# Scalable Emotion Analytics on the IBM SmartCloud

Presented by

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(CEO & Co-founder)

**nviso**
imaging people

**Presented 15th October 2013**

# Best-in-Class Facial Imaging Analytics

- **Founded 2009, Switzerland**
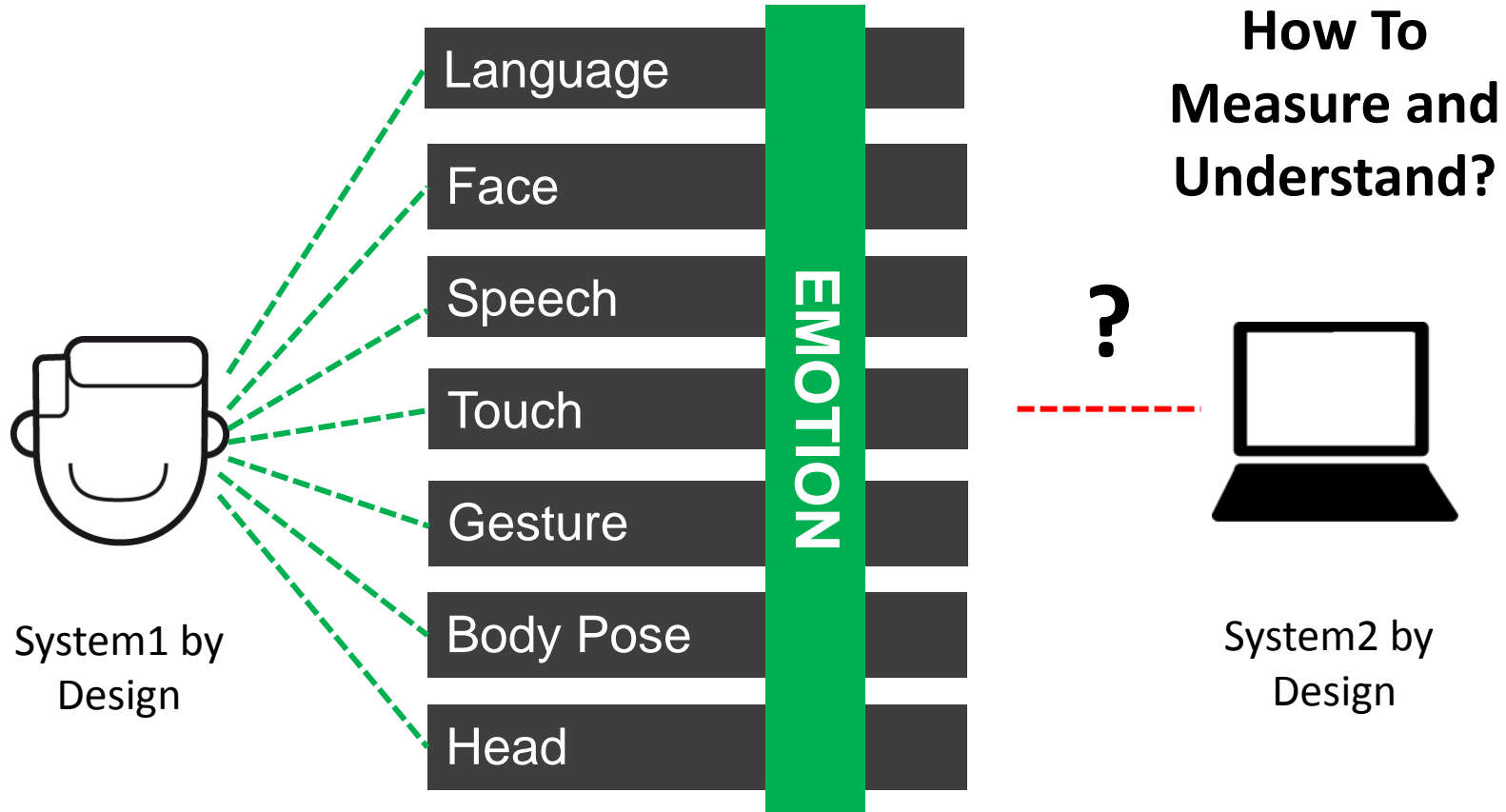- **12+ years research at EPFL**
- **1Million+ subjects worldwide**
- **Real time on IBM SmartCloud**

# Fundamental Emotion Research

| FNSNF **Swiss National Science Foundation** | | nViso *imaging people* | IBM | EPFL *École Polytechnique Fédérale de Lausanne* |
|---|---|---|---|---|
| IM2 Study of human computer interaction | Affective Sciences Study of emotions | Founding of nViso Spin-out from EPFL | Deployment on IBM SmartCloud In-market trials | Creation of Neuropole in Lausanne, global Neuroscience hub. |
| **2001** | **2005** | **2009** | **2011** | **2012** | **Future** |

### Investment in Emotion

- 60Mio CHF
- Interaction with computers
- Study of emotion

### Spin-offs

- nViso (emotion)
- Koemei (speech)
- Kooaba (mobile content)

