Ready or Not
AI Nutrition is Coming

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Predictions…..

Variety Magazine 1955

Fruit and Vegetable Consumption
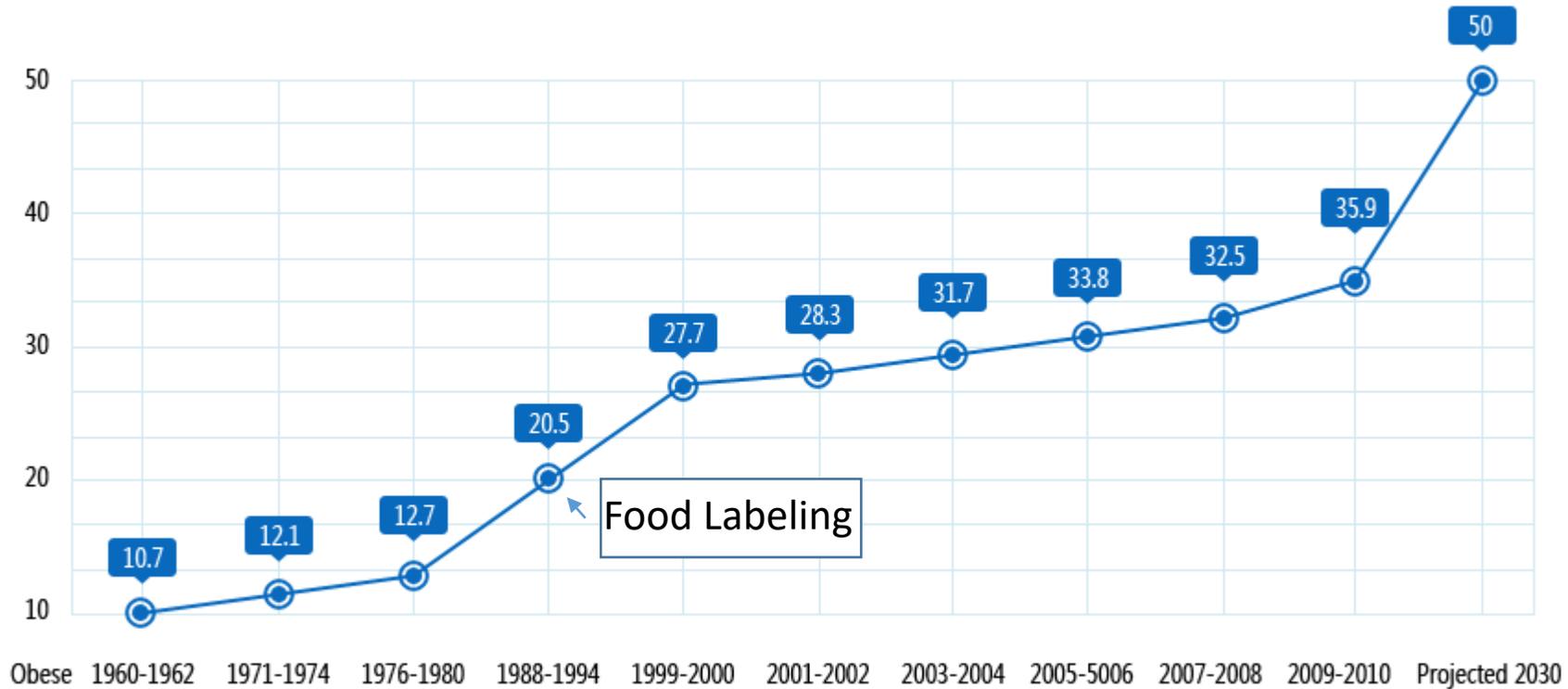## Per Capita Intake 2003 to 2015

