

# Personalized Food for Health: Food Disruption Challenge for SME



International Conference on Small and Medium Enterprise Empowerment (ICSMEE)

Thursday, October 11th 2018

UNS Inn, Universitas Sebelas Maret, Surakarta City, Indonesia

Website : <http://icsmee.psp-kumkm.lppm.uns.ac.id/>



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## Food for health



**Hippocrates (400 B.C.)  
Father of Medicine**

**“Let thy food be thy medicine  
and  
the medicine be thy food”**

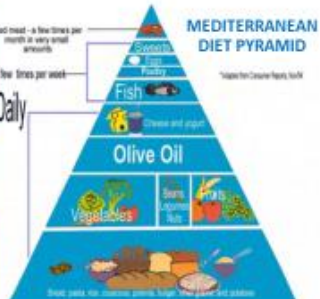


**Ancient Ayurvedic Proverb**

**“When diet is wrong,  
medicine is of no use.**

**When diet is correct,  
medicine is of no need”**

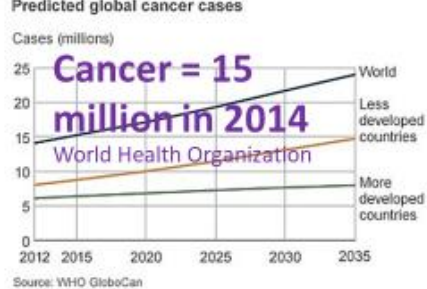
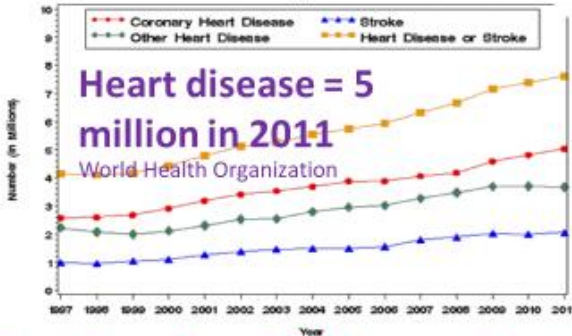
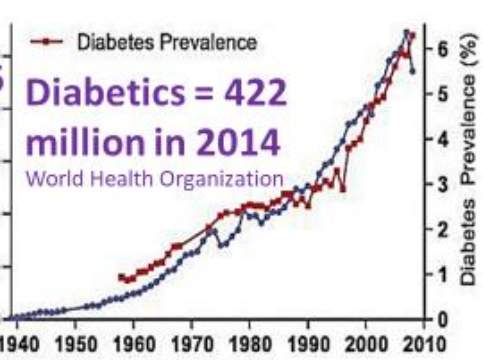
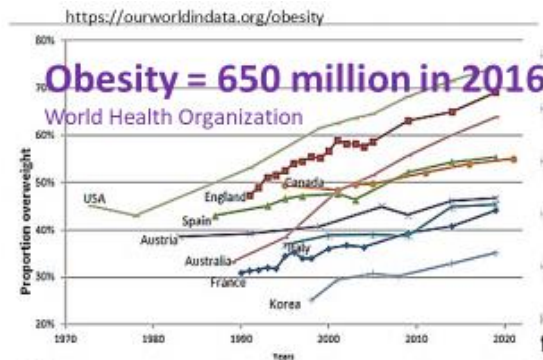
# Food for health: Food guideline



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## Are Food guidelines effective?

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- ❖ Over-weight population
- ❖ Diabetes
- ❖ Heart disease
- ❖ Cancer

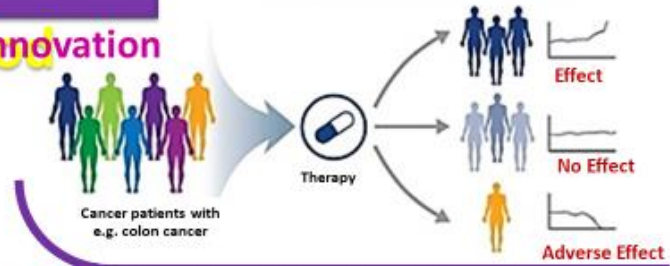
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# Personalized medicine