### Future Invesment

- 110Mio CHF
- Global neurosciene hub
- Human brain project

# Emotion Fundamental in Daily Life



Language

Face

Speech

Touch

Gesture

Body Pose

Head

EMOTION

System1 by Design

**How To Measure and Understand?**
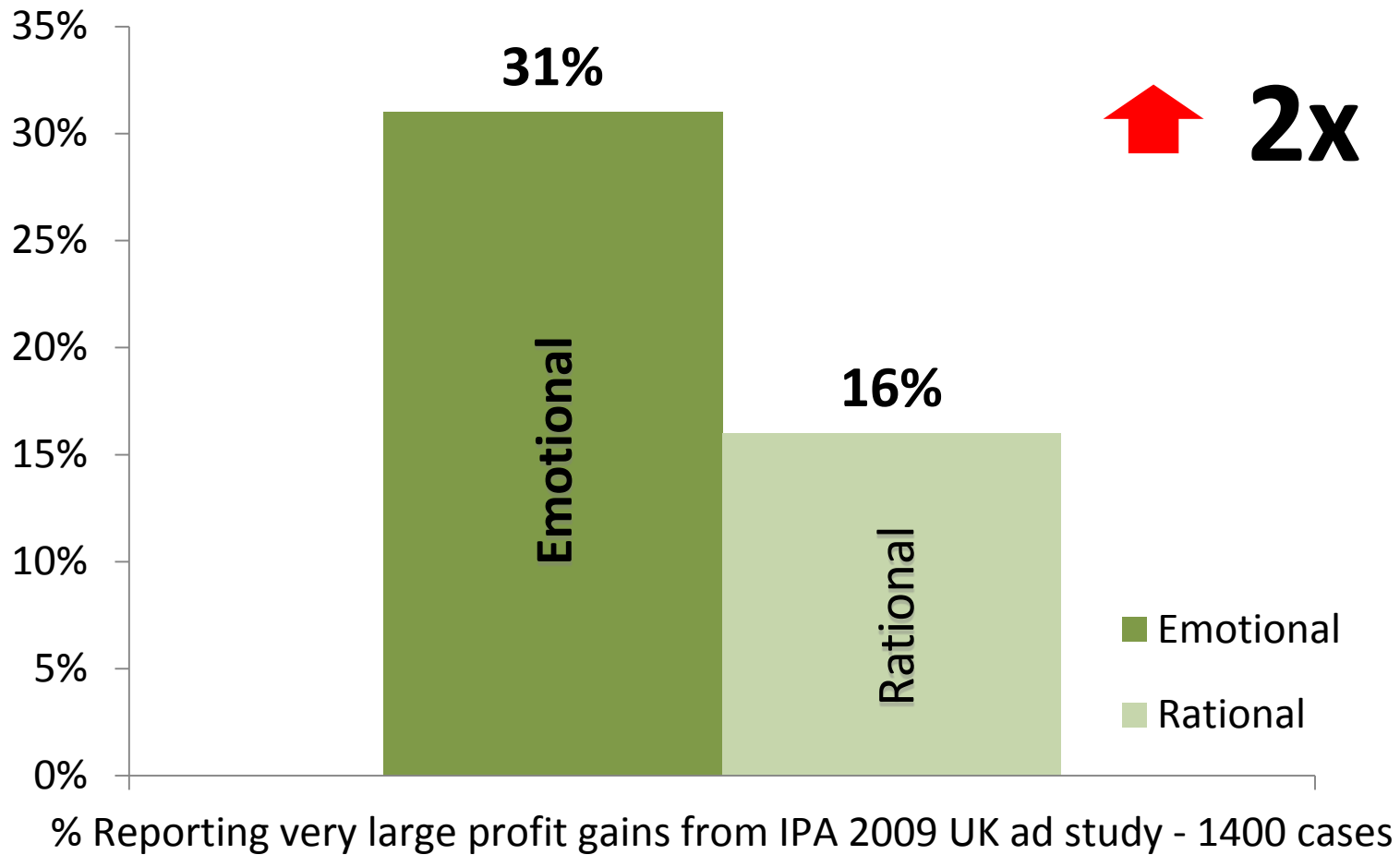
?

System2 by Design

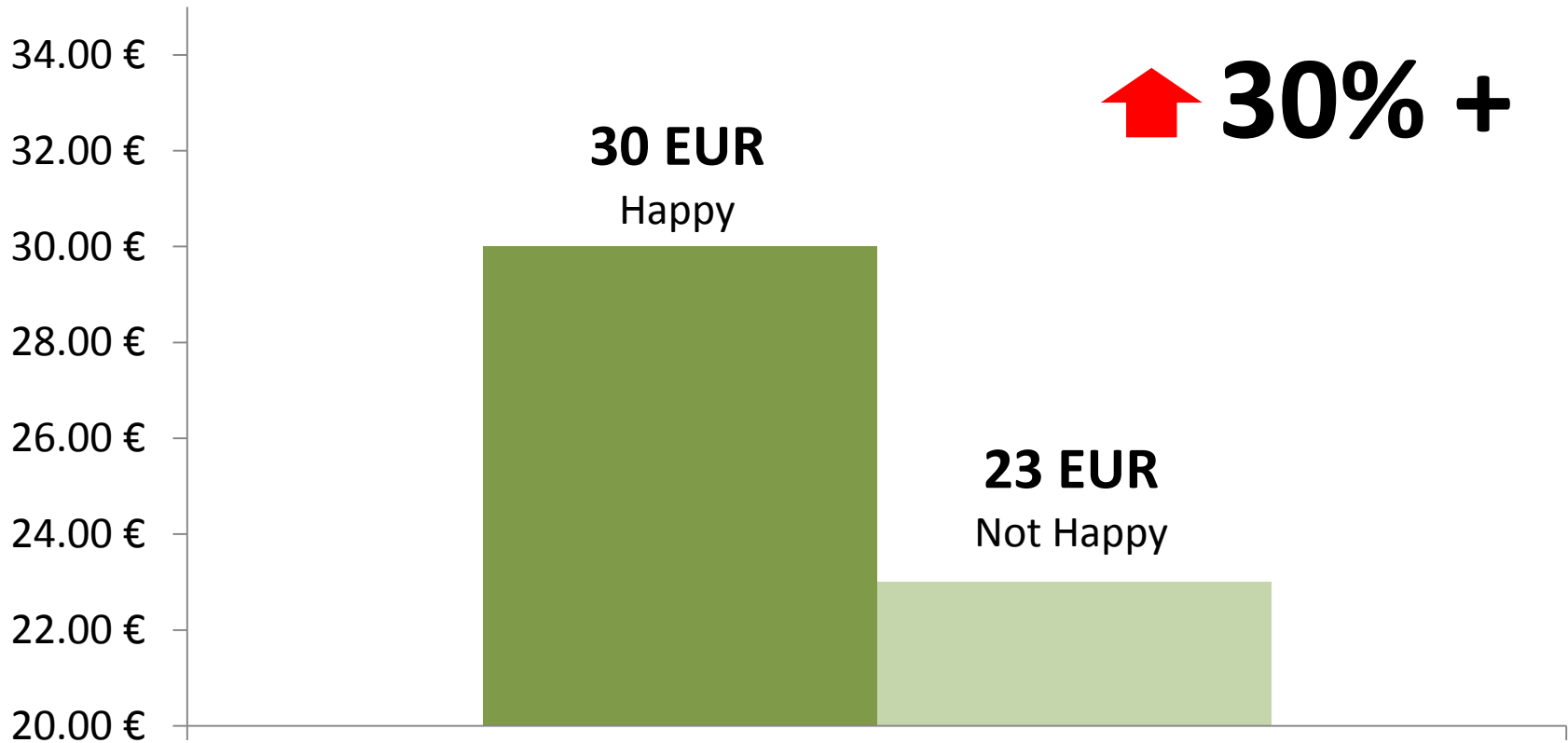# Brands and Emotions are Everywhere



- Marketers aim to provoke a **range of emotions** associated with a brand or product
- Advertising enhances these emotional responses
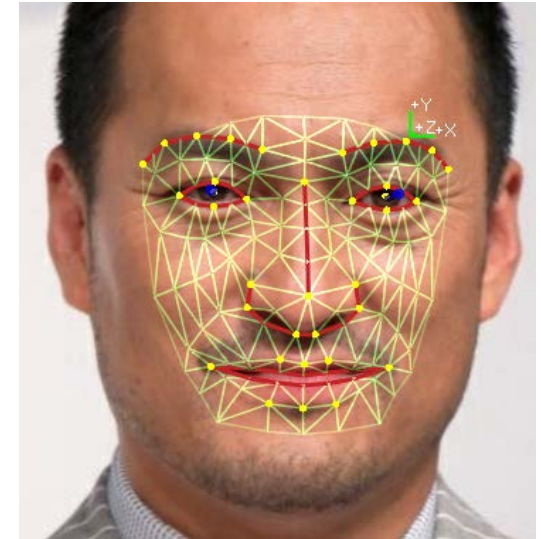
# Emotional Campaigns Outperform



% Reporting very large profit gains from IPA 2009 UK ad study - 1400 cases

# Happy Shoppers Spend More



↑ **30% +**

**30 EUR**
Happy

**23 EUR**
Not Happy

Average spend in retail stores of customers expressing Happiness and Unhappiness.