Down 7%

Down 5%

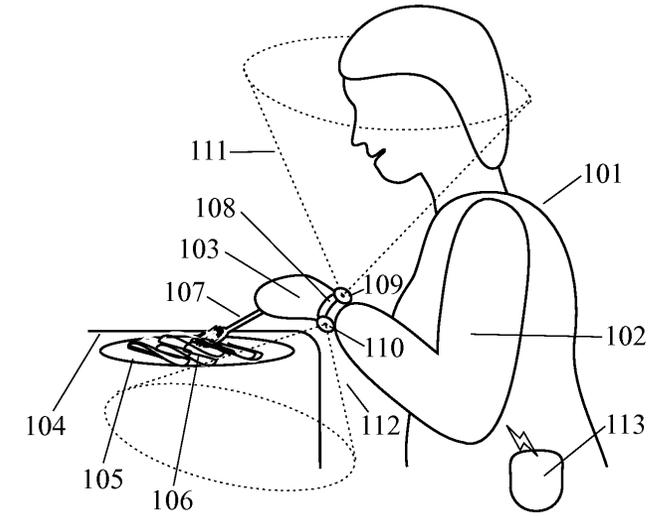Prevalence of Obesity Among U.S. Adults Aged 20-74

Derived from NHANES data (http://www.cdc.gov/nchs/data/hestat/obesity_adult_09_10/obesity_adult_09_10.html#table1)
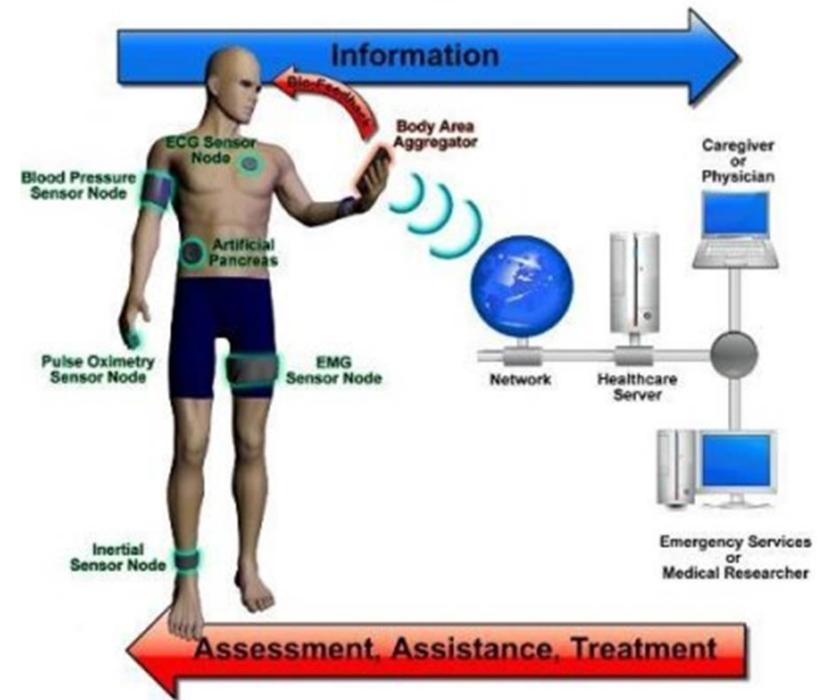
Confused Consumers

- New food related disease findings regularly announced (then reversed, possibly because of poor studies)

- Food labels depend on tracking and math

- Innumerable diets, none of which appear to work long term

- Dietary Guidelines not based on consumer acceptance

- Restaurants – little information to confusing information?

Here it Comes!

FOODINI
A 3D FOOD PRINTER

Healthy Dining Finder

Convergence

Intakes
Food –
Dietary Supplements
Medical Foods
Drugs
Illegal Drugs
Packaged food profiles
Restaurant foods

Location
Restaurants
Hospitals
Parks

Medical Condition
Illness
Injury
Biomonitoring
Vitals
Weight
Genetics
Allergies
Hunger
Family history

Big Data/AI
Diet/Disease
Exercise/Disease
Enhancements

Advice
Eating
Exercise
Sleep
Leisure
Medical care

Activity
Exercise
Sleep
Stress
Sunlight
Smoking

Preferences
Taste
Price
Social Setting
Available time
Culture

Personalized Advice

© Netflix

There is a restaurant near you that serves food you like, can afford, and fits your nutritional needs right now. It will be ready in the appropriate proportions when you arrive. You may also use the kiosk, instead.

I have chosen your foods at your supermarket and they can be picked up or delivered.

Your personalized dinner will be ready in 30 seconds from your 3D printer. It will also contain your medicines.

