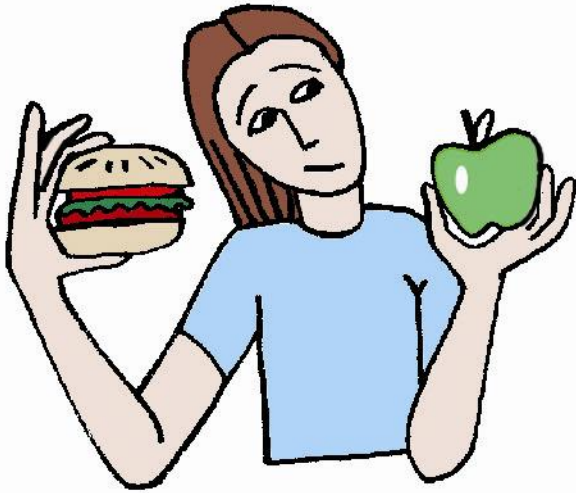
Nudge Innovation, Pepsi case study, and small group/open discussion



***When Nutrition and Health are
Not the Full Story of What Drive Human Behavior:
How to get people to say “yes” to healthier choices?***



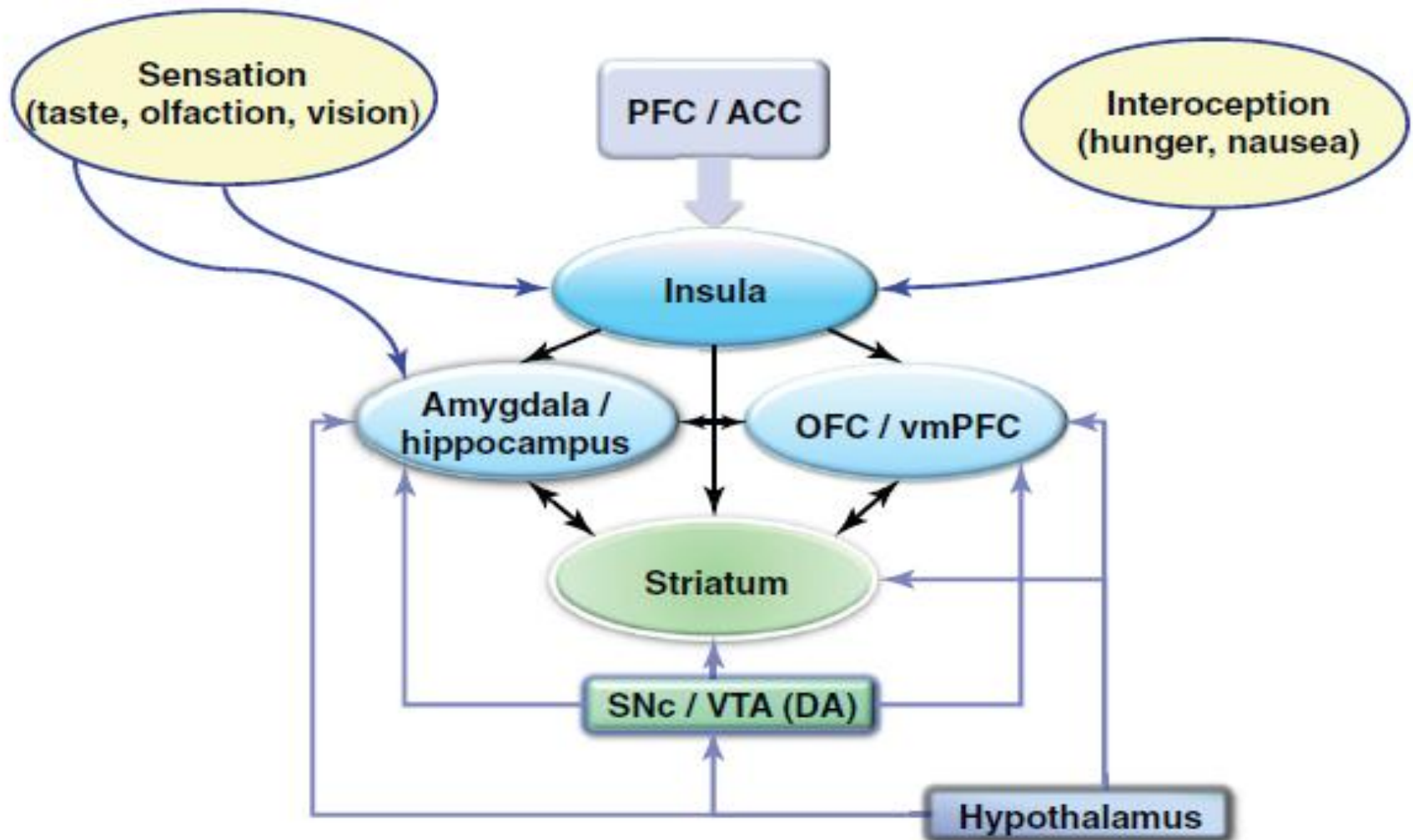
We need a **new lens** into the mind-set of the consumer



To succeed in positioning healthier choices we need to better understand **WHY** and **HOW to** deliver what consumers want:

- *Why people say one thing - but do something different*
- *What drives their behaviors – or holds them back*
- *What is their deep rooted “relationship” with food and beverages (how it varies by occasion, state of mind, satiety, satisfaction, hunger, cravings; enjoyment, healthier, wiser choices)*
- *How do people successfully shift deeply ingrained behaviors*
- *How do “low fat”, “sugar free”, “diet”, “light” foods and beverages impact choice and when does it become acceptable - and when not*
- *How do the above criteria deliver against “healthier” or not*
- *How do senses, metabolism, conditioning impact their decisions*
- *The real meaning behind risk/ reward trade-offs*

Brain Imaging of Motivated Choice/Eating as Neurobehavior (Dagher et al 2012)



Overview of prominent brain areas involved in eating behavior. ACC = anterior cingulate cortex; dlPFC = dorsolateral prefrontal cortex; IOFC = lateral orbitofrontal cortex; mOFC = medial orbitofrontal cortex; NAcc = nucleus accumbens; vmPFC = ventromedial prefrontal cortex; VS = ventral striatum

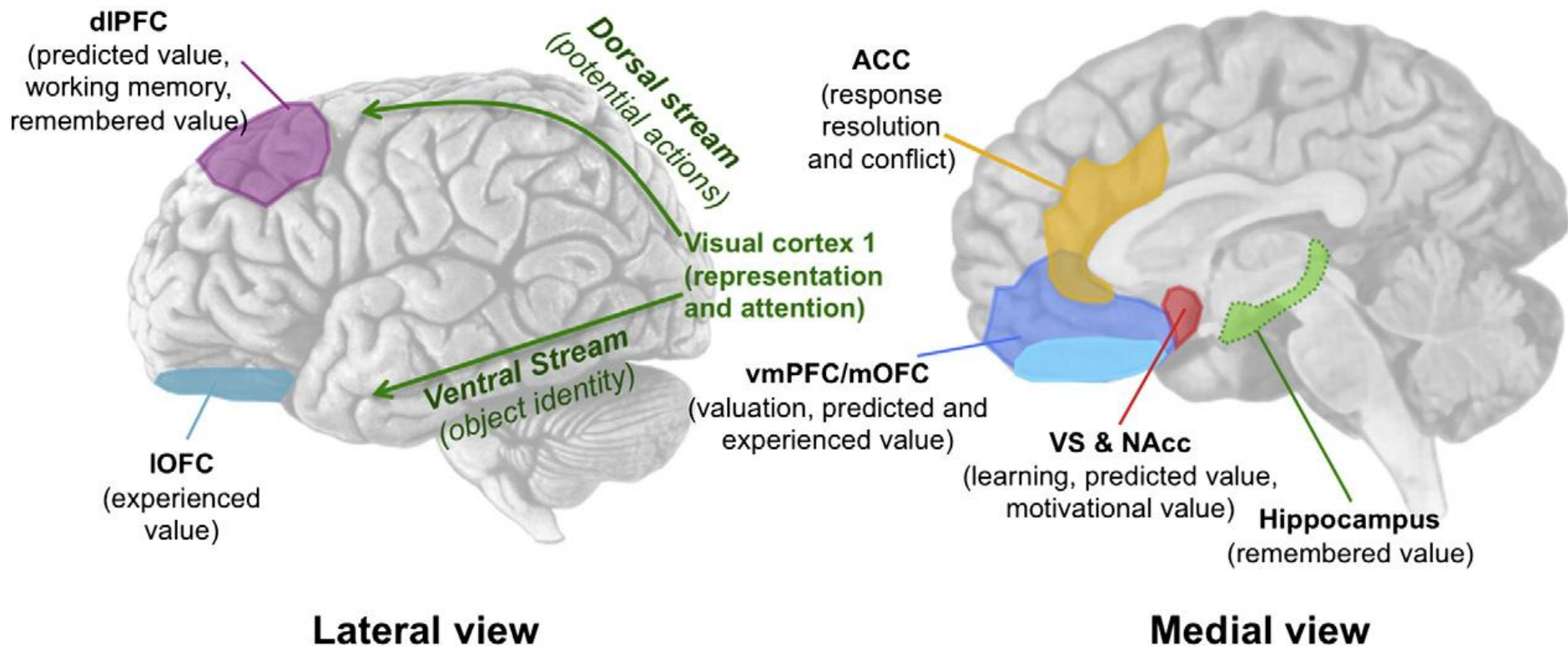
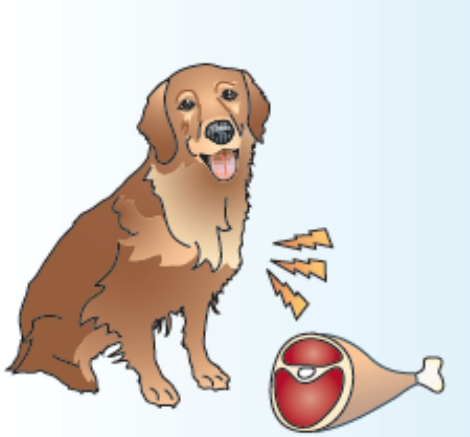
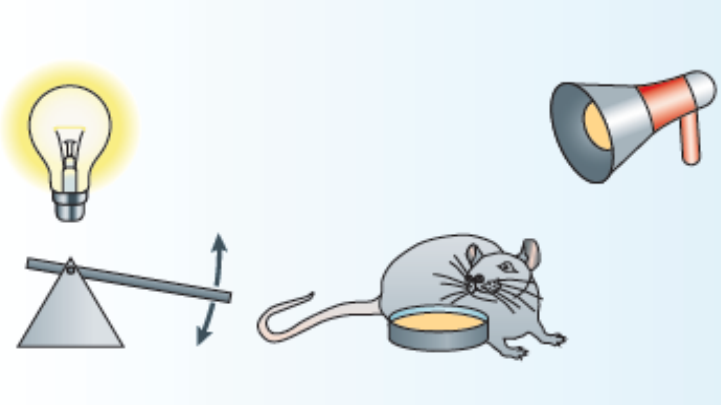
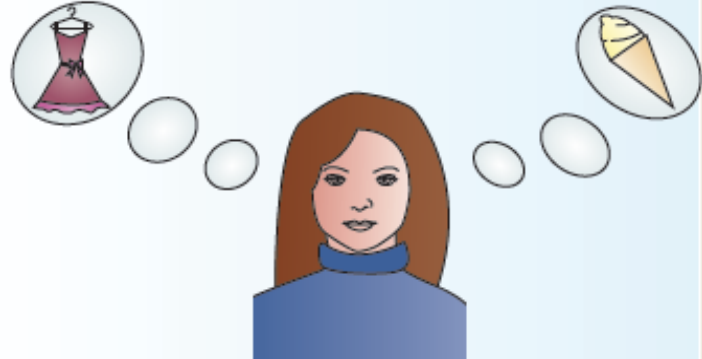