# From Psychologists to Neuro

▪ Status-quo challenged in **<u>scale</u>**, cost, and accuracy



| 1960 | ▶ | 1990 | ▶ | 2010 |

# The Face as a Sensor



**2D-3D Face Rec**

Emotion

Attention

Gestures

Behaviours

Identity

**Predictive Analytics**
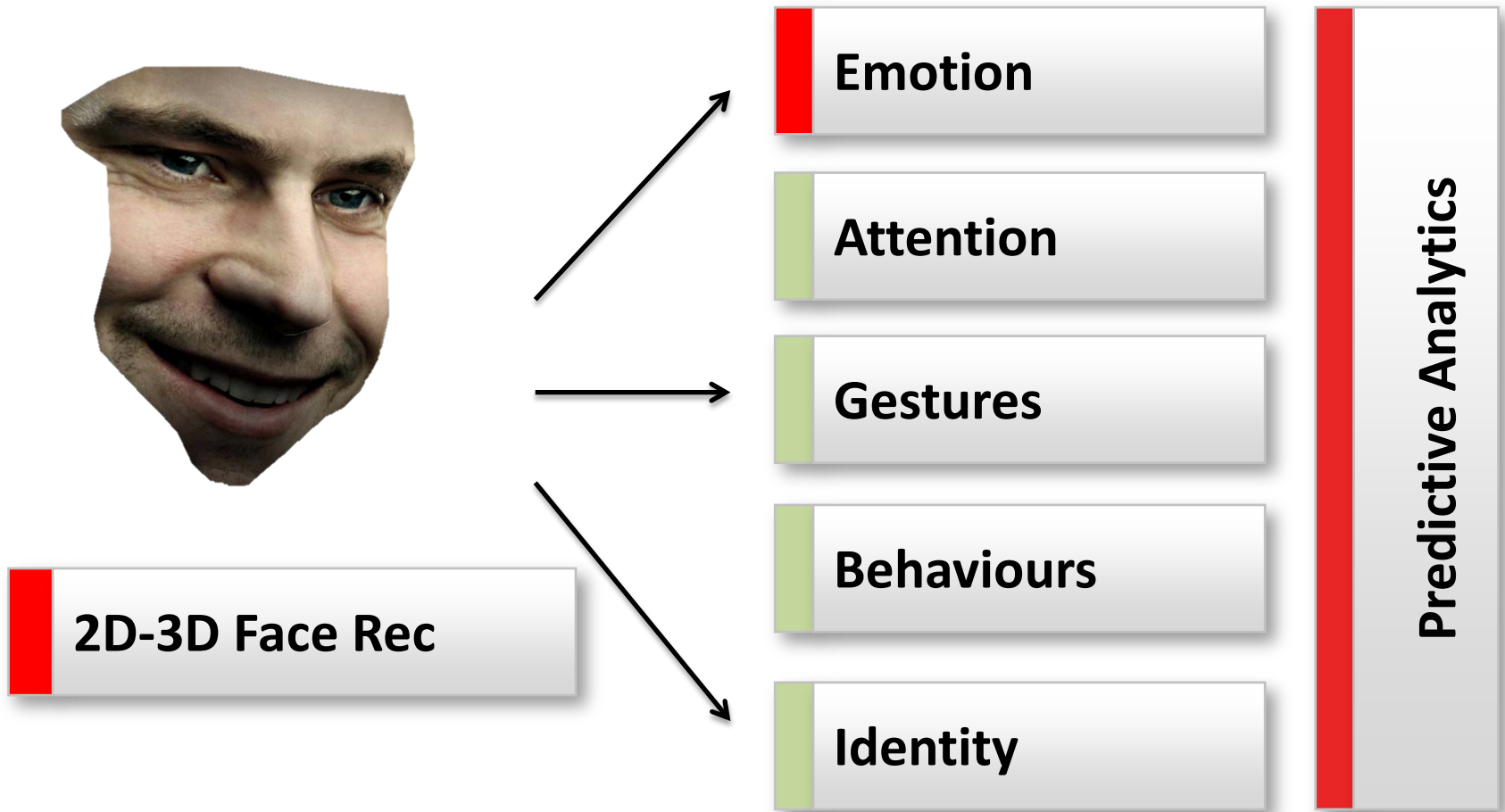
# From Great Artists to Scientists



"expressions reflect the innermost soul"