Why It Will Work
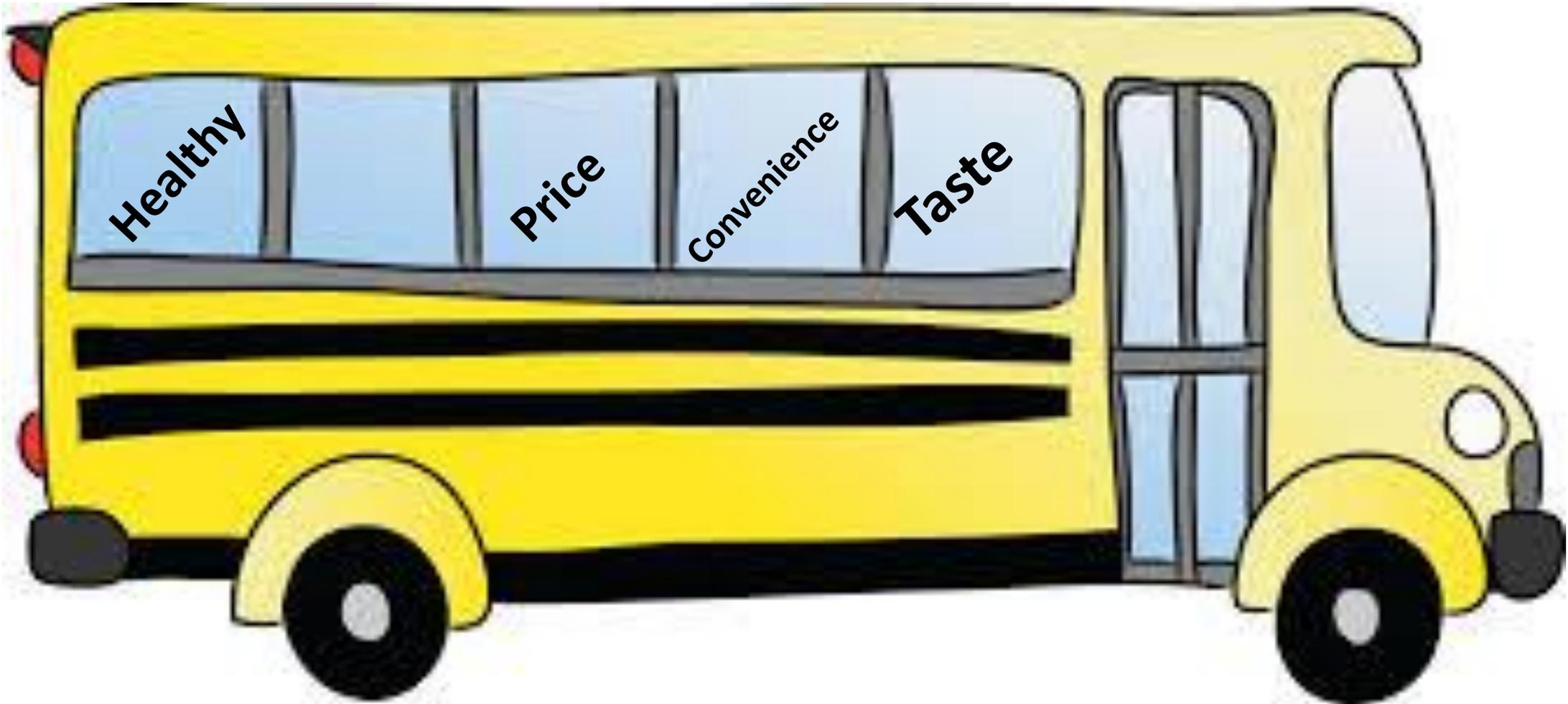
Algorithms

"Many of us would be happy to transfer much of our decision-making processes into the hands of such a system…."

"Eventually we may reach a point when it will be impossible to disconnect from this all-knowing network even for a moment."

"Algorithms won't revolt and enslave us. Rather they will be so good at making decisions "for us that it would be madness not to follow their advice."

Homo Deus
by Yuval Noah Harari

_____

"The data is overwhelmingly clear that it is really easy to make better decisions than even an experienced expert will make by following the data and not applying any judgment on top of it."