Figure 2 | Conflict between the valuation systems

	Pavlovian	Habitual	Goal-directed
	<p>Pavlovian</p> <p>Example: hungry animal presented with food and electric shock simultaneously</p> <p>Appetitive Pavlovian system: high value for food, low value for escape behaviours</p> <p>Avoidance Pavlovian system: high value for escape behaviours, low value for food</p>	<p>Example: animal rewarded for running away from food</p> <p>Appetitive Pavlovian system: high value for running towards food</p> <p>Avoidance habitual system: high value for running away from food</p>	<p>Example: individual considering taking an extra bite after feeling full</p> <p>Appetitive Pavlovian system: high value for food</p> <p>Health goal-directed system: low value for food</p>
	<p>Habitual</p> <p>Example: an animal trained to run towards a lever in response to a sound and away from a lever in response to a light being presented with both stimuli</p> <p>Approach habitual system: high value for lever approach</p> <p>Avoidance habitual system: high value for lever avoidance</p>	<p>Example: alcoholic considering having a drink at a bar</p> <p>Appetitive habitual system: high value for drink</p> <p>Avoidance goal-directed system: low value for drink</p>	
	<p>Goal-directed</p> <p>Example: dieter considering having ice-cream</p> <p>Appetitive goal-directed system: high value for ice-cream</p> <p>Avoidance goal-directed system: low value for ice-cream</p>		

When healthy makes you hungry

(Finkelstein and Fishbach, 2010)

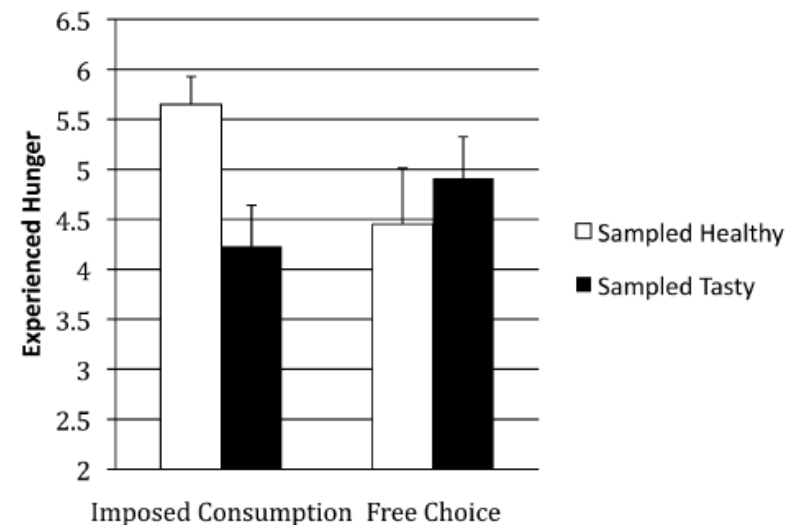
- People are experiencing more hunger when food frame as healthy (vs tasty) and ,they are more likely to eat in a subsequent episode.
- When **imposing** the consumption of a “healthy” item, people experience more hunger.

New health bar containing high levels of protein, vitamin and fiber.



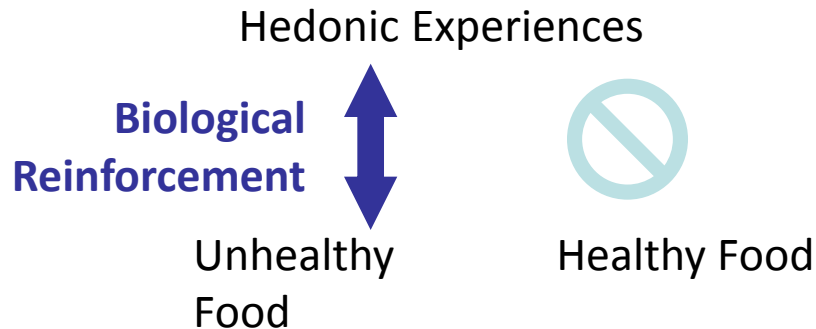
A chocolate bar that is very tasty and yummy with a chocolate raspberry core.

EXPERIENCED HUNGER AS A FUNCTION OF THE FRAMING OF THE FOOD SAMPLE AND THE NATURE OF THE CONSUMPTION SITUATION



On Biological and Emotional Reinforcement and Conditioning

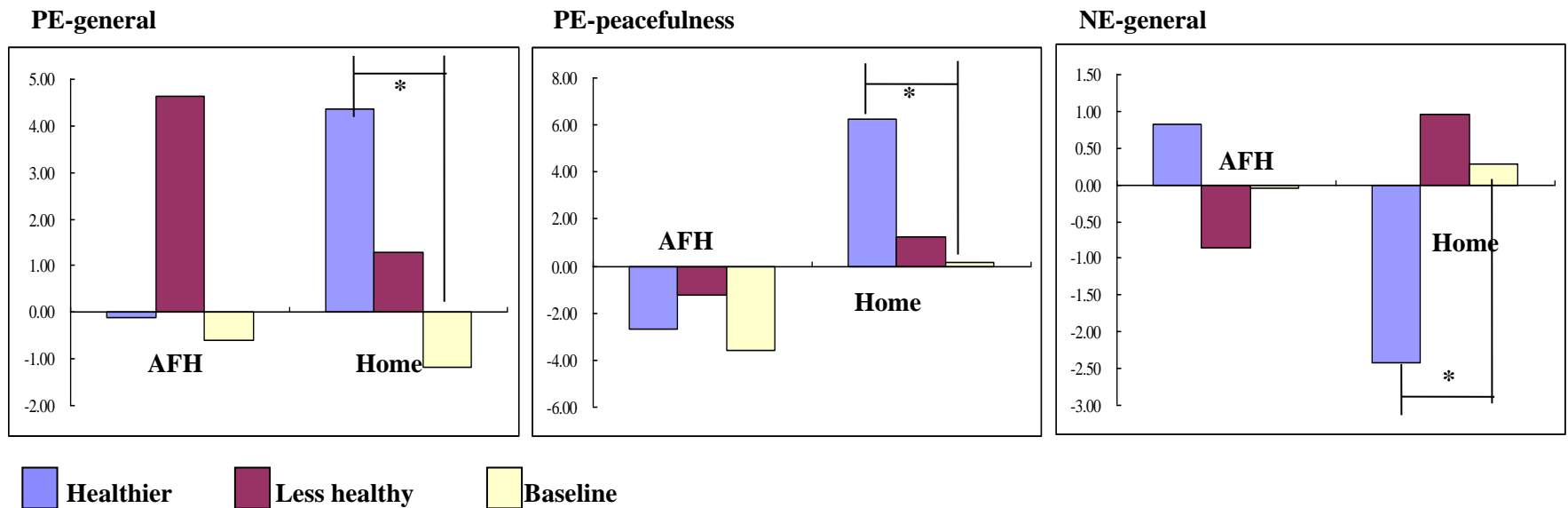
- Reinforcement and food consumption
 - The reinforcement is the process of associating contingent positive consequences with a behavior (Epstein et al. 2007).



Superior Affective States @ Home

Individuals typically experience more intense positive emotions and less intense negative emotions at Home (H) than away-from-home (AFH) contexts (Côté & Moskowitz 1998).