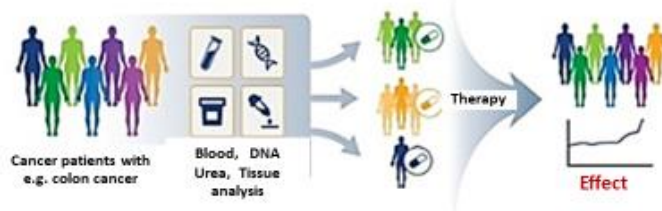
## AI Meets Healthcare Innovation

- Precision medicine/food
- Proactive health monitoring
- Remote patient/person monitoring (tele-medicine/food)
- Lower cost with high effectiveness

### Current Medicine/Food One treatment fits ALL



### Future Medicine/Food More Personalized diagnostics



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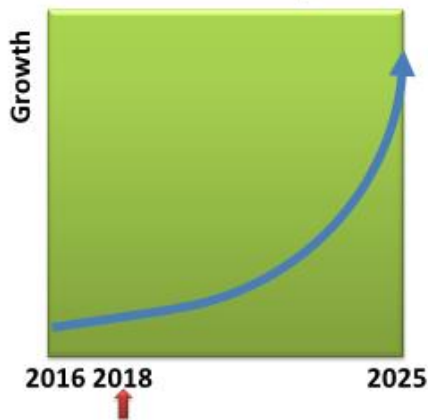
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## Disruption Challenge



### Creative disruption!



### Exponential Technology

IoT...Internet of Things  
AI...Artificial Intelligence

Domino Impact



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# Artificial intelligence (AI)

Artificial Intelligence and Data Management  
emerge **DISRUPTIVE INNOVATION**

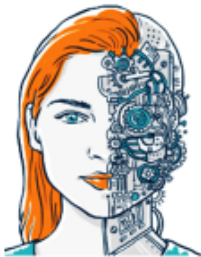


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## Definition: Artificial Intelligence (AI)



Mind or Machines  
Cognitive Science Changing  
Artificial Intelligence

“any device that **perceives its environment and takes actions that maximize its chance of successfully achieving its goals.**” [1]

“a machine mimics "**cognitive**" functions that humans associate with other human minds, such as "**learning**" and "**problem solving**".[2]

[1] Definition of AI as the study of intelligent agents:

Poole, Mackworth & Goebel 1998, p. 1, Russell & Norvig (2003) (Russell & Norvig 2003, p. 55). Nilsson 1998 Legg & Hutter 2007.

[2] Russell & Norvig 2009, p. 2.

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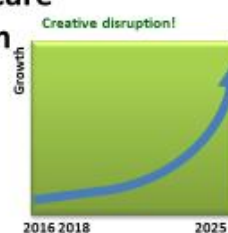
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## Artificial Intelligence (AI) & Data management



### Domino Impact

- Internet of Things (IoT): hardware, software
- Finance (FINTECH)
- Heavy industry
- Construction
- Medical care
- Education
- **Food**



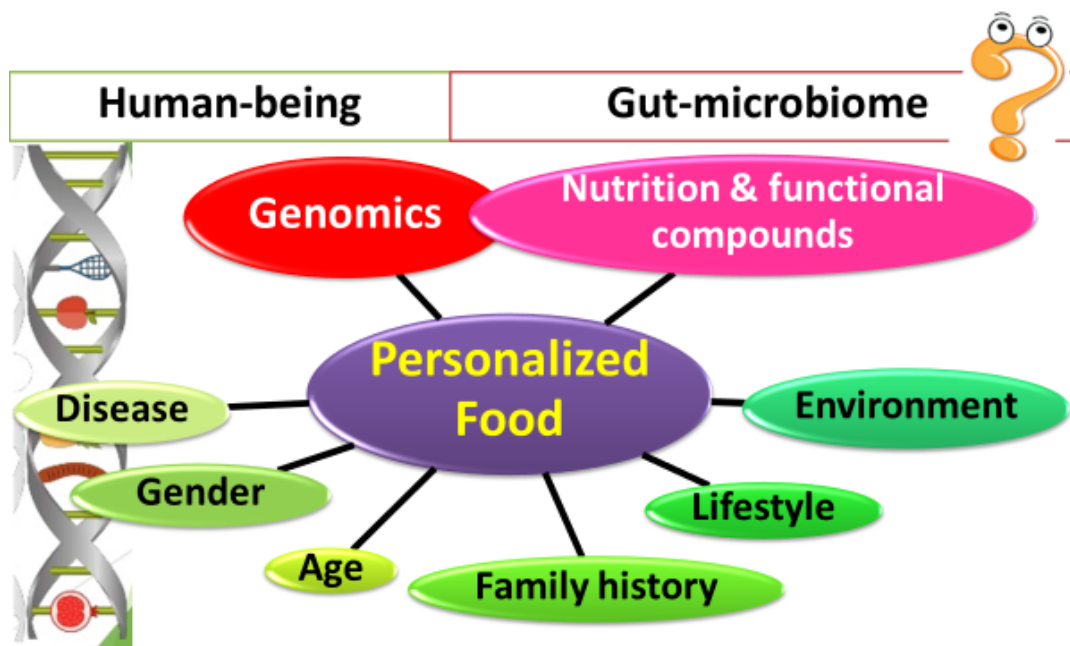
- 3D food printer: small machine produces a variety of food
- Food design: personalized food

