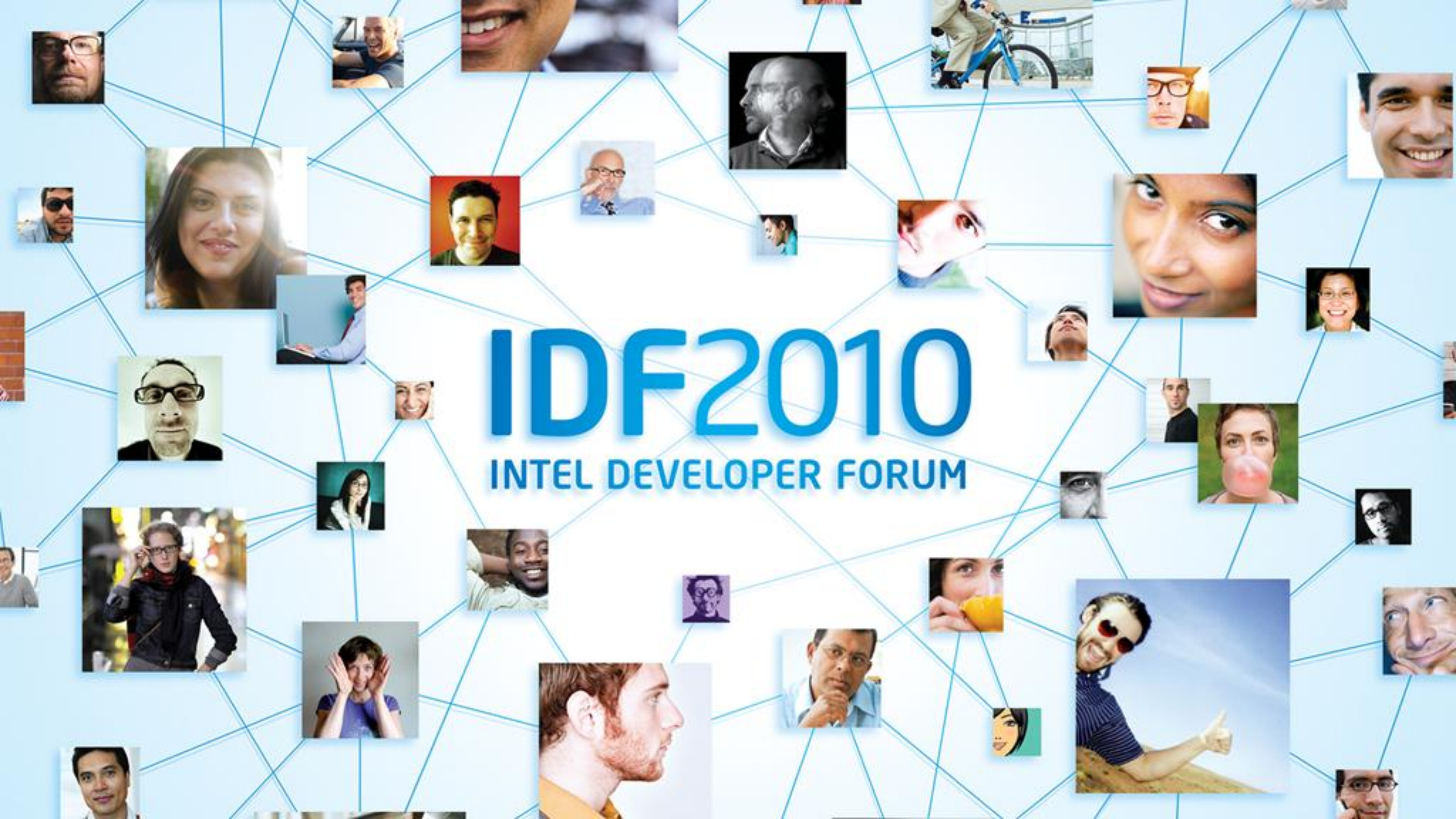