Means of Post-meal Emotions after Home versus Away-from-home (AFH) Meals with Different Nutritional Quality



* Significant difference ($p < 0.05$) was detected in the hierarchical linear models used in analysis.

Competing with Tony the Tiger

Craving: TV ads. ("They're grrreat!")

Cue: Tony the Tiger on the cereal box.

Routine: Child nags parent to buy Frosted Flakes.

Reward: Frosted Flakes.



jive HEALTH
HELPING CHILDREN EAT HEALTHIER.

Easy Eater & Hugo

Craving: Easy Eater iPad game. (Gold Stars)

Cue: Hugo on apple packaging or merchandise.

Routine: Child nags parent to buy apples.

Reward: Apples.



Easy Eater (iPad)

Children Ages 5-9

30

① The goal is to earn **30** points at dinner each night.



② **Healthier** foods give **more points**.



③ Win **real-world rewards**.

BACK

Step 2 of 3

Now Choose a Character!

Each one has a super secret power. It's a win-win-win situation.



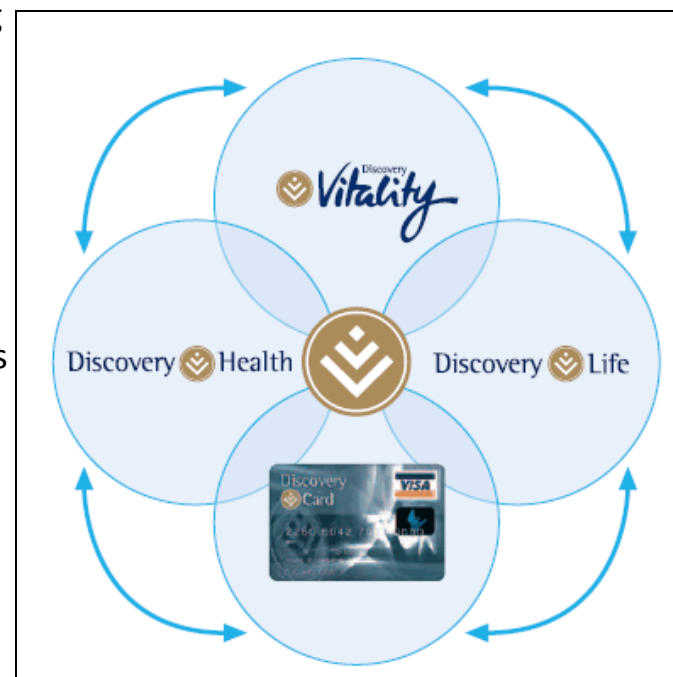
Development Build

The Vitality Group:

Reward-Based Model for Health Promotion and Affordable Healthcare

The Vitality Wellness Group

- Member of South Africa-based **Discovery Holdings Limited**, a leading international financial services organization founded on the principles of consumer engagement and wellness
- Launched in 1997 with a focus on prevention, as there were so few doctors in South Africa
- Today South Africa's largest health insurer, and a total of 4 million members worldwide
- By capitalizing on heritage of actuarial expertise, the Vitality wellness program is meeting the needs and cultures of a wide range of U.S. companies in their pursuit of increased workforce health and productivity
- The Vitality Group has numerous peer-reviewed outcomes and published studies, participating members in all 50 states, and the largest network of biometric screeners and fitness health club partners that verify engagement and secure return on investment

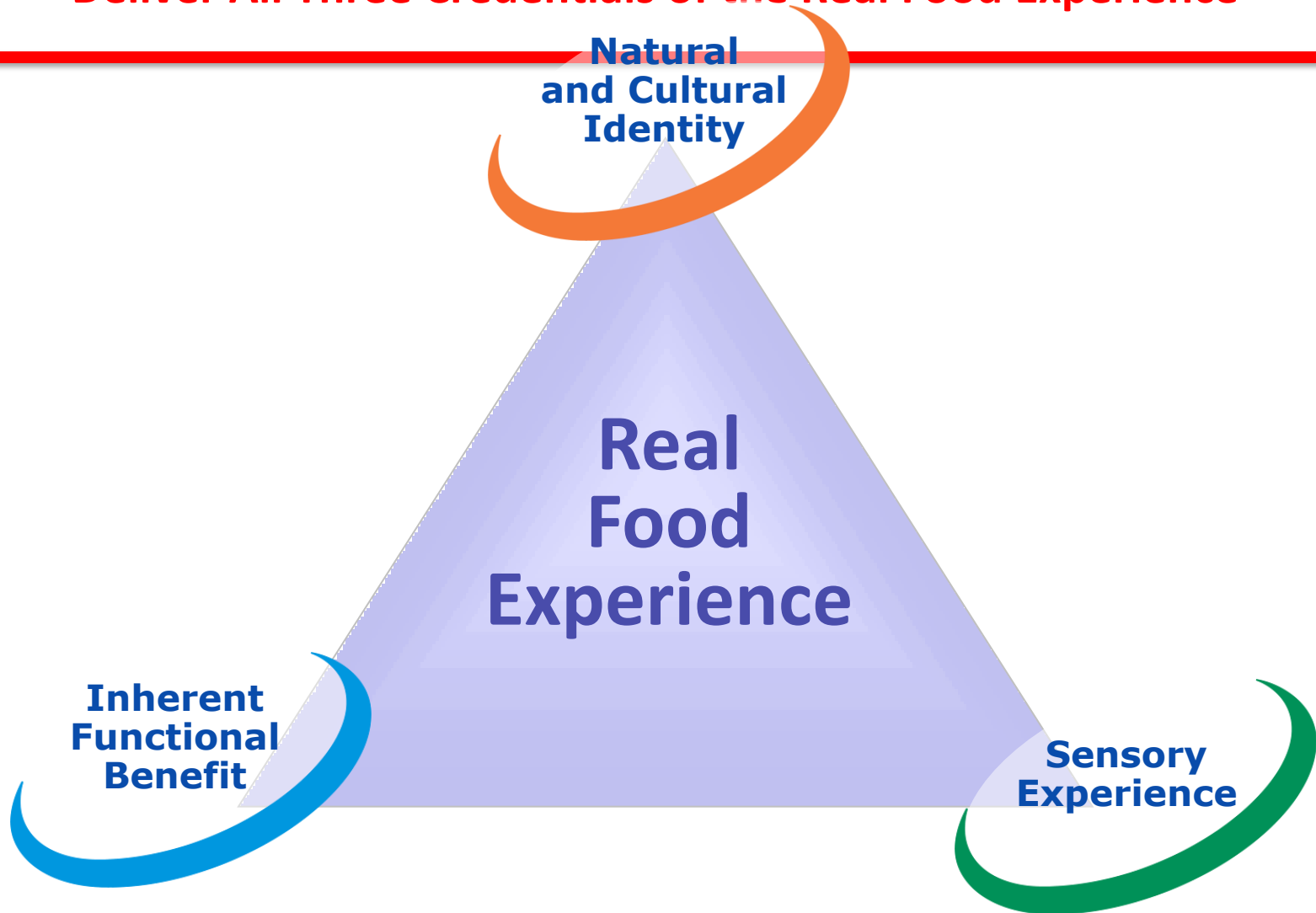


Nudge Innovation: Making the “Good” Choice the Simplest One Dube, 2010

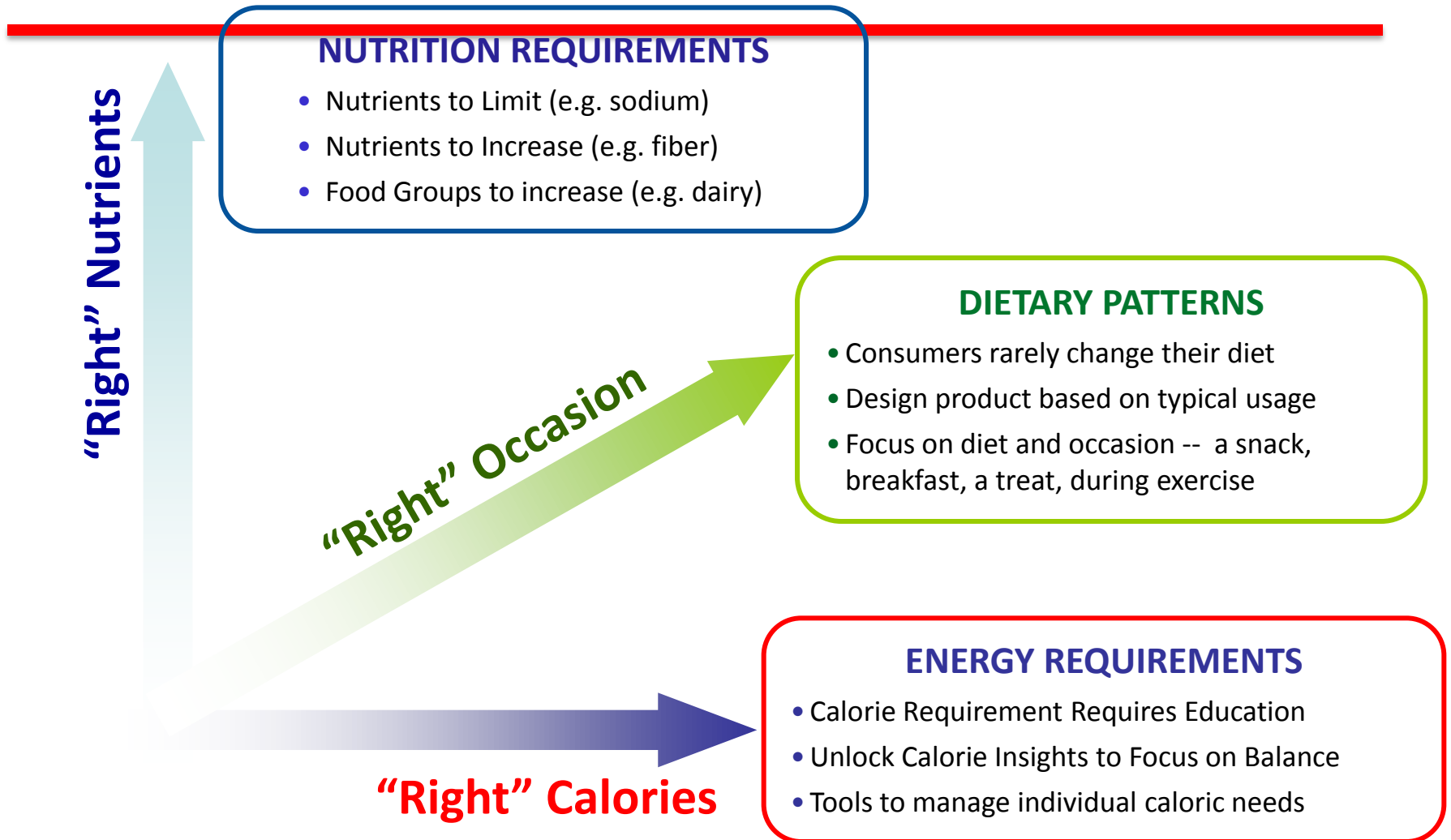
- Relies on a sophisticated understanding of neurobehavioral decision processes and judgmental **biases** and shortcomings to **nudge** individuals to act in their own and society’s best interest while preserving freedom of choice.
- What helps those who suffer from the biases has little impact on others (preserve freedom of choice)