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## Personalized Food: Scientific Concept – AI



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# Nutritional Genomics: Can it deliver on Its promises?



Kristin Gunderson, Amanda Carlson and Lindsay Sane

Personalized medicine  
Personalized food

Precision medicine  
Precision food

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## NUTRITIONAL GENOMICS

Specific traits are associated with health/disease



Genes interact with environmental factors



Bioactive compounds interact directly/indirectly with genes  
& alter physiological traits



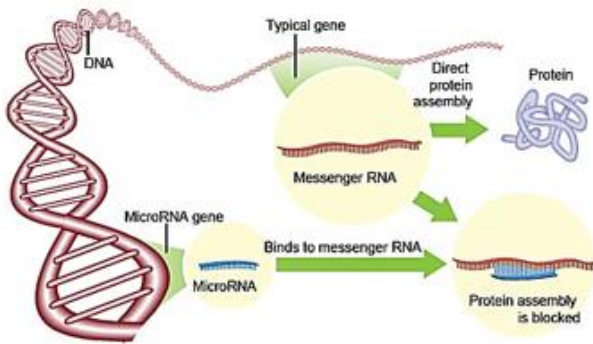
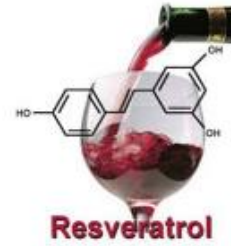
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Kristin Gunderson, Amanda Carlson and Lindsay Sane

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**Resveralogues: resveratrol derivatives**

Switch a specific category of genes back on  
made cells look youthful & start dividing



**Other functions:**

- Antioxidant
- Anti-inflammatory
- Anti-viral
- Cancer chemopreventive
- Protect from infection
- Protect from ischemia
- Prevent aging
- Cardioprotective
- Neuroprotective
- Reduce obesity

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**HOT ISSUE: GUT MICROBIOME**

<https://drjockers.com/10-ways-improve-gut-microbiome/>

### Intestinal Flora Affects Your Health

The microbes that live inside your intestines influence your health in beneficial and harmful ways

**Immunity**  
Providing a physical barrier to invasive microbes, our gut flora enhances the functionality of the immune system.

**Vitamins**  
Bacteria in the gut plays a direct role in the synthesis of vitamins B and K as well as the absorption of calcium and iron.

**Metabolism**  
Metabolic activity of the gut flora allows our body to utilize food that would otherwise not be digested.

**Obesity**  
In 2009, Dr. Krajmalnic-Brown discovered gut bacteria of obese patients differs significantly from normal individuals.

**Inflammation**  
Gut flora likely plays a major role in the development of various inflammatory diseases including IBD and colitis.