"innate and universal"
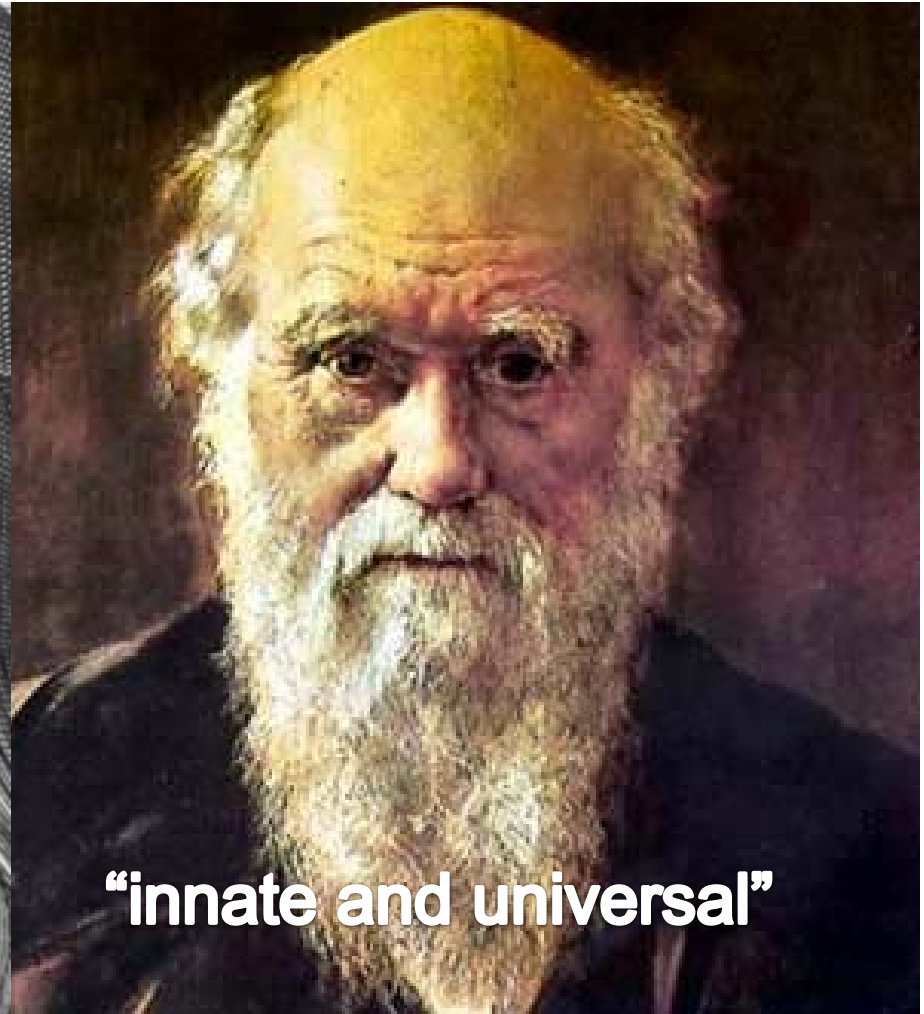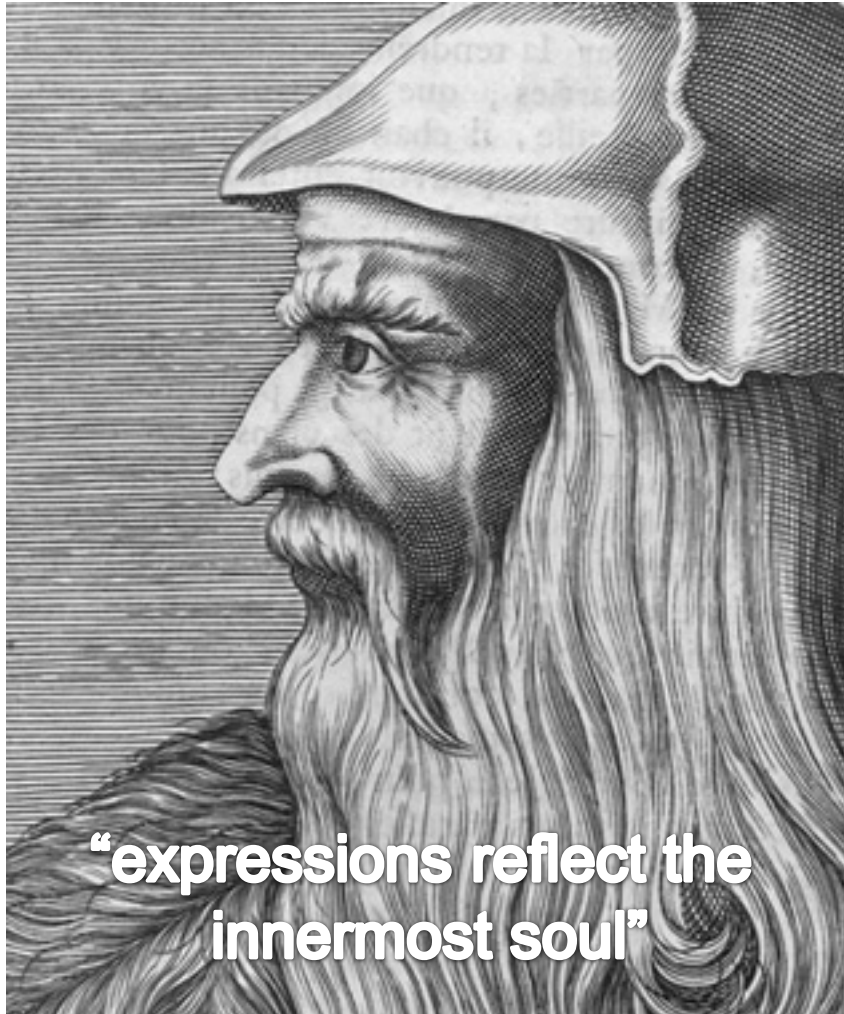
# Darwin's Theory of Emotions

In 1872, Charles Darwin published Expression of the Emotions in Man and Animals, a hereditary study of behavior. At the time, the dominant belief was that humans possessed unique and divinely created muscles to express emotions. In Expressions, however, Darwin claims that our emotional capabilities are subject to natural selection. Using detailed illustrations and close analyses of physiological responses to different emotions—such as hair raising, vocal emissions, perspiration, and the precise movement of facial muscles—Darwin traces purposeful links between expressions of emotion in animals to their human equivalents. He concludes, "the young and the old of widely different races, both with man and animals, express the same state of mind by the same movements." Notably, the book was also the first scientific text to make use of the new medium of photography.

# Paul Ekman - 1972

- Universal expressions of emotion
- Facial Action Coding System
- **Problem** – **requires manual coding**
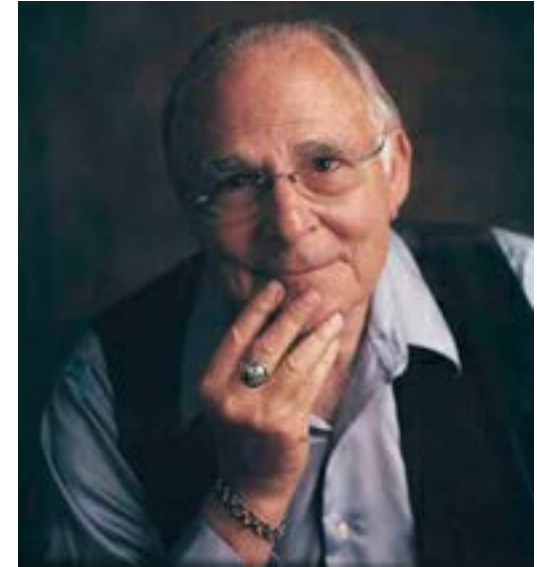
**happiness**    **surprise**    **fear**    **anger**    **disgust**    **sadness**