**The Vision of Long Term Food Research Is to
Deliver All Three Credentials of the Real Food Experience**

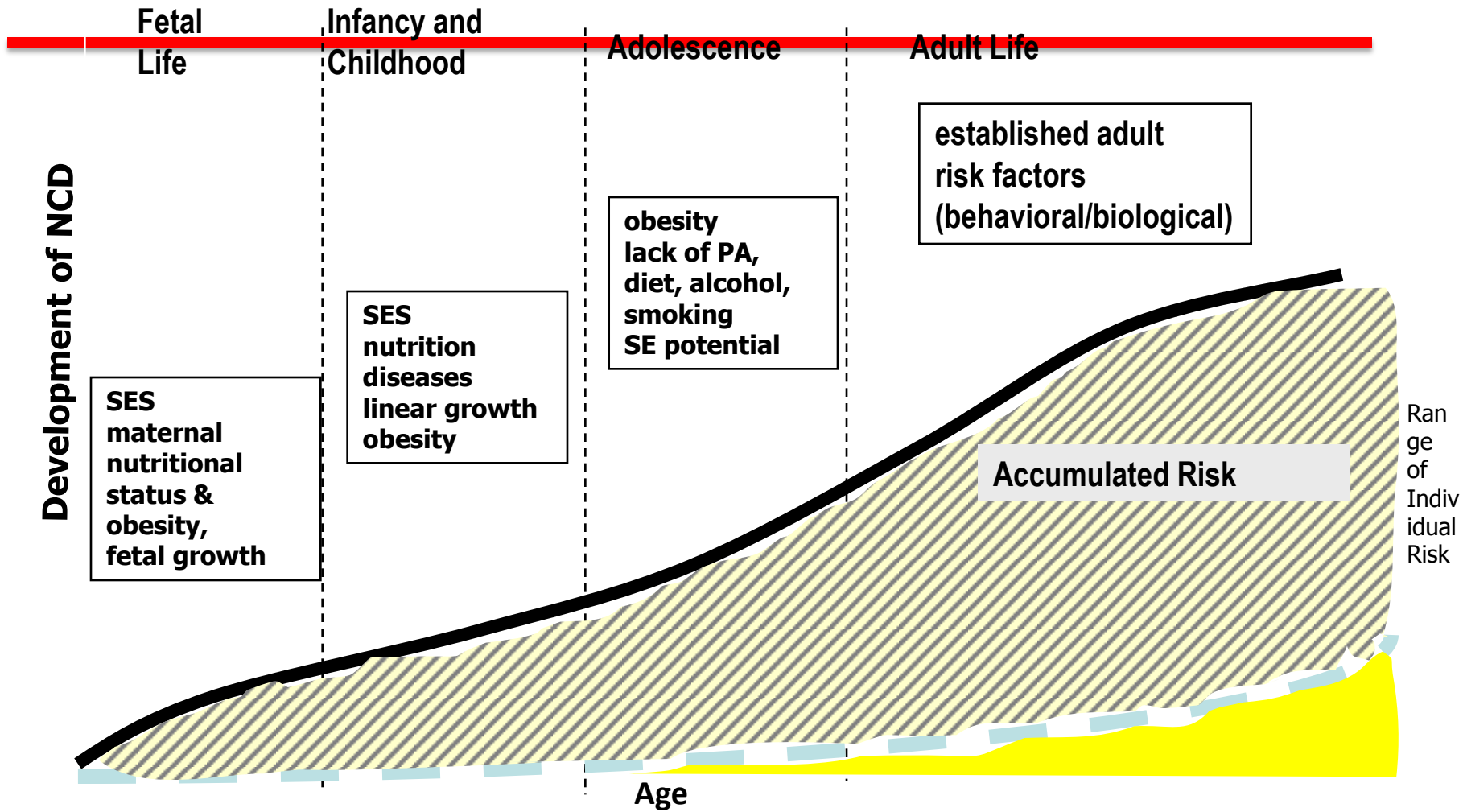


Translation of Nutritional Requirements into Every Day Delicious, Nutritious, and Convenient Products



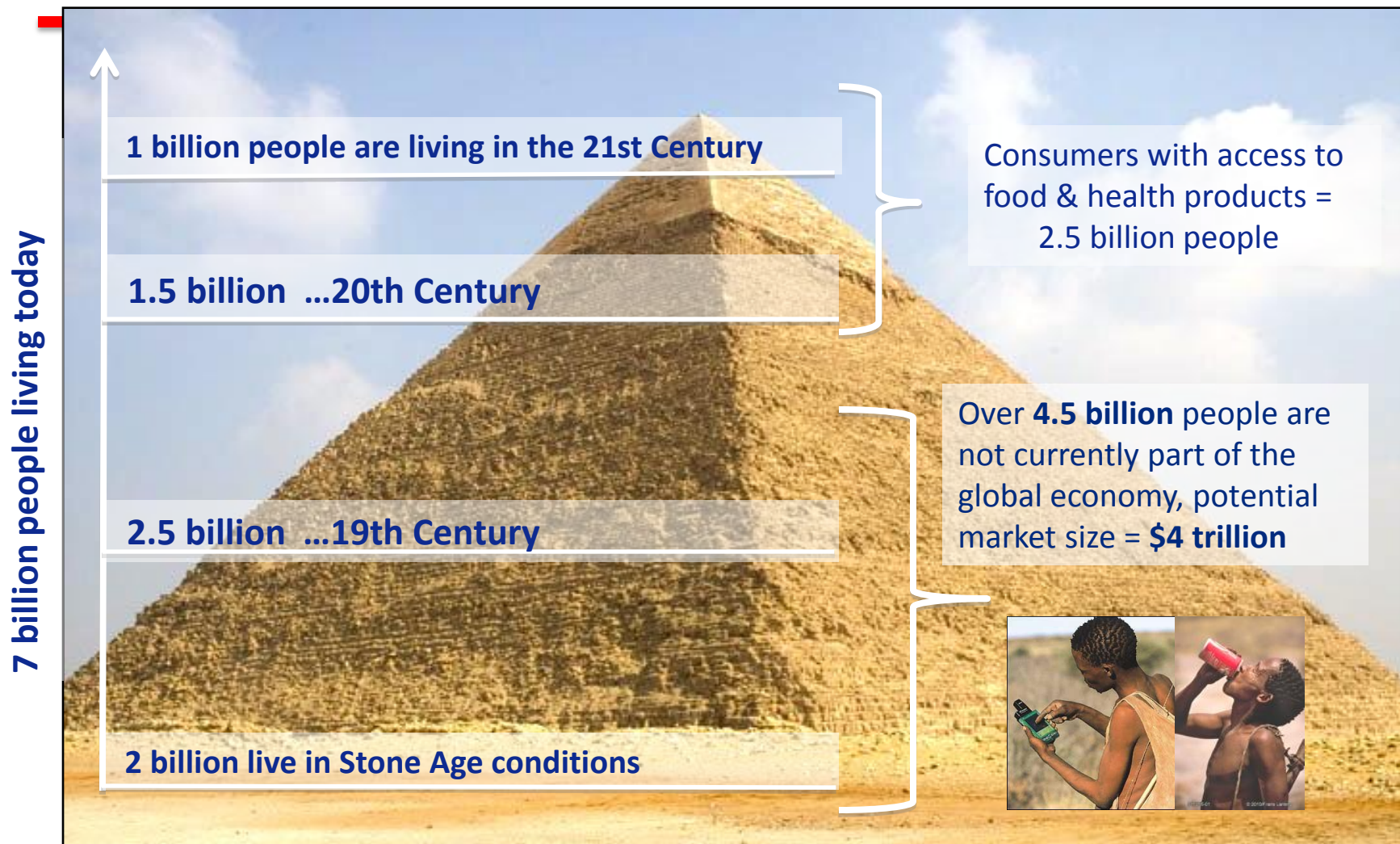
ONE SIZE DOES NOT FIT ALL IN NUDGE INNOVATION