Andrew McAfee MIT

21ˢᵗ Century Augmented Humans

Age
Average Age
Death

Mental
Not Depressed

Health
Absence of
Disease/Injury

Age
Methuselah

Mental
Constant Happiness

Health
Superwoman

CONSUMPTION SPREADS FASTER TODAY
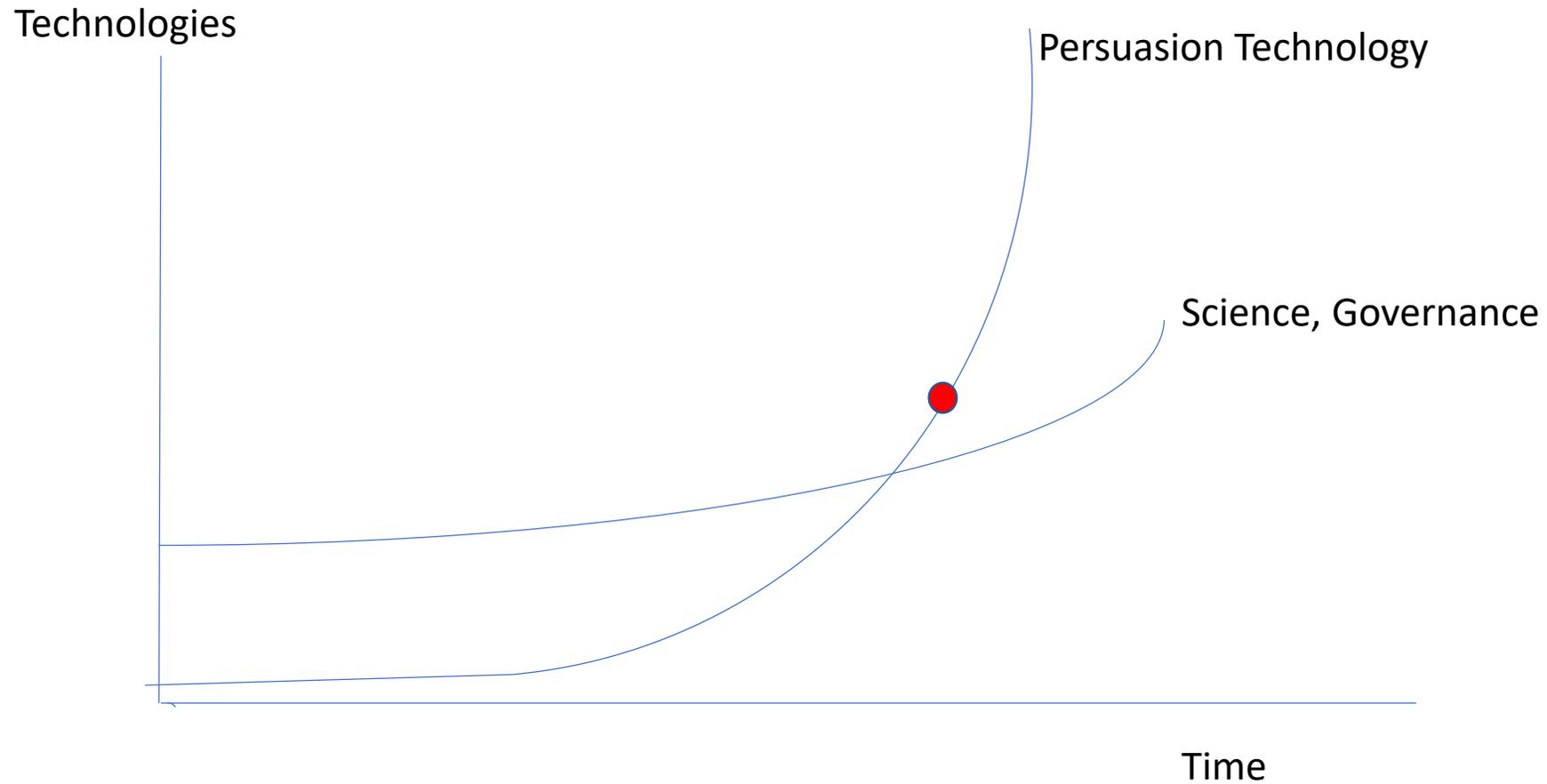