# The Facial Nerve : The Link to the Brain
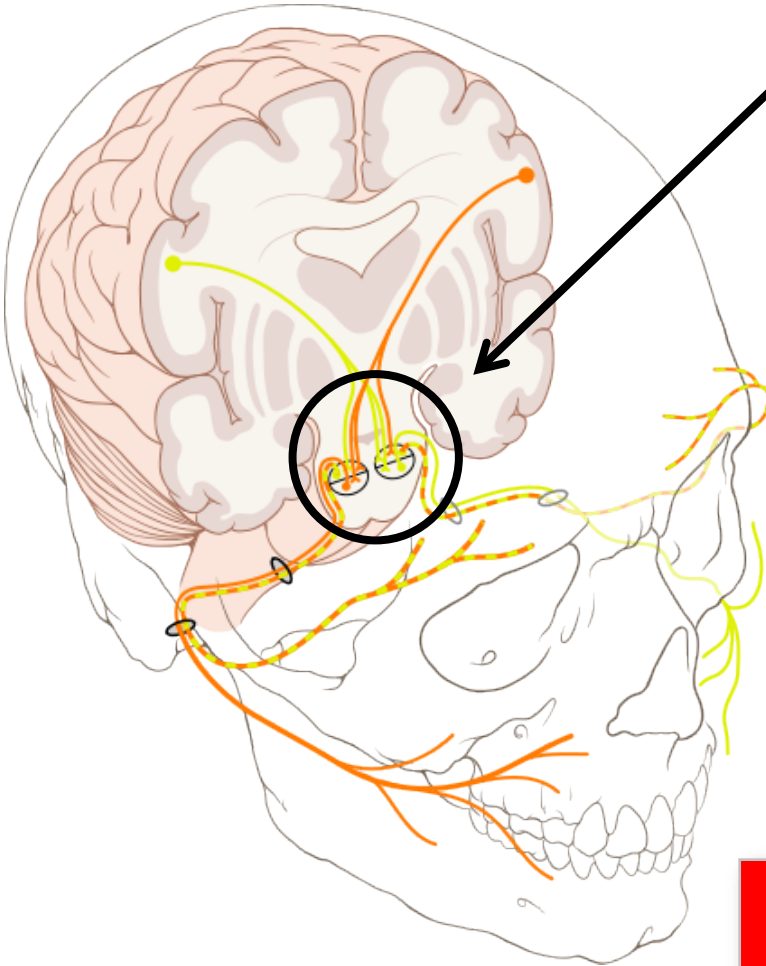
- Difficult to measure areas :
  - Emotion (amygdala)
  - Long Term Memory (hippocampus)

- What can be measured :
  - Facial expressions
  - Involuntary micro-expressions
  - Head and eye movements
  - Blood flow (heart rate)

**Unique Measure of Affective State**

# nViso 3D Facial Imaging Software
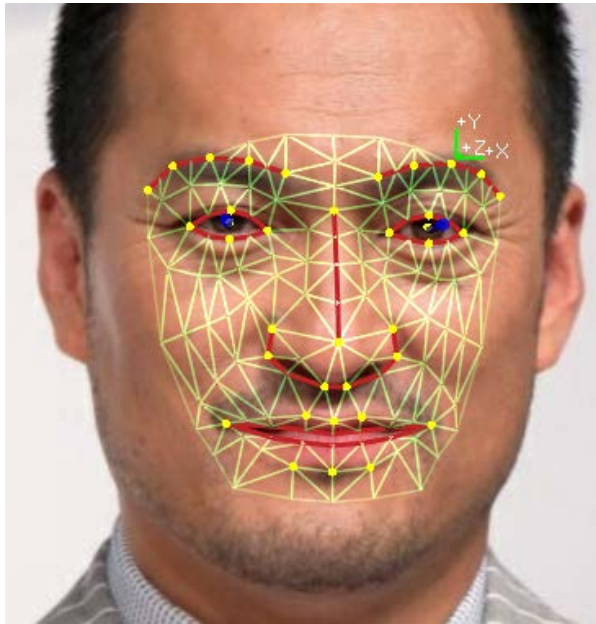


Software maps 143 points in the image directly to facial muscles
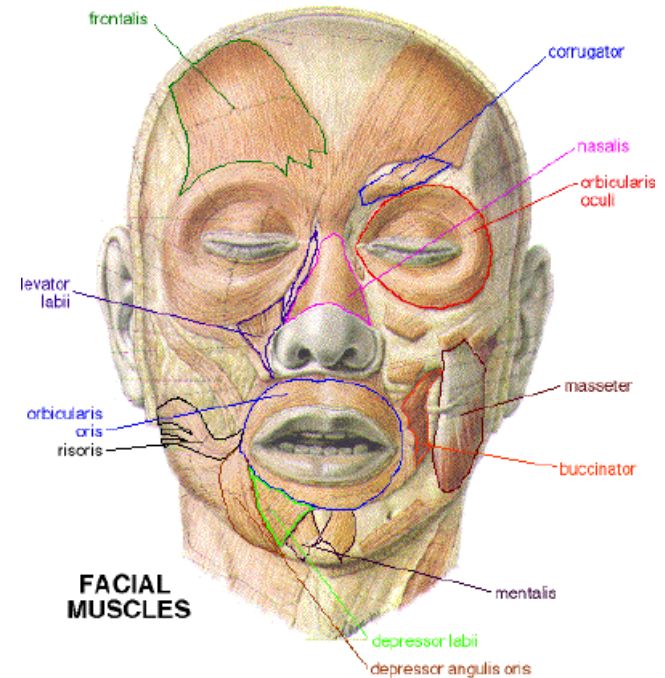


- **Artificial intelligence** precisely detects facial muscles
- Facial muscles movements **encoded based on FACS**
- **Machine learning system** decodes facial behavior

# Modeling Emotion Perception
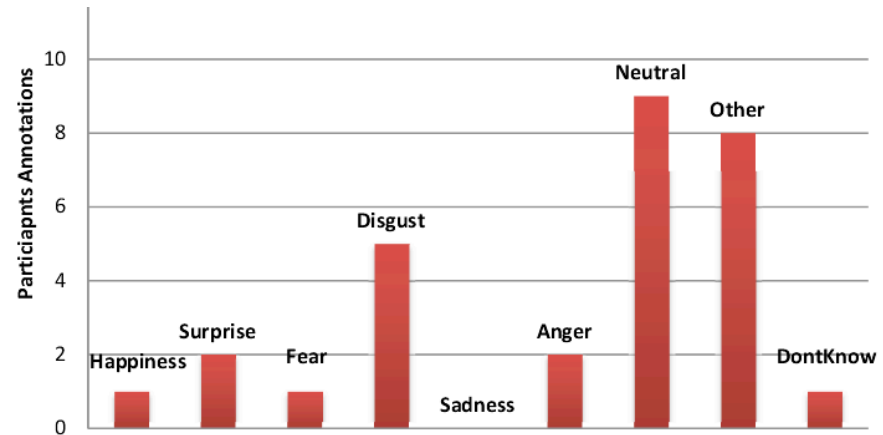
# Real-World Environments

- Natural conditions
- Image quality
- Face diversity

▼
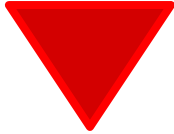
- Robustness is key
- Consistent measure
- More applications