Life Course Segmentation and Targeting



Affordable Nudge Innovation throughout the Global Economic Pyramid

(Adapted from R. Rodriguez , Delhi 2012)



Nudge Innovation: PepsiCo Case Study

(material from global executive vice president Mehmood Khan's presentations 2008 and 2012)

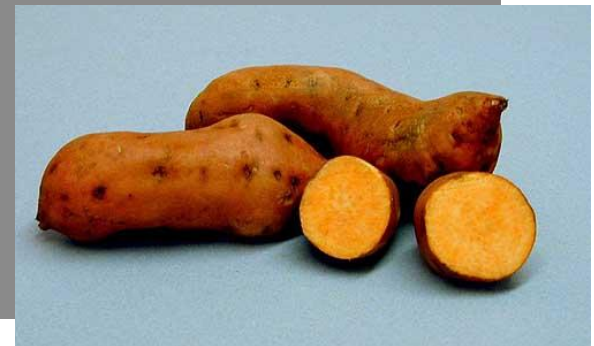
Links with Agricultural Innovations: E.g., Biofortification

HarvestPlus

- High iron beans & pearl millet
- High vitamin A cassava, maize, sweet potato
- High zinc rice & wheat

Orange-fleshed sweet potatoes

- High vitamin A sweet potato for sub-Saharan Africa

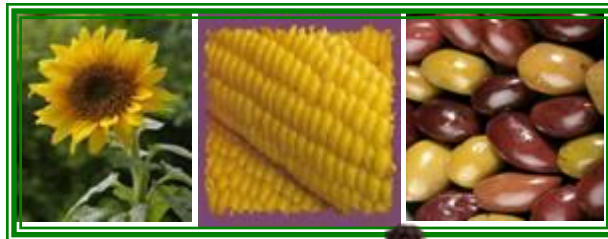


...the emphasis on HS initiatives within PepsiCo Innovation Big Bets?

Natural Ingredients, Clean Label



Improved Nutrition Profile



Reduce negatives
Increase positives
Improve processing

New Platforms



PEPSICO R&D gears up...



Executive Summary



Research News: Scientists at the PepsiCo Fruit and Vegetable Research Center have developed

Infrared drying when used as part of a combination drying process in fruits and vegetables reduces drying time, saves energy and improves product quality. A pilot scale infrared dryer for produce will soon be available at FLNA (*Page 2*).



Fruit and Vegetable Research Summit to develop research priorities for snacks and beverages will be held in Purchase, NY September 3-5, 2008 (*Page 3*)

Project RED in the UK is well poised to deliver a line of baked



Renovate and Innovate Portfolio



Building Demand For and Making Anemia Prevention Cool



Leverage New Corporate R&D Structure to Deliver the Innovation Pipeline...

Biological & Ingredient Research

Packaging and Processing Research

Health & Science Policy



Food Safety & Regulatory Affairs

Nutrition

Long Term R&D Strategic Alliances

Exploring alliances based on strategic platforms

M&A/In-Licensing

Academia

- North Carolina

Venture Capital/ Small Start-up

- Physic (initiated)

Emerging Markets

- Ayurvedic Medicine
- TCM

Pharma

Large Food

- Unilever

Strategic Suppliers

- Cargill
- IFF

**PepsiCo
R&D**

3

Paths of Convergence

Convergence in Development, Nutrition, and Health Literature: The *World* Converging with the *West*



Searching for a New Type of Convergence: The 2005-2010 series of McGill Health Challenge Think Tank

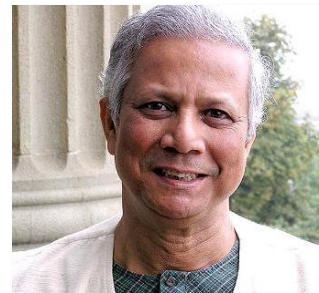
- ✓ Spearheaded by the MWP, a think-and-do tank that has been in incubation since 2005, with involvement of leading 21st Century visionaries and a worldwide network of local, national and global action partners, supported by academic backbone from disciplinary and complexity sciences, science/policy research agencies, and philanthropies
- ✓ Capitalize on innovation for whole-of-society solutions



Daniel Kahneman
2002 Nobel Economics
Laureate



Paul Krugman
2008 Nobel Economics
Laureate



Muhammad Yunus
2006 Nobel Peace
Laureate

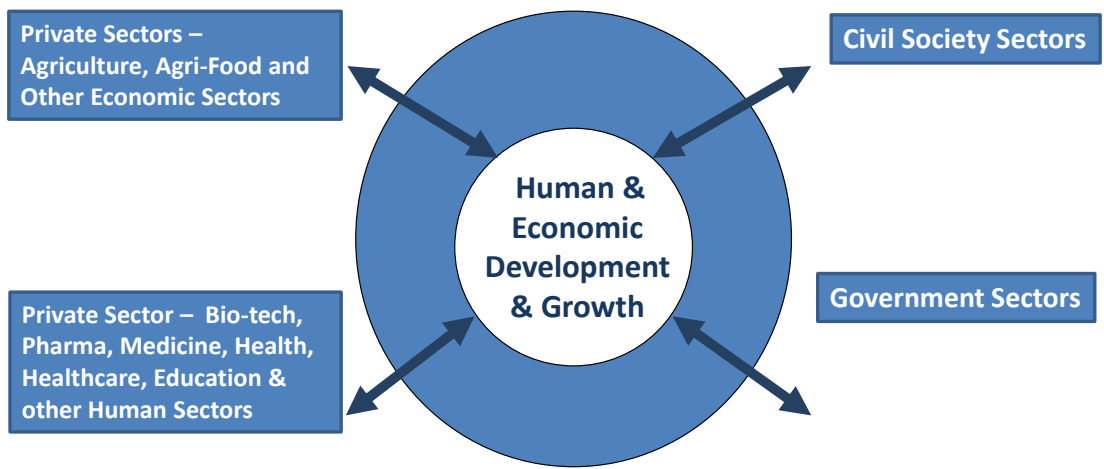
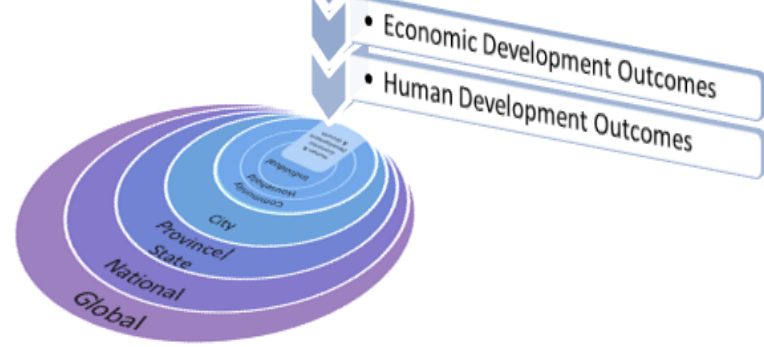


C.K. Prahalad
Late business strategist

Whole-of-Society Approach To Convergence between Human and Economic Development and Growth (Agriculture, Food, Health, and Wealth)



- Information & Communication Technology Sectors & Systems
- Trade, Finance and, Other Economic Sector & Systems
- Housing, Transportation & Infrastructure Sectors & Systems
- Agriculture/Agri-food Sectors & Systems
- School, Education & Health Systems
- Social Support & Systems





PNAS Special Feature

July 31, 2012 | vol. 109 | no. 31 | 12261–12836

PNAS

Proceedings of the National Academy of Sciences of the United States of America

www.pnas.org



Cover image: Pictured are open-air markets amidst heavy traffic in Hyderabad, India, showing the chaotic environments that populations in developing countries must contend with to obtain produce. Much of the food in these markets is transported from small farms outside the city and carried through clogged streets by a vast ad hoc network of small trucks, scooter trucks, and bicycle carts. Laurette Dubé et al. propose a roadmap for progress toward sustainable global nutrition security. Such roadmaps could help reduce hunger and poverty, and halt the spread of noncommunicable chronic diseases. See the article by Dubé et al. on pages 12294–12301, which introduces the Agriculture Development and Nutrition Security Special Feature. Image courtesy of Alex R. Freedman (Community Cooperative Farms, Sheffield, MA).