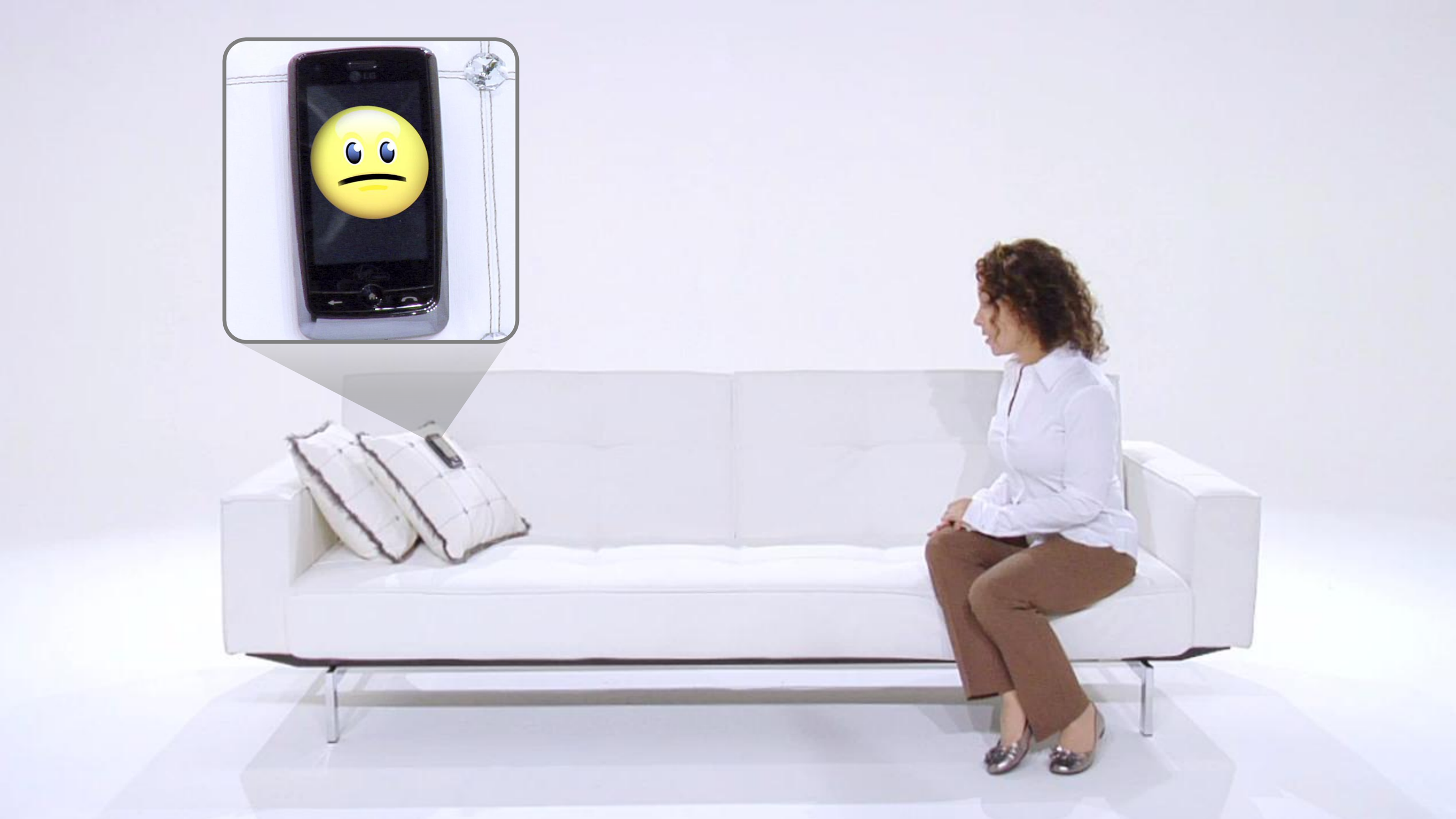

IDF2010
INTEL DEVELOPER FORUM




CONTEXT-AWARE
COMPUTING
How Am I Feeling?
Who Am I With?
Why Am I Here?
What Am I Doing?
Where Am I Going?
When Do I Need To Leave?

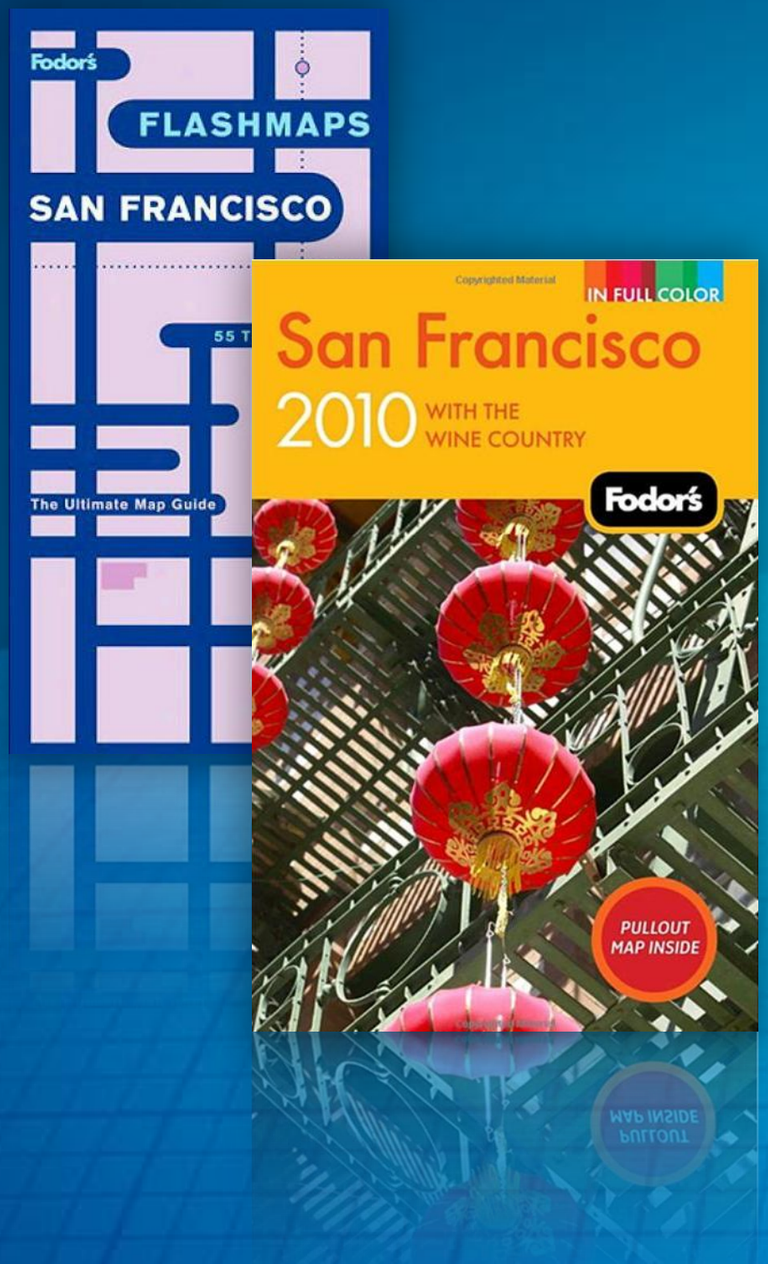
A Personal

VACATION ASSISTANT

Tim Jarrell

Vice President & Publisher

Fodor's Travel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& Market Streets


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Navigation Assistant
No SIM
17:51
Calendar
Map
Search
Suggestion
Nearby
Wander
Clear map
Current Location
Pier 39
San Francisco Maritime National Historical Park
Fisherman's Wharf
Bay St
San Francisco Art Institute
Coit Tower
The Embarcadero
Hyde St
Russian Hill
St Peter & Paul Church
South Beach
City Lights Bookstore
Broadway
Lombard St
Van Ness Ave
Cable Car Museum
101
Nob Hill
California St
Market St
Mission St
Downtown
San Francisco Museum of Modern Art
Gough St
Geary St
O'Farrell St
Curran Theatre
Japantown
Turk St
Tenderloin
Western Addition
2000 ft
500 m
N
Map data ©2010 Google, Sanborn - Terms of Use

Origins of Context-Aware Computing

“The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.”

Mark Weiser

(July 23, 1952 – April 27, 1999)

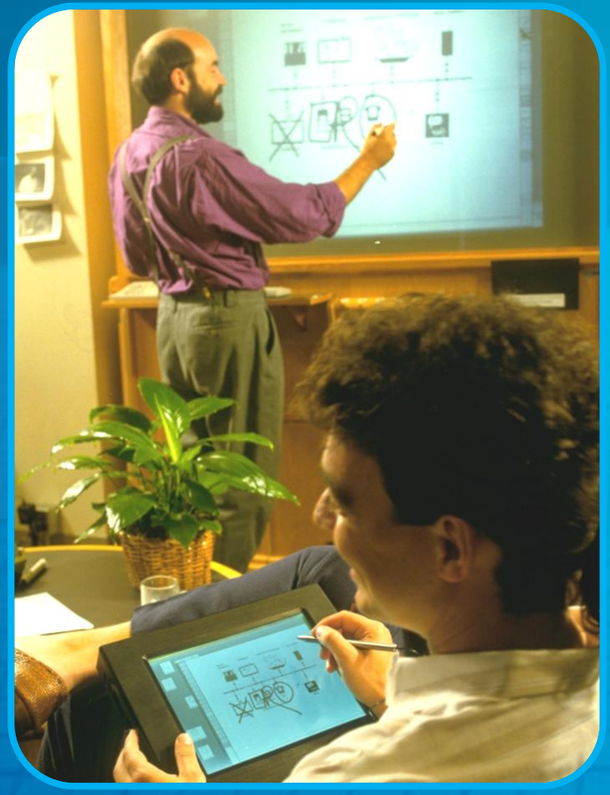
Xerox PARC, September 1991

Back to the Future of Ubiquitous COMPUTING

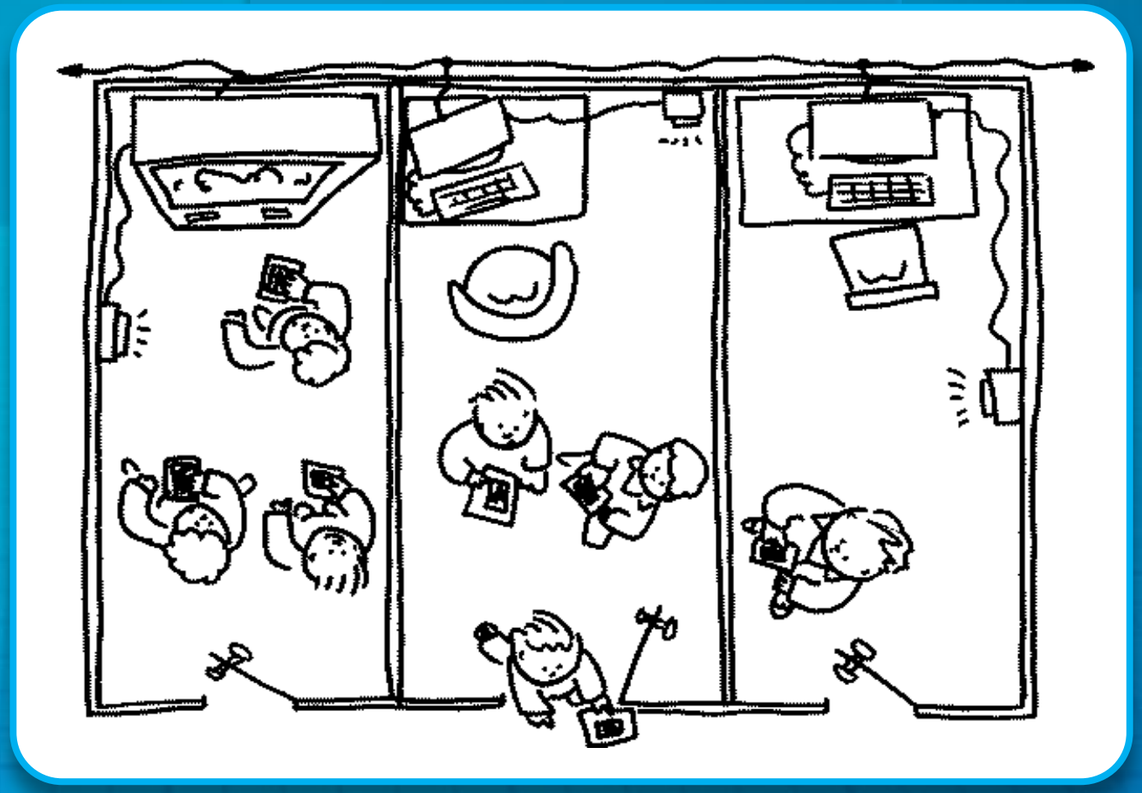
Bo Begole
Director
Ubiquitous Computing Research
Palo Alto Research Center

Ubiquitous Computing Was About How *People Get Things Done* in Real Life

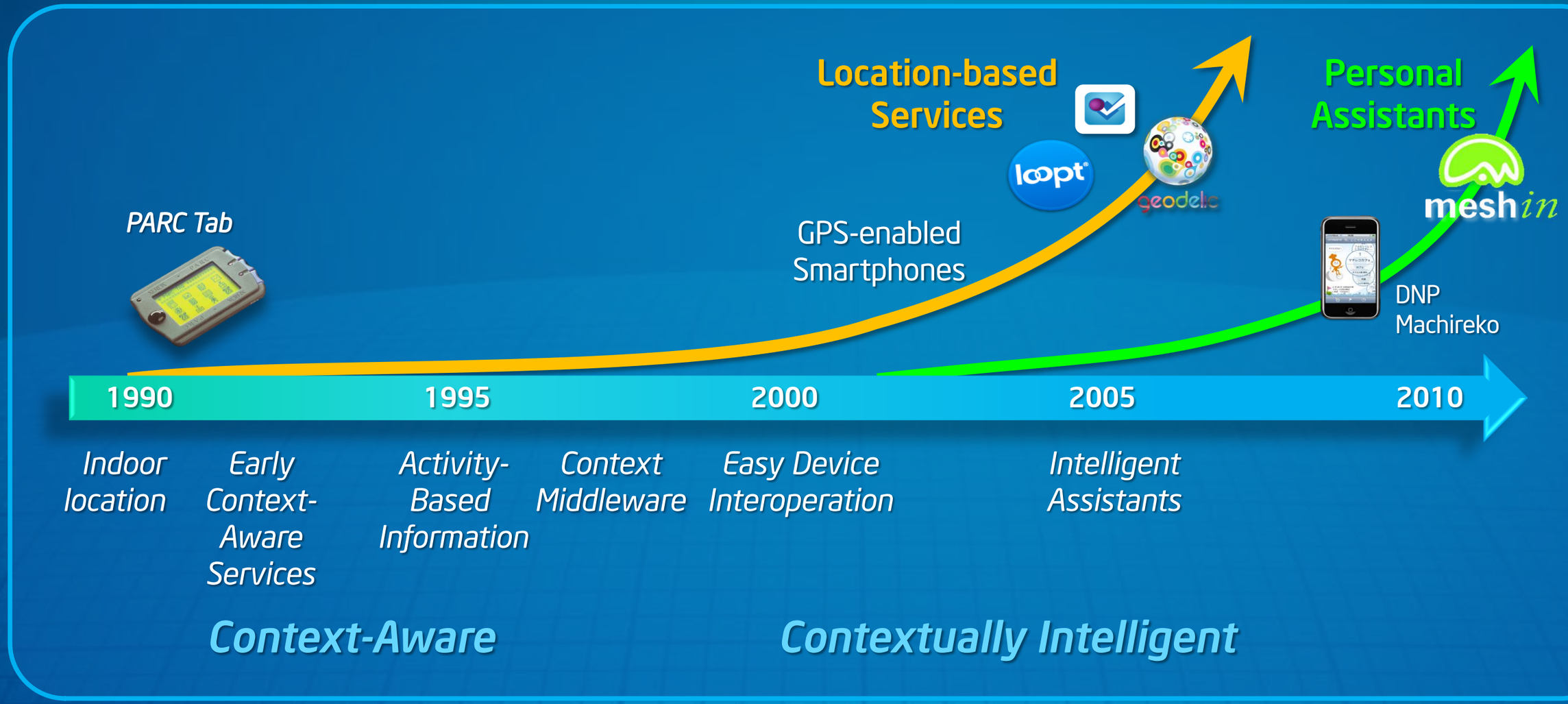
Seamless Multi-person and Multi-device Collaboration