# nViso : Robust and Scalable



**Any Video Feed (Webcam)**

**Stimulus Video**

**Attention**

**Real-time Emotional State**

00:26
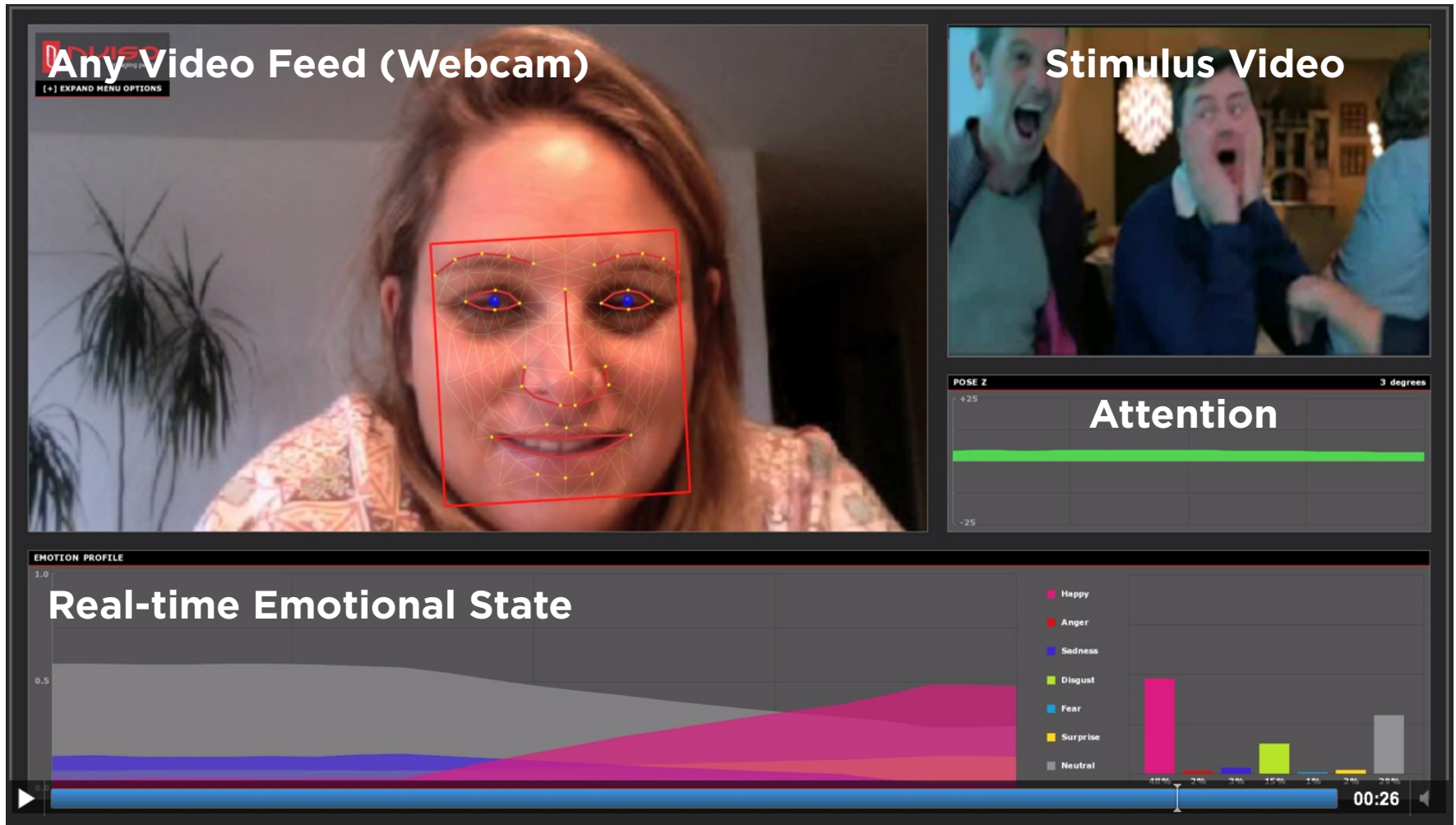
# Mix of Emotions

(Heineken : Walk in Fridge)