From the Cover

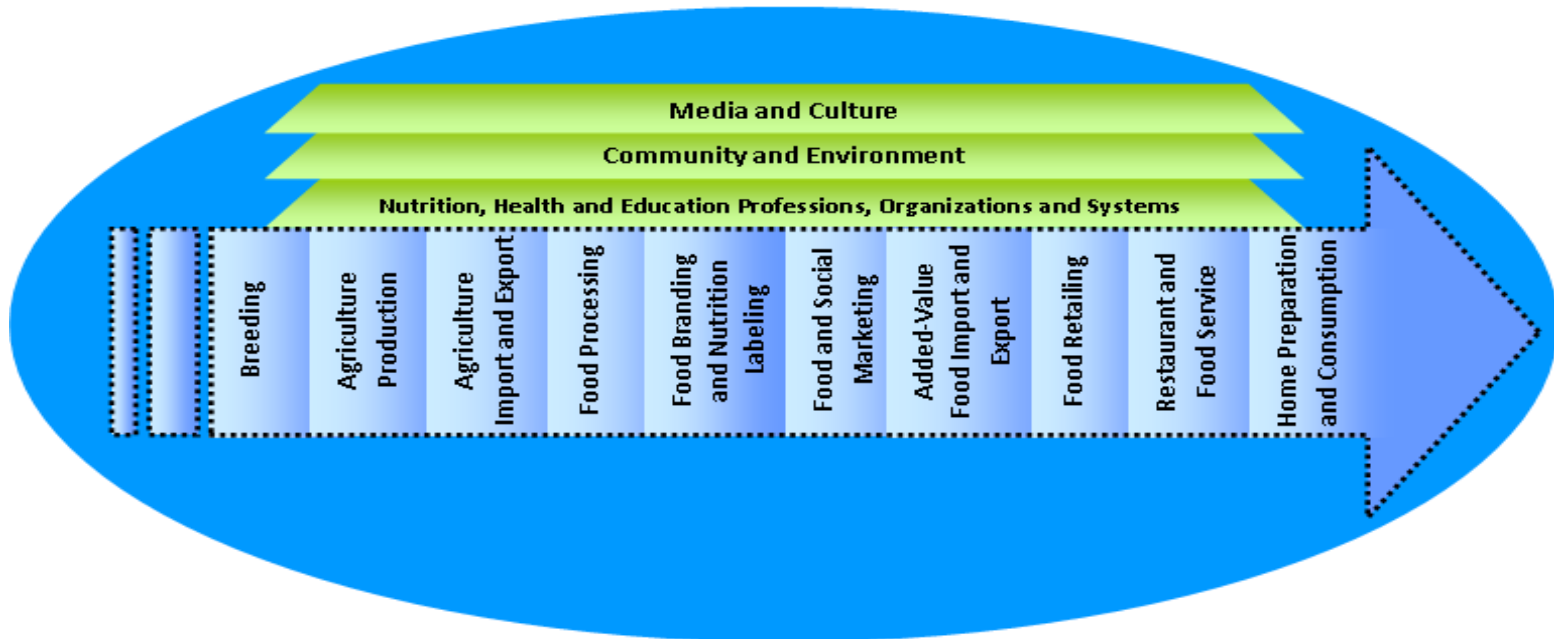
- 12294 Paths of convergence for agriculture, health, and wealth
- 12369 Topological soft matter
- 12680 The influence of Ig isotype
- 12805 Cell walls constrain diffusion

4

Convergent Innovation and small group/open discussion

Convergent Innovation for Transformation through the Whole-of-Society (WoS): Shifting Drivers of Supply, Demand, and Behavior

Figure 2: Moving towards an integrated health and agriculture and agri-food strategy



Four Key Features of Convergent Innovation for WoS Transformation

1. Innovation has been the lifeblood of industrialization for its benefits and ills and remains so for reaching impact, scale and resilience
2. Beyond Industrial innovation, businesses, social enterprises, other NGOs, philanthropies and governments are called upon for many other building blocks to effect meaningful transformation at the community, state, and national and global levels
3. There is an emphasis on simultaneously achieving humanitarian and economic goals through a convergence of technological, organizational, social and institutional innovation
4. The process must enable different types of actors to work independently as well as collaboratively toward well-integrated, time-bound, targeted, and achievable goals, and on a sustained, real-world basis, rather than only in conferences and workshops

CONVERGENT INNOVATION

The LEGO strategy to innovate in the way we innovate

CI roadmap project goals and success metrics

1

Nudge Innovation

- In depth knowledge of human biology and behavior; in depth-focus *for* and *with* the poor for nutrition and health as successful drivers of technological innovation

2

Convergence in Technological Innovation

- Convergence in siloed technological innovation including, agriculture, food, transportation, healthcare, IT, etc...

3

Organizational Innovation

- Nutrition and health-promoting work practices, business processes, value-chain transformation, shared-value creation, and BoP

4

Social Innovation

- Social entrepreneurship, social business, micro-finance

5

Financial Innovation

- Impact investment, consumption.investment market signaling systems, venture capital

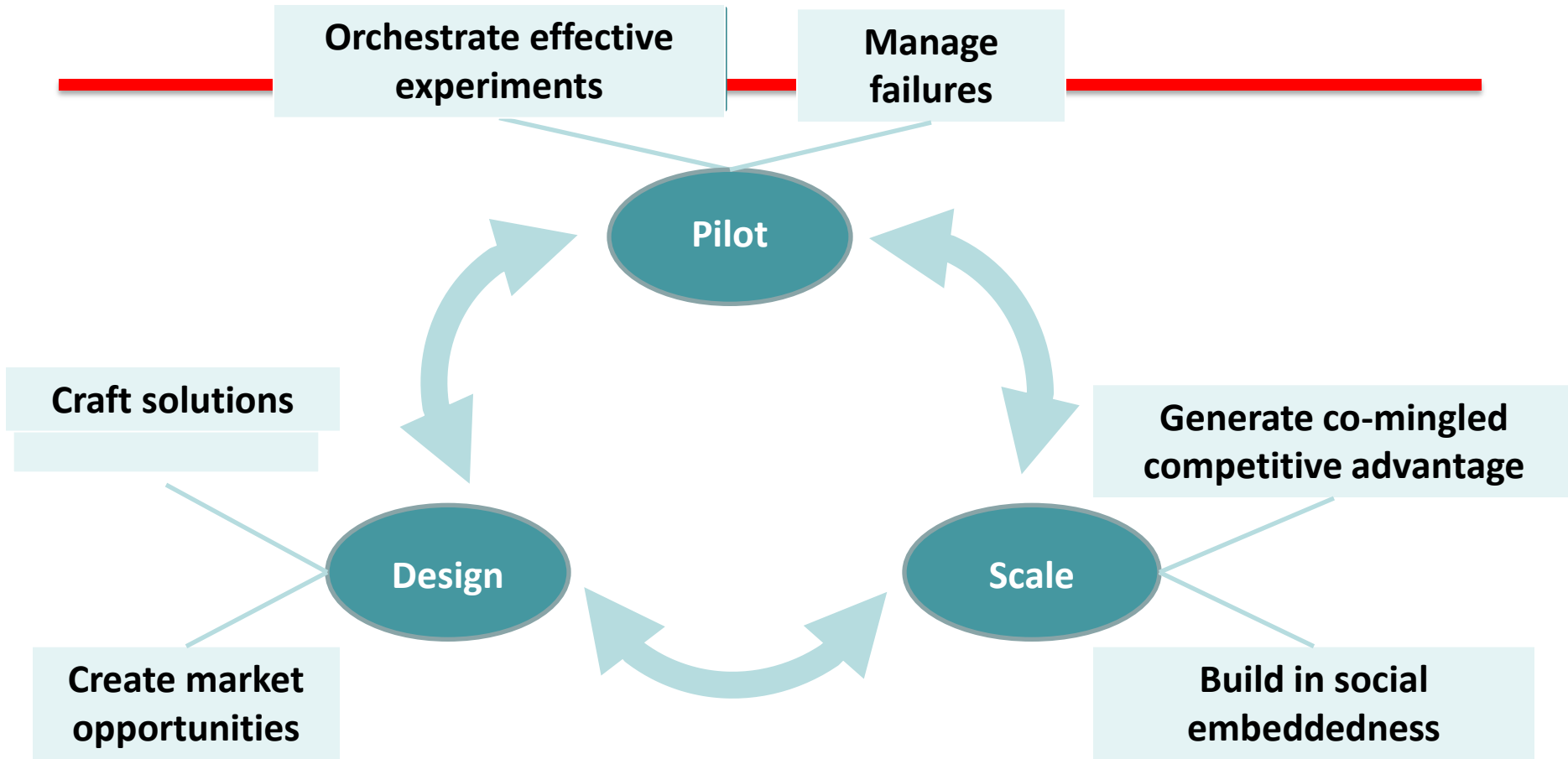
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Institutional Innovation

- Enabling policy environment, norms and media for highest humanitarian and economic return on investments in all of the above



Convergence Innovation Roadmaps



Cross Sector Collaborations

Linking business initiatives with community mobilization, philanthropy and development investments, public policy

4 Roadmaps for Real World Change with Impact, Scale, and Resilience



Obesity & NCD Prevention and Control

Projects

- Global Obesity Roadmap Project to understand the drivers of (un-)healthy consumer behavior (ACTIVInsight™)
- Healthy Eating



Micronutrient Sufficiency

Projects

- Improve nutritional practice in pregnant /lactating women and young children (1000 days)
- Micronutrient sufficiency (anemia)
- Convergent Innovation Prize for Stunting



Dietary Diversity and Balance

Projects

- Scaling up pulse household production and consumption in rural India (value chain assessment)
- Increased pulse consumption through processed foods in developing countries



Home Health

Projects

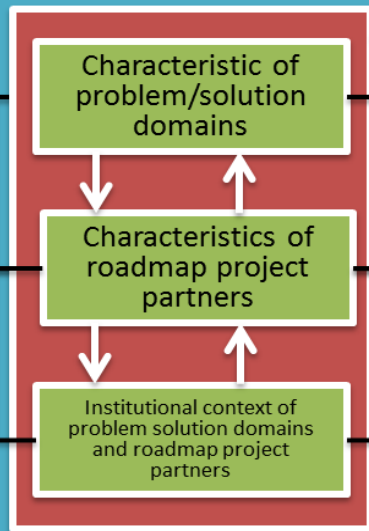
- Generate awareness about provision of health, nutrition and development services using digital technology
- Assess low cost market-based products for improving quality of diets in pregnancy / infants