**Autism**  
New research by Dr. Krajmalnic-Brown suggests a link between autism and decreased gut bacterial diversity.

**Bad Gut Microbes**

=

**Increased Inflammation**

=

**Poor Quality of Life**

DrJOCKERS.COM 7/24/2018

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# Gut Microbiome

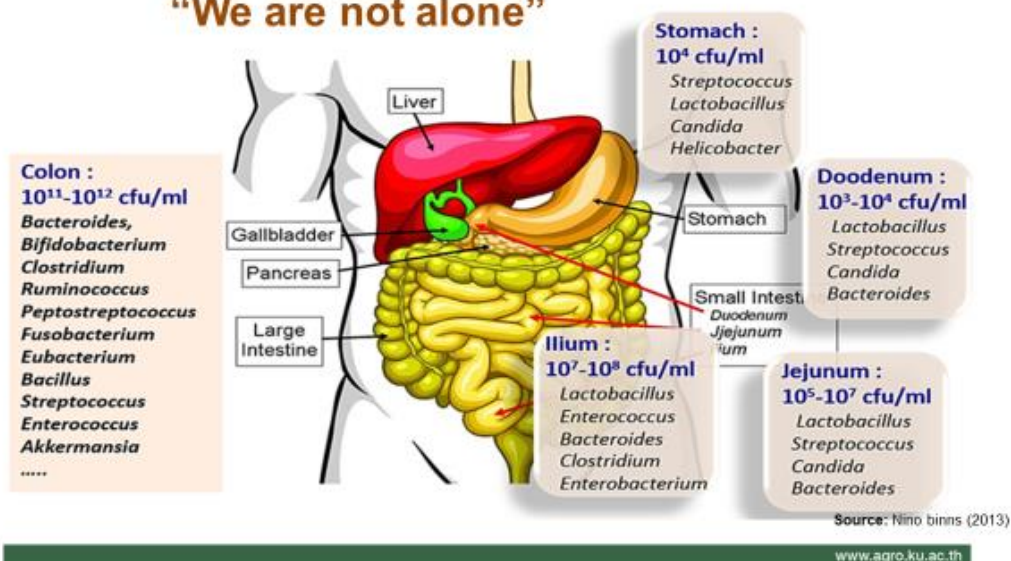
## Function on Host

- ❑ **Metabolic function** – breakdown of **non-digestible compounds** such as resistant starch or plant oligosaccharide and polysaccharides
- ❑ **Trophic function** – control of proliferation and differentiation of **epithelial cells and immune system maturation**
- ❑ **Protective function** – competitive exclusion with pathogen by intestinal surface occupying and antimicrobial production



# Gut Microbiome

“We are not alone”





## Bacteria:Human Cells ratio



Who is the boss?



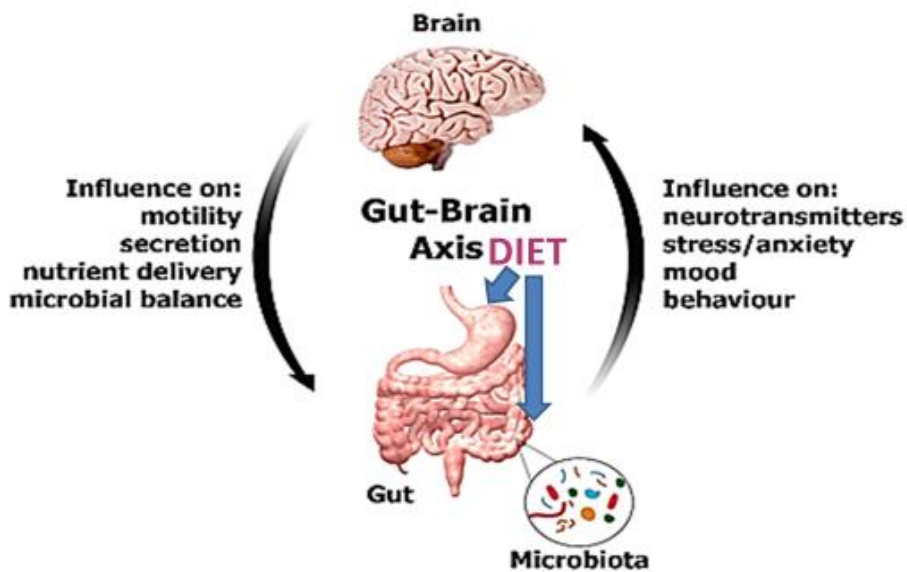
Population segment	Body wt (kg)	Age (y)	Blood vol. (l)	RBC count ( $10^{12}/L$ )	Total human cells ( $10^{12}$ ) (2)	Total bacteria ( $10^{12}$ )	B:H
Ref. man	70	20-30	4.9	5.0	30	38	1.3
Ref. woman	63		3.9	4.5	21	44	2.2
Young infant	4.4	4weeks	0.4	3.8	1.9	4.4	2.3
Infant	9.6	1	0.8	4.5	4	7	1.7
Elder	70	66	3.8 <sup>(3)</sup>	4.8	22	38	1.8
obese	140		6.7	5.0 <sup>(4)</sup>	40	56	1.4