**22** Peak Expected?
(branding moment)

**10** Was Drop Expected?
(channel switching)

**30** Heineken®
Brand Impact
(measure of brand)

Chart: % Change of Emotion vs Course of time (1 sec – 32 sec)
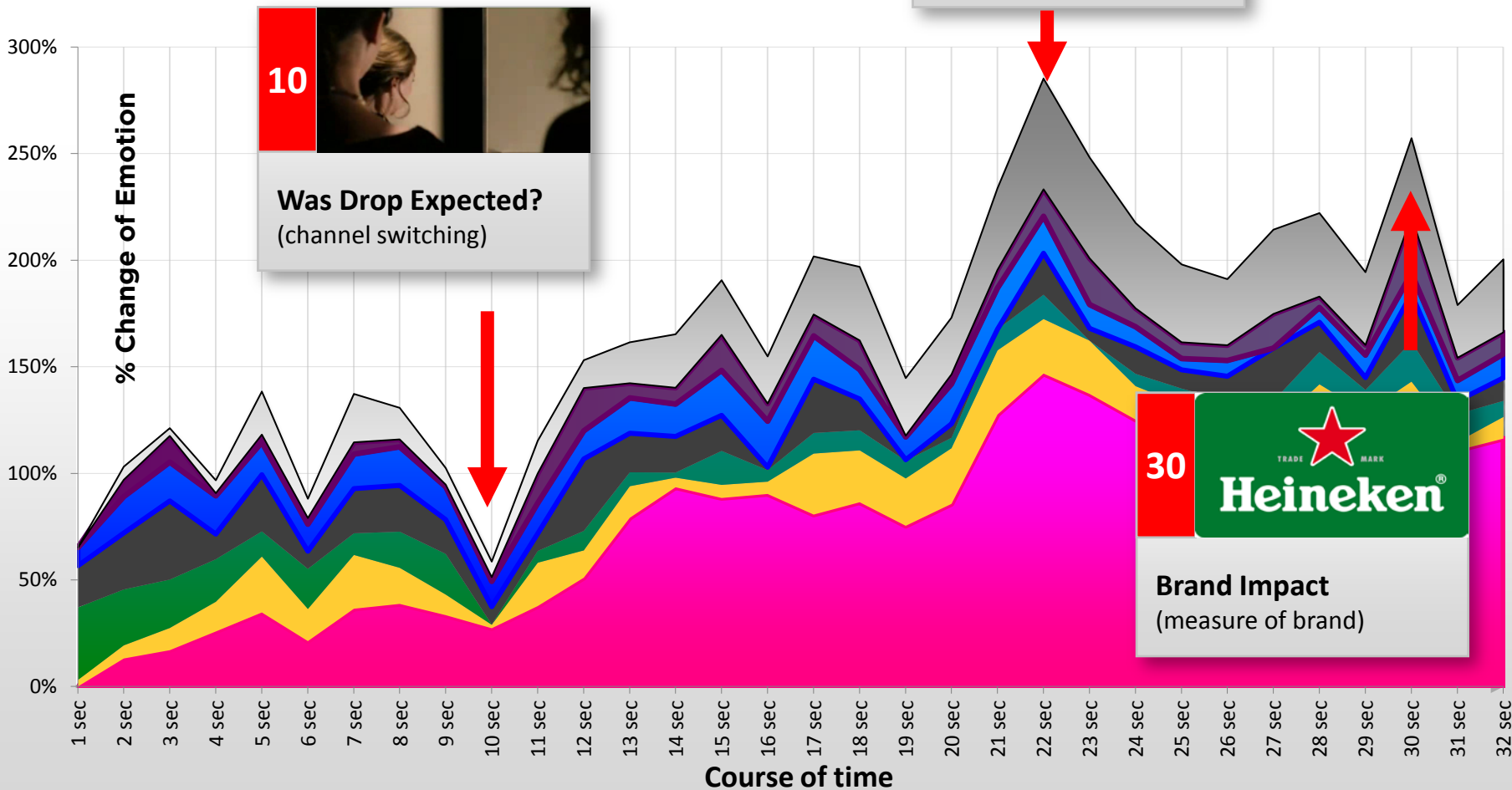
# Emotion Analytics on the Cloud
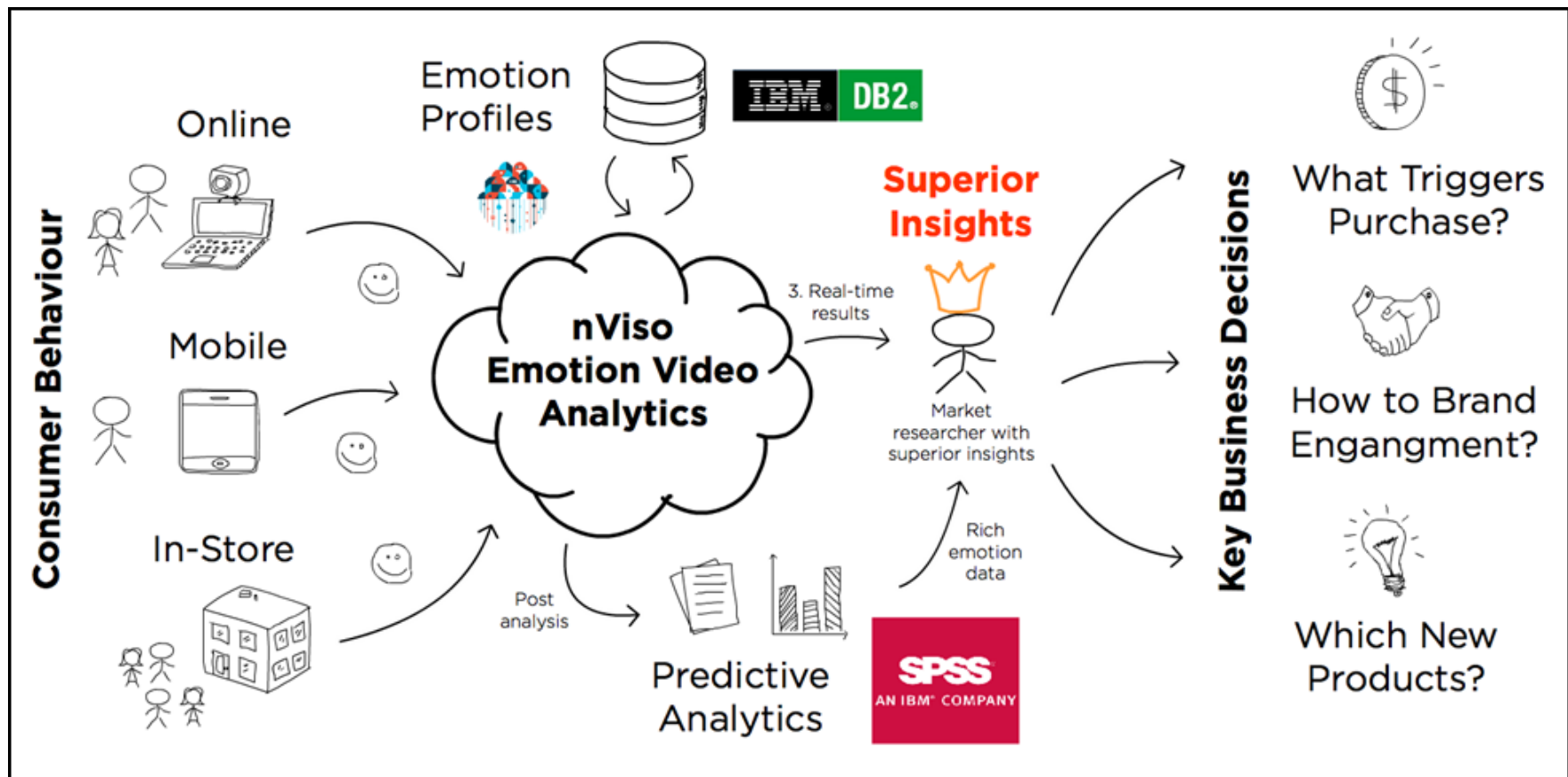
# nViso API : Developer Platform
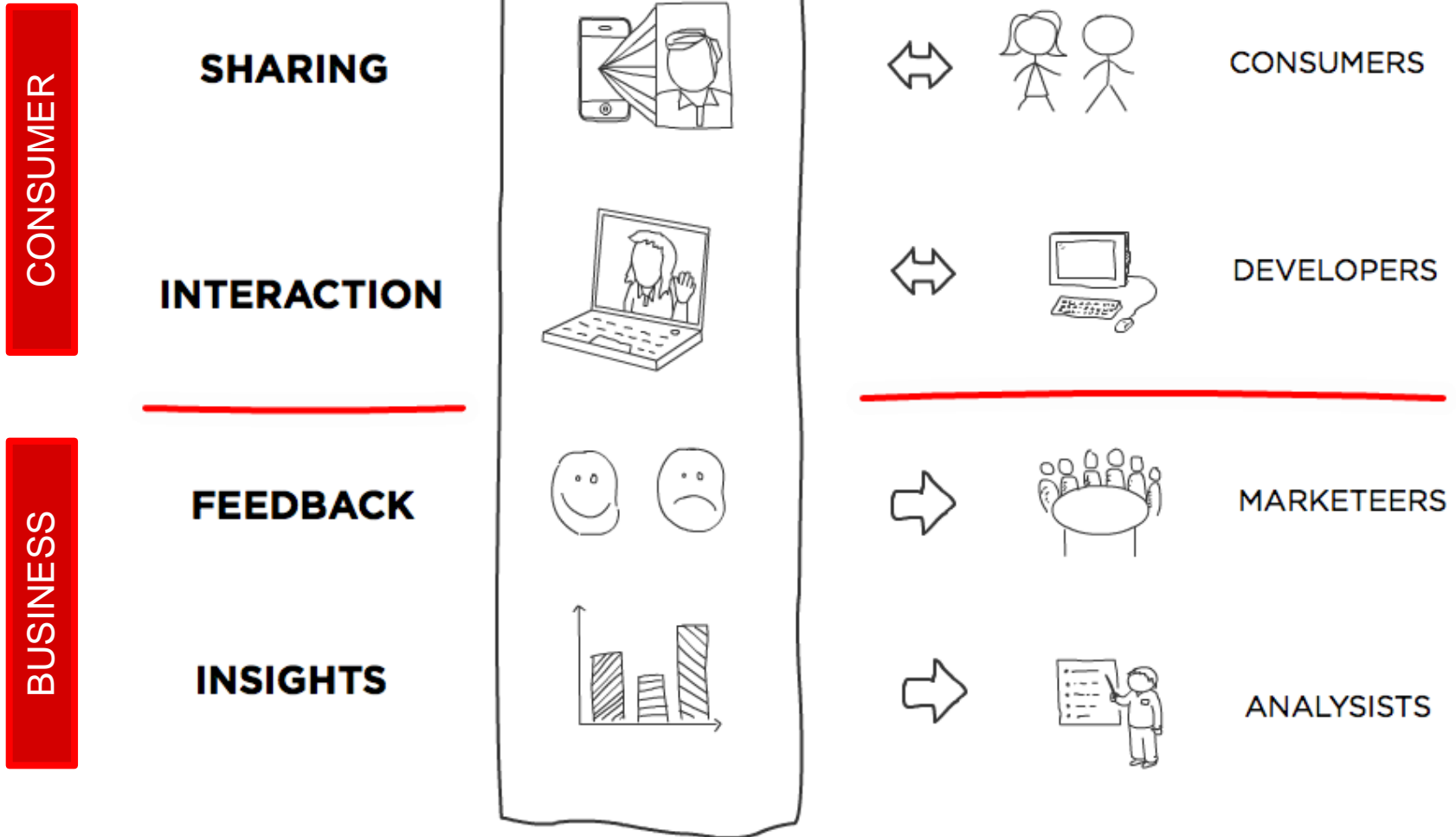
# Emotion Engaging Apps