CI Operationalization

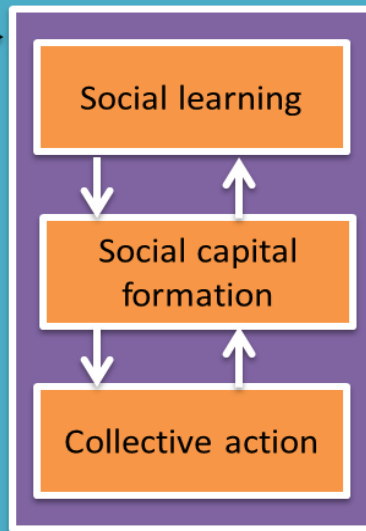
WoS conditions, challenges and possibilities for sustainable development and affordable health care

CI ARENA FOR ROADMAP DEVELOPMENT AND DEPLOYMENT

CI Input



CI Process



CI Building Blocks



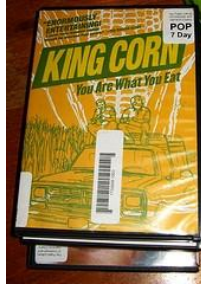
CI Outcomes



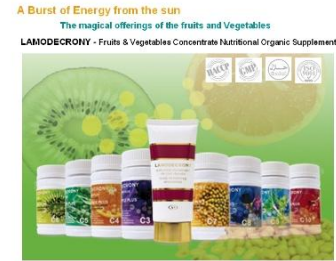
Convergent Innovation: A Multi-Stakeholder Approach



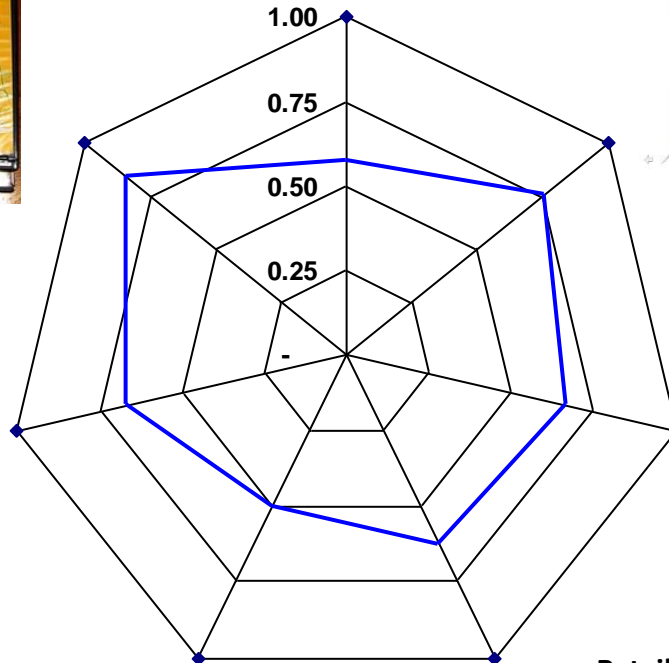
HN Food Offerings



HN Food Subsidy



HN Food R&D



Government Tax Labeling Set Levels

Nutrition Facts	
Serving Size 1 bag 7 oz 198g (198 g)	
Amount Per Serving	
Calories 972	Calories from Fat 558
% Daily Value*	
Total Fat 64g	99%
Saturated Fat 16g	80%
Trans Fat	
Cholesterol 0mg	0%
Sodium 1485mg	62%
Total Carbohydrate 105g	35%
Dietary Fiber 5g	35%
Sugars	
Protein 15g	
Vitamin A	9% + Vitamin C 112%
Calcium	10% + Iron 21%

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

©www.NutritionData.com

AgriFood Community Rollout



HN Marketing & Education Programs

Retail Pricing, Promotion



Pulse Innovation Partnership

Convergent Innovation Process at Work

- An alliance of public and private organizations, civil society and academia, including:
 - The MCCHE, CGIAR (ICRISAT and CRP4), IFPRI
 - Small, medium and large national NGOs in agriculture extension, school and health
 - Small, medium and large national processing companies
 - Multi-national manufacturers (farming, processing, packaging, sensory, food technologies)
 - Leading advertisement agency
 - Pulse grower organizations
 - Micronutrient fortification company
- **Vision:** move from feeding people to nourishing people around the world
- **Mission:** provide balanced nutrition by enhancing pulse perception as protein source that improves environmental sustainability
- **Goals:** scale up private sector engagement in agriculture and nutrition, develop innovation in processing and manufacturing to allow pulses to enter the market

Pulse Convergent Innovation Roadmap (in progress)

- Product Development
 - An open innovation platform to boost pulse consumption worldwide on an economically sustainable basis.
 - Develop good tasting processed pulse foods with health/nutrition benefits at low cost
 - Innovation at multiple steps of processed food value chain
 - Utilize multi-sectoral partnerships
- Value Chain
 - Multi-stakeholder engagement to support small holder farmers with processing/production
 - Two regions with varying degrees of agro-ecological and development transition challenges: Bihar and Karnataka
 - Introducing agricultural innovations to increase yield
 - Institutional design experiments to increase productivity



Towards a Fruit & Vegetable CI Roadmap...