Sender, R., Fuchs, S., & Milo, R. (2016). Revised estimates for the number of human and bacteria cells in the body. *PLoS biology*, 14(8), e1002533.  
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## GUT vs. BRAIN + OTHERS

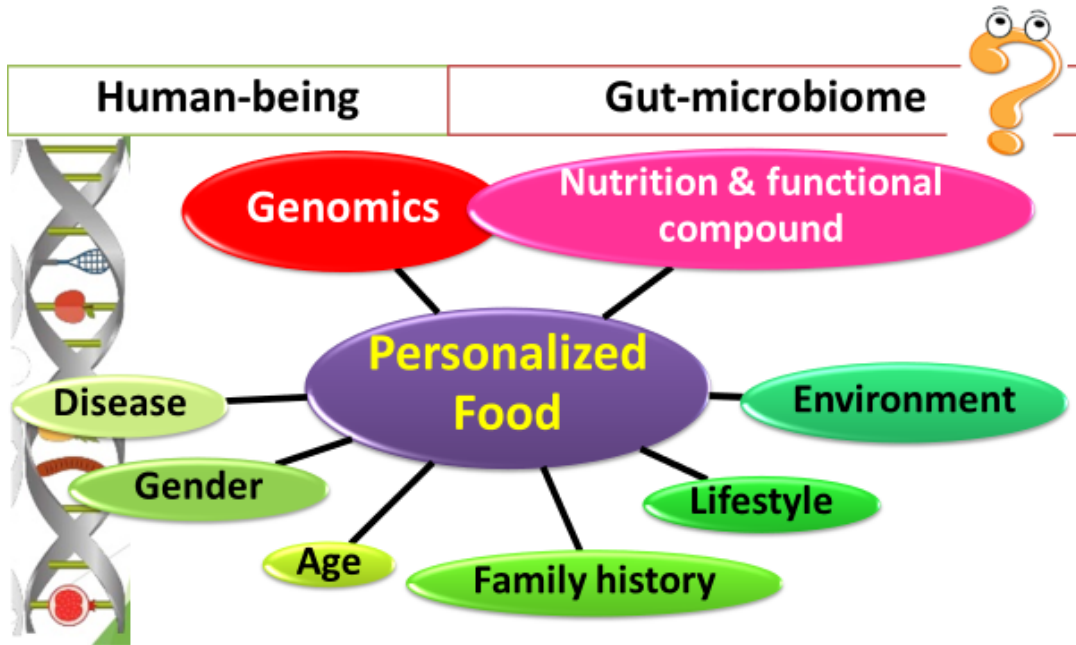


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# Personalized Food: Scientific Concept – AI



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**AI INVENTION**

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# For a better life! **Nestlé** brings **human DNA** to individual food production. Hope to help solve health problems.

Tangsiri 03/09/2018

It is known that many countries are entering the **elderly society**. Young people today are more **health conscious**. It is the origin of Nestlé's new strategy to develop **individualized foods** through the introduction of **DNA**.



<https://brandinside.asia/nestle-and-food-by-human-dna/>

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## Nestlé's new strategy:

News by **Tangsiri** -  
03/09/2018

**Nestlé is using DNA to create personalized diets in Japan**

**Japanese**

**~100,000 member**

Nestlé sends the device to collect **DNA samples** at home

Members use an **app** to post pictures of what they're eating.

Nestlé then **recommends dietary changes** and supplies **specialized supplements** that can be sprinkled on or mixed into a variety of food products



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## Campbell Soup (Nestlé)

SAN FRANCISCO — **Personalized nutrition** is “the next big opportunity” for packaged food companies.

**Habit**, a San Francisco-based start-up

- Launched in 2017
- Develops nutrition recommendations based on an individual’s biology, metabolism and personal goals, while offering one-on-one wellness and nutrition coaching.

Artificial flavors/Colors

Sugar  
Salt



Natural



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habit

HOW IT WORKS | TEST RESULTS | SCIENCE | FRESH MEALS | SUCCESS STORIES | SHOP NOW

Nestlé

Find out what foods  
your body needs to  
be its best.

Now you can get a personalized  
nutrition plan to match what you eat to  
your body's unique make-up.

SHOP NOW



“This is the complexity of the personalized nutrition space,”  
“One of the things: focused on marrying biology and behavior to get to a holistic recommendation, recognizing someone’s body, mind and heart at the same time.”

HABIT.  
DNA-FIT MEALS  
DELIVERED.