developer.nviso.net

# Case Study : Banking Sector

BNZ – Bank in Asia Pacific
Online, Retail, and Out of Home Experience

http://www.youtube.com/watch?v=F7mV3hwdFDw

**COLENSOBBDO**

**bnz**
*Be good with money*

# Interactive Financial Experience

# Personalized Emotion Results

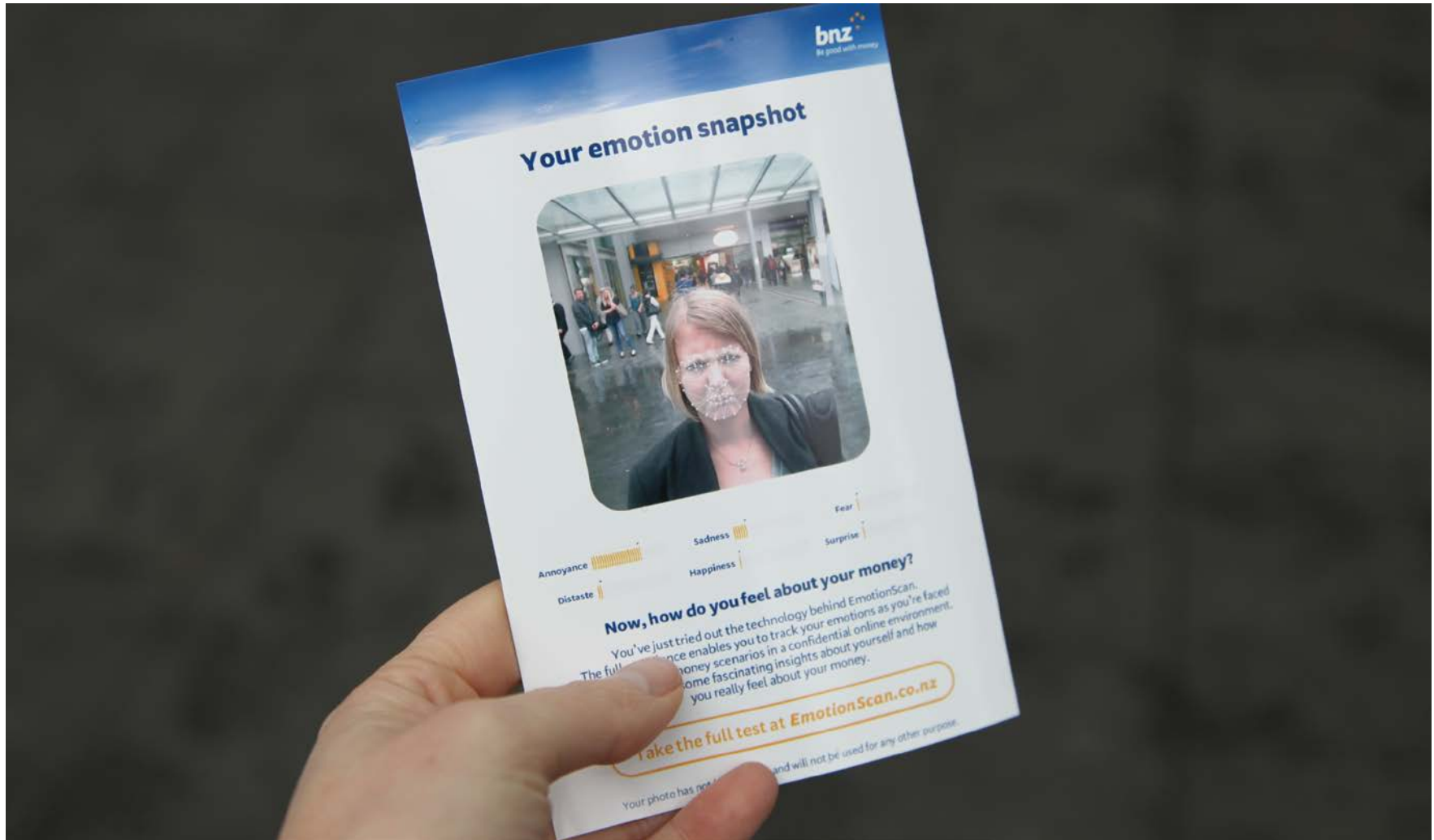# Out-of-Home Experience
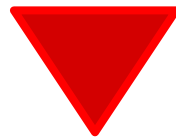
# Out-of-Home Experience

# Out-of-Home Experience

# Analytics Goldmine

- By Demographic
- By Region
- By Store
- By Financial Product Area



## New Ways to Personalize and Interact with Customers