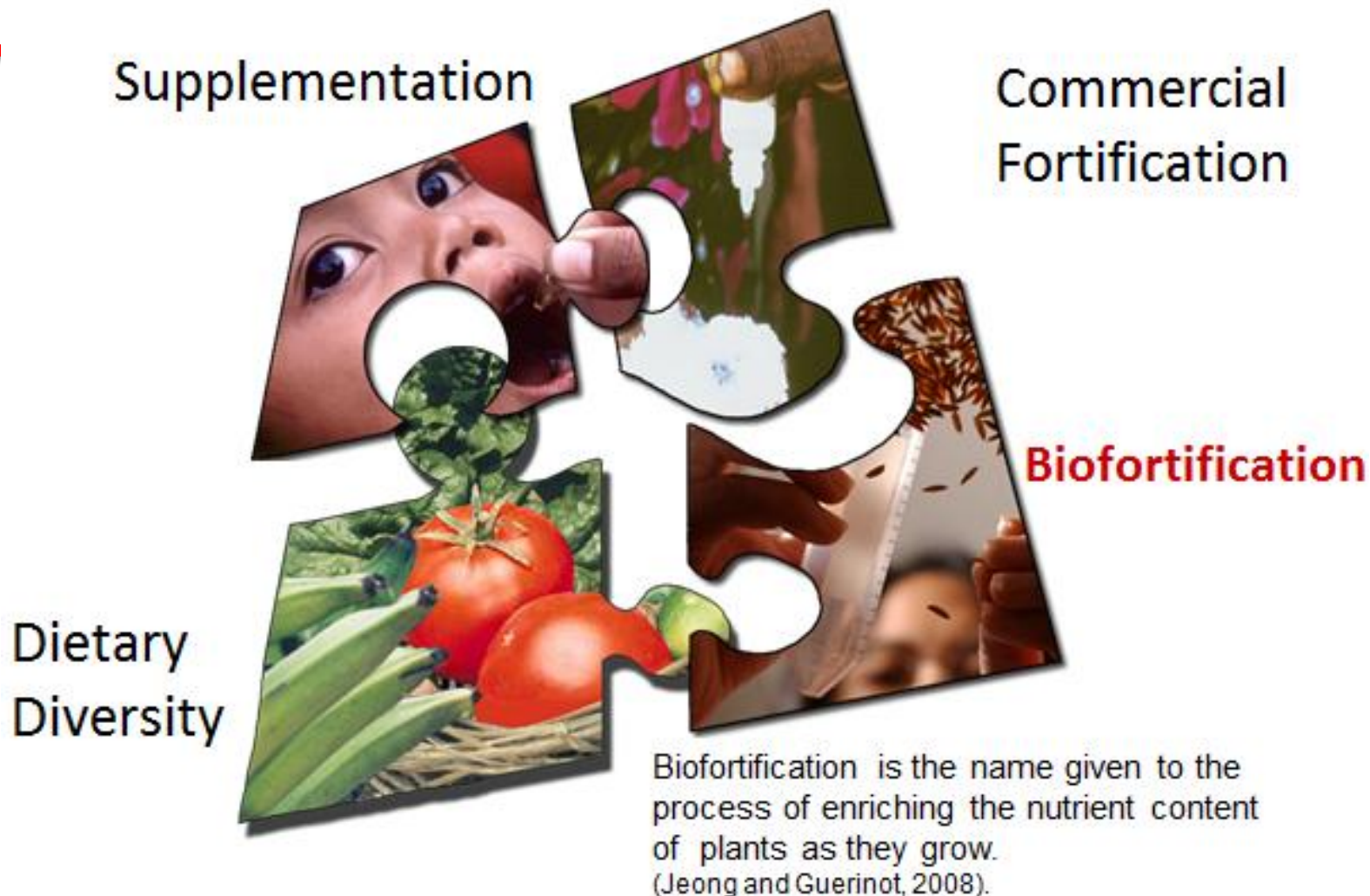
THE BUILDING BLOCKS

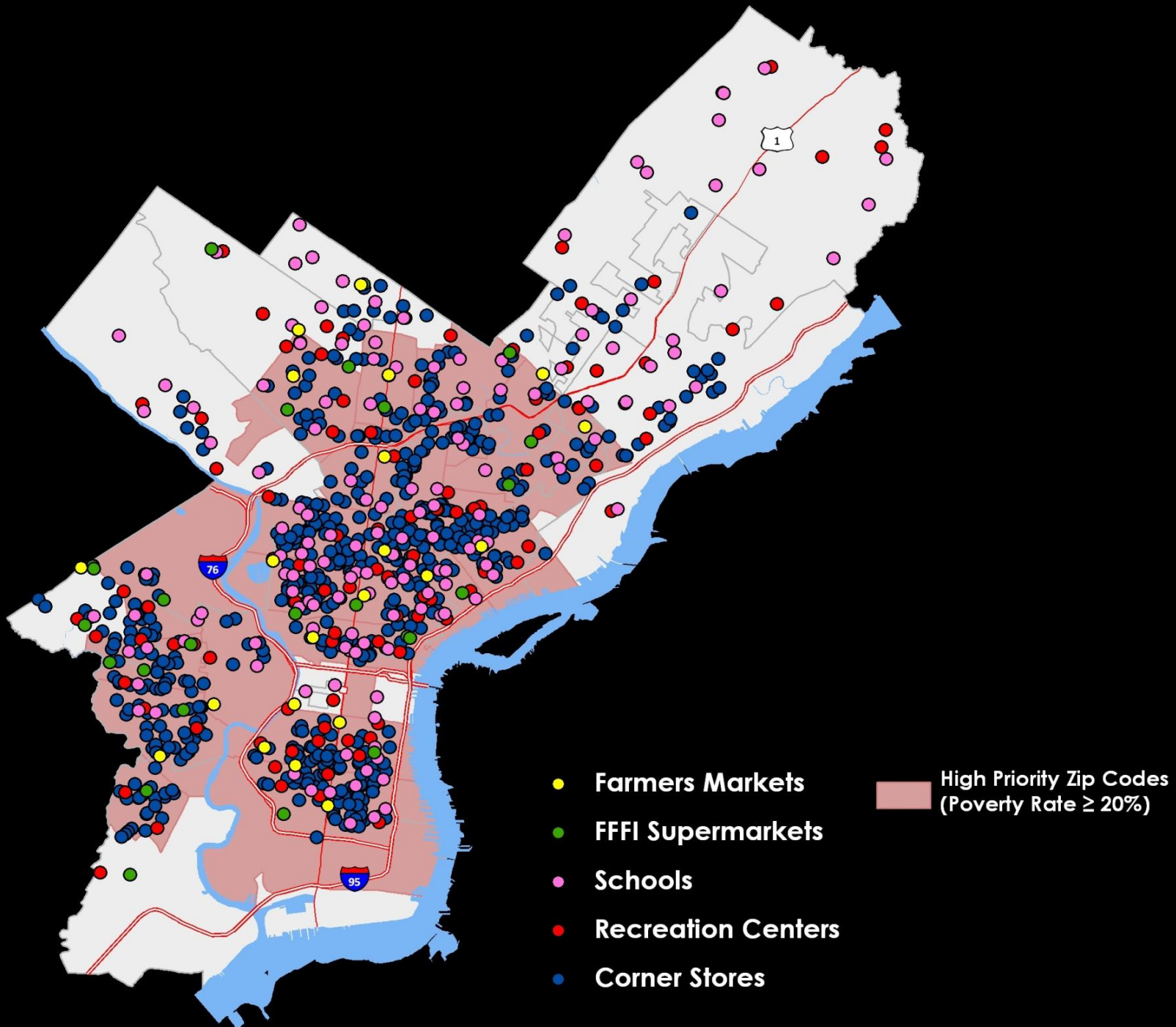
EU School Fruit Scheme



- Budget 90 M Euros
- Reaches over over 8 M children (25 %) of target in 54,267 schools
- FV demand increased by 43,730 tons in 2010/11 (0.06% total gross net supply)
- High level of cooperation between Ag, Health and Ed. at ground level

Learning from Innovation to fight micronutrient malnutrition





Part of a comprehensive approach:

Food marketing strategies that may help parents, caregivers and youth select and purchase healthier foods and beverages at the grocery store.

Integrate these healthy food retail strategies into the business model of the supermarket and food industries.





Process, Partnerships and the TAKE 10!® Program: 10 Years of Learning

ILSI Research Foundation

Physical Activity and Nutrition (PAN) Program

1156 15th Street NW, 2nd Floor, Washington DC 20005

Email: take10@ilsf.org

Website: www.take10.net

Innovation in Taste and Flavor has Multiple facets

Biosynthesis

Analytical Chemistry

Food Science

Brand



Resources/
RM

Sustainable
Planet

Shifting
Demographics

Policy



Physiology/
Sensory

Nutrition

Lifestyles/
Social Habits

Behavioral
Economics



jive HEALTH

HELPING CHILDREN EAT HEALTHIER.

Three Core Wholesome Wave Programs



Double Value Coupon Program

Incentives to leverage public nutrition benefits.

Farm Bill
SNAP



Healthy Food Commerce Investments

Capital and business development

Private
Capital



Fruit & Vegetable Prescription Program (FVRx)

Integrated clinical/community intervention

Health
Care
Spending

wholesome
wave

Towards a FV roadmap...

....The Lego Strategy

-
- Starts with a deep understanding of food choice and human behavior to embed nutrition and health within other motives
 - Taste and image – new partnerships to understand the role of taste, convenience, and image to increase fruit and vegetable consumption-BUILDING DEMAND
 - The importance of early intervention – reshaping food choice in pregnancy and infants
 - Changing the choice architecture at home, in school, in community, in business, and in government

Towards a FV roadmap...

- Community development and local value chain innovation models for improving access to fruit and vegetables for all
- Linking local communities and value chains to state, national and global agriculture, food, and health practices and systems
- Innovative, sustainable and resilient finance
- Enabling norms, institutions and policies

From Aruba to Bruxelles and Copenhagen via Halifax, Delhi, Dhaka, Montreal, Washington, Geneva, and Mexico



Reframing the Conversation (London 2012)

From **Prescribing** to...

Innovating

From **Building for** to...

Creating with

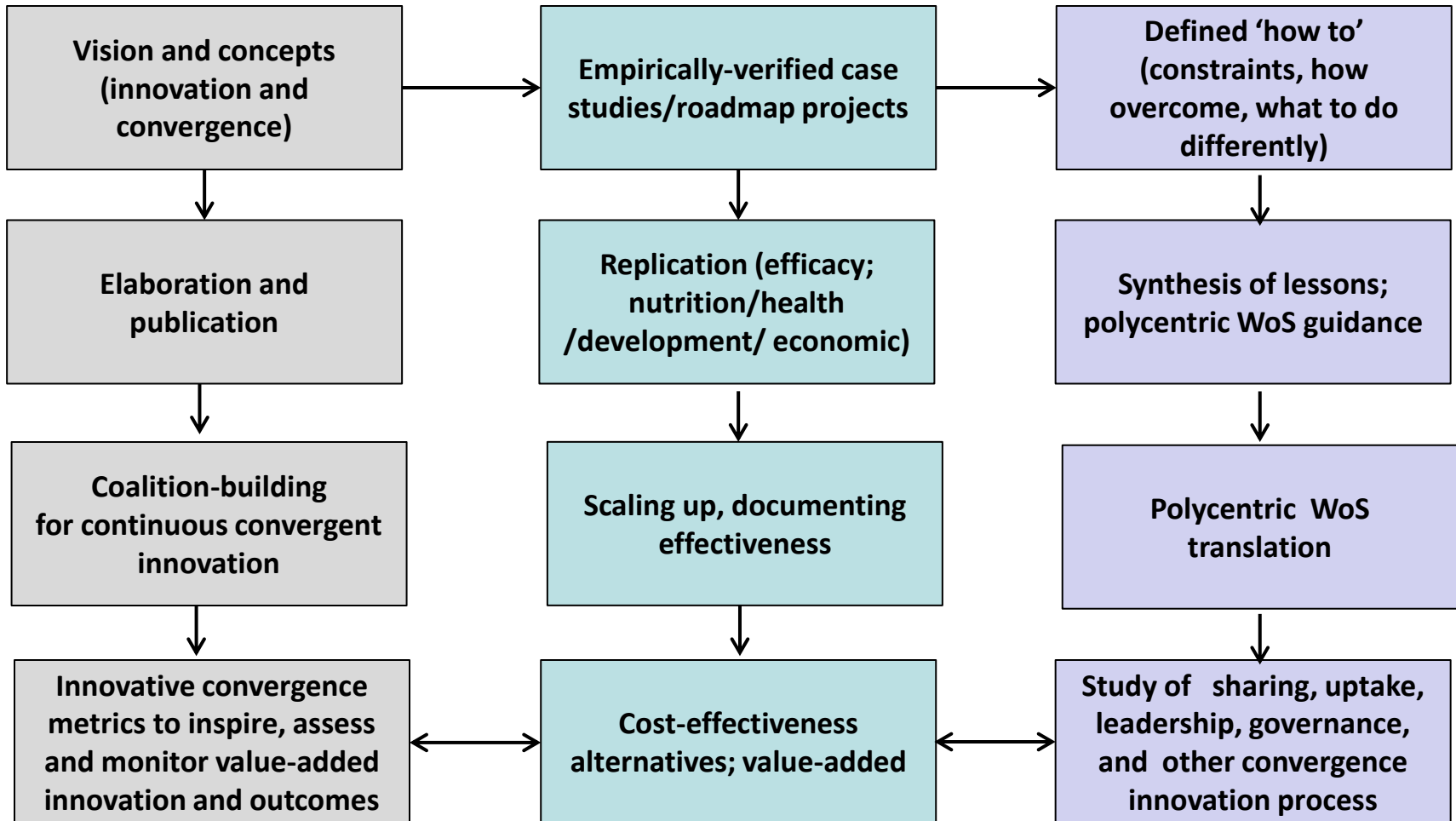
From **Independence** to...

Interdependence

From **Evaluating** to...

Enhancing

CIC 5-YEAR START-UP PLAN



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