Habit uses cutting-edge science to find out what their customers' bodies crave at a cellular level. The hyper-personalized diet plan is based on a customer's DNA test, self-reported data and individual health goals. The meal delivery service will be available in selected US areas from early 2017 on.

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VEGGIES  
64%

HERO FOODS  
CALIFLORES, MUSHROOMS,  
BROCCOLI

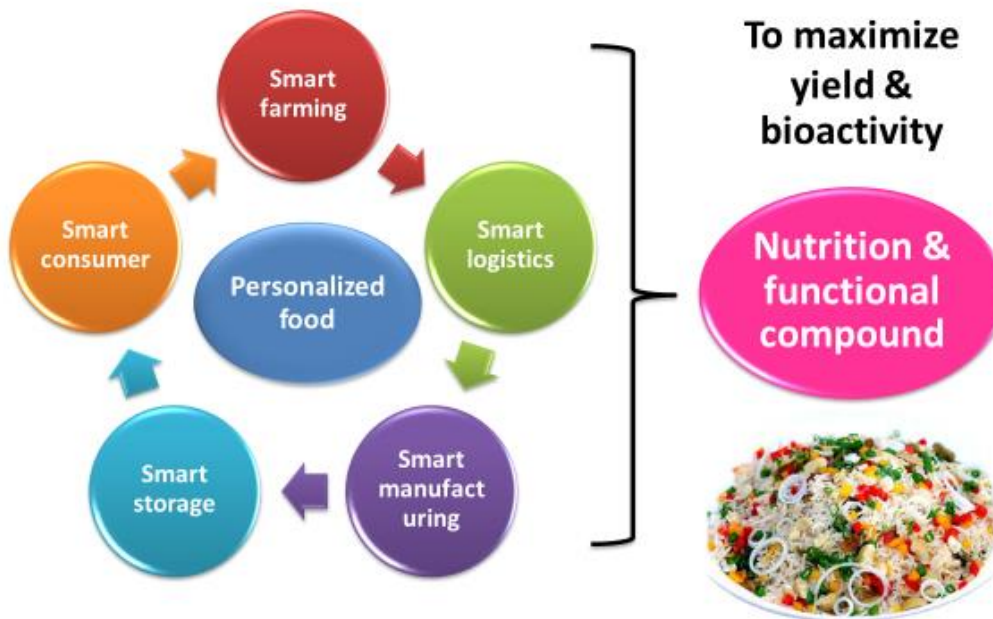
TREND

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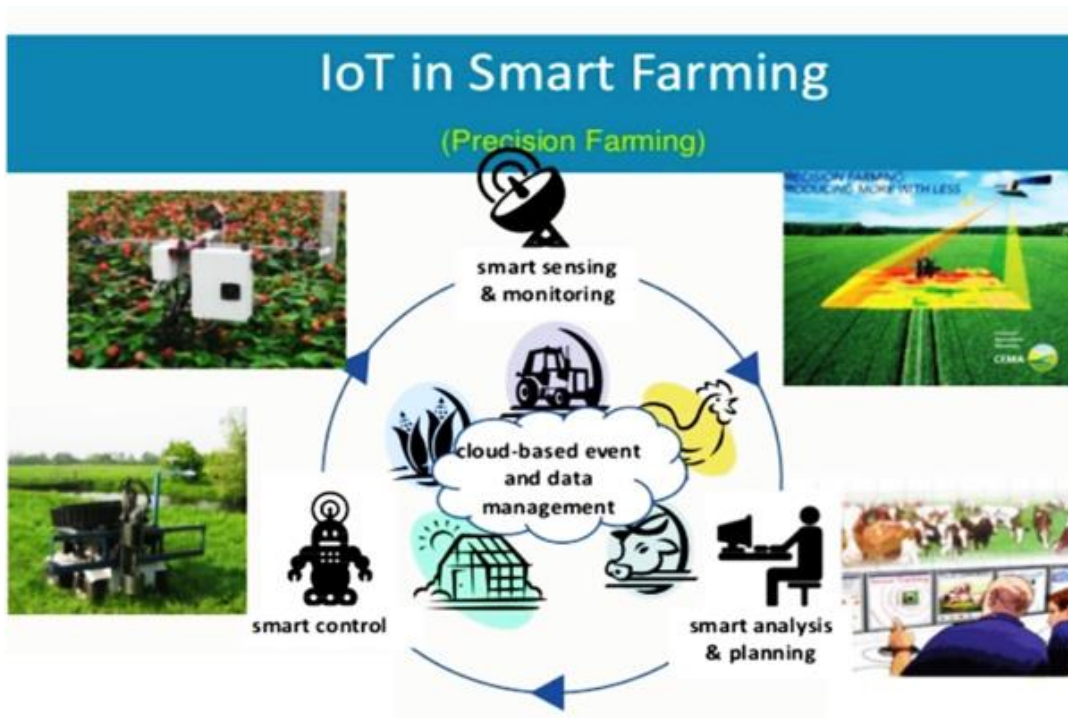
# Food chain for personalized food



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# SMART FARMING: THAILAND

Smart Farm(Thailand) Co., Ltd.

<http://smartfarmthailand.com/precisionfarming/>

SMART FARM THAILAND

AUTONOMOUS SENSOR DRONE

“เปลี่ยนเกษตรไทยสู่เกษตรอัจฉริยะ”

จุดติดตั้ง IoT เซ็นเซอร์สำหรับตรวจวัดสภาวะปัจจัยการเพาะปลูก

HCE LANNA AGRO RSU SMART AGRICULTURE Star Manee Manao PALM OIL KU GRANDMONTE

KNOWLEDGE

COMMERCIALLY AVAILABLE

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## EGGPLANT

Weather for ฟ้าทะลายโจร

More at [Dark Sky](#)

☁️ 25° and falling  
Mostly Cloudy  
Wind: 2 mph (S)

Today	Tue	Wed	Thu	Fri	Sat	Sun	Mon
☁️	☁️	☁️	☁️	☁️	☁️	☁️	☁️
34°	28°	26°	28°	30°	31°	31°	28°
21°	22°	21°	21°	21°	21°	21°	21°

Macro-Climat Monitoring

Real-Time Meso-Climat Monitoring

Today's Meso-Climat Monitoring

Meso-Climat Data History

Wind Monitoring

Rain Monitoring

Current Soil/Leaf Monitoring

Today Soil/Leaf Monitoring

Soil/Leaf Data History

Database

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## Intelligent Technology Smart Farming, Modern agriculture management for rice paddy field in Thailand

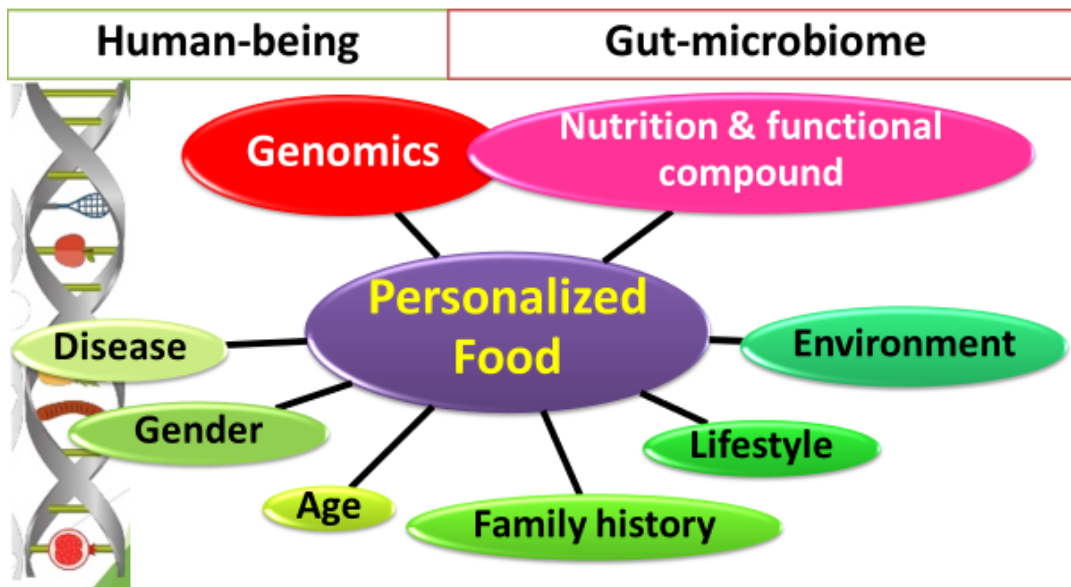


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## Personalized Food: Rice product for diabetes



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