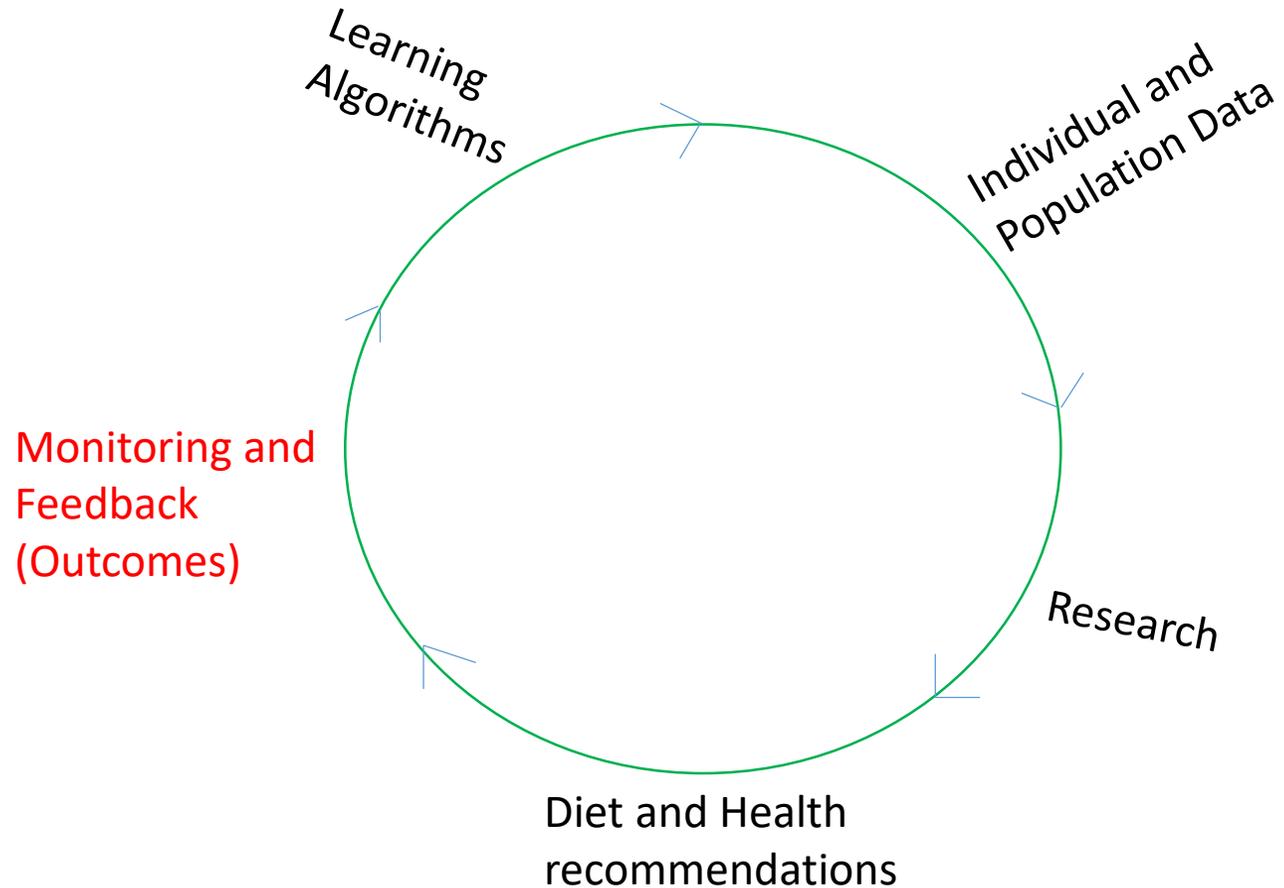
PERCENT OF U.S. HOUSEHOLDS
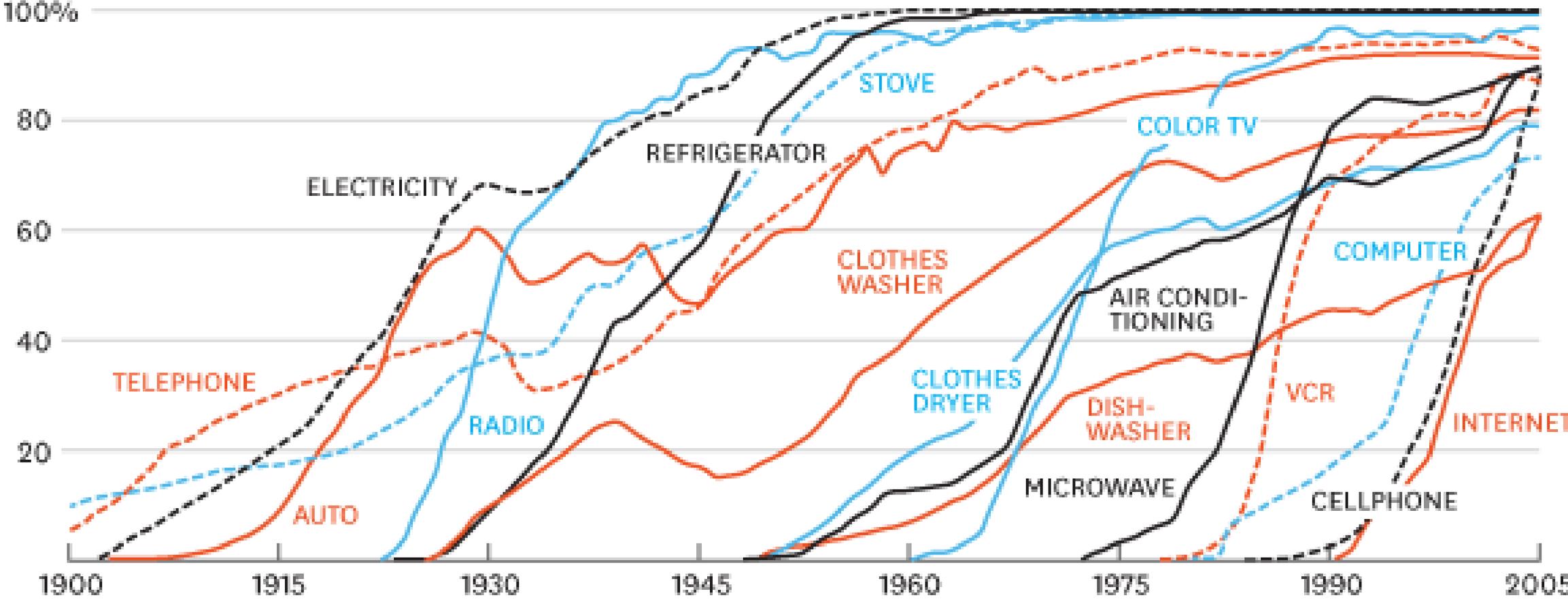
We are already behind

What Science is Needed?

Learning Algorithms

Individual and Population Data

Monitoring and Feedback (Outcomes)

Research

Diet and Health recommendations

AMSTATNEWS
The Membership Magazine of the American Statistical Association

Statistics Ready for a Revolution
1 September 2010 8,054
Next Generation of Statisticians Must Build Tools for Massive Data Sets

Research Quality

Good/Bad Competition

Policy Tools for AI

Hard Law

Prohibitions
Pre-market approval (products, companies)
User Fees
Regulation/Adaptive management
Performance/Design Standards
Mandated Transparency/Disclosure (access to data)
Ex post liability with sanctions
Licensing
Planned Review

Soft Law

Private Standards
Codes of Conduct
Monitoring with triggering
Principles
Voluntary Programs
Notification
Monitoring algorithms

Premarket Approval Cost/Time to Market

$1.3 billion/12 years

$24 million/1 year
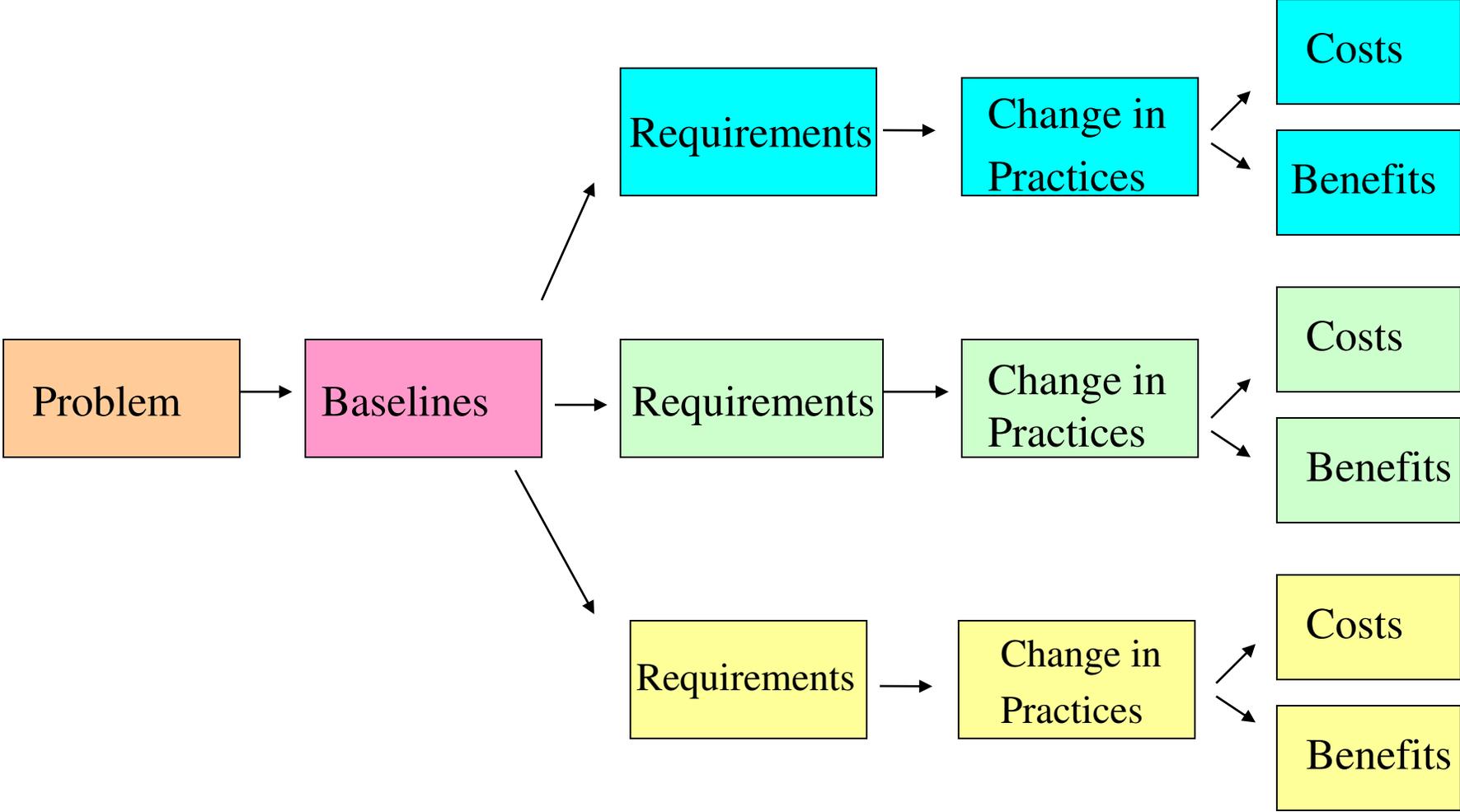

$830,000/5.5 years

$0/0

Definition of Benefit-Cost Analysis

Cost-benefit analysis is an analytical tool used to evaluate policy options by estimating the dollar value of benefits and costs associated with each option.

Costs and Benefits - Options

Benefit-Cost Analysis (and Risk Assessment):

- Organizes facts and different kinds of science
- Reveal need for more information
- Contain uncertainty and variability
- Are decision *aids*

Levels of Societal Changes
Dietary/Health Technologies

Level One	**Will the technology perform as designed?**	1. **Probability of a good outcome versus a bad outcome?** 2. **Benefits of a good outcome versus costs of a bad outcome**
Level Two	**What are the unintended effects?**	1. **How will medical care be affected?** 2. **How will industries be restructured?** 3. **What will be the social inequalities?**
Level Three	**How will these technologies change cultures, governments, longevity?**	1. **Where will human design go?** 2. **How will this affect societies – religion, geopolitics?**

Key Takeaways

- Food Technologies are currently moving faster than science and governance but are likely to drive consumer choice.
- Emerging food technologies include health and food intake monitoring, additive printing, interactive GPS restaurant advice, and may interact with enhanced humans
- Benefit-Cost analysis can help decide between pre-market approval versus post market soft law to strike the right balance between progress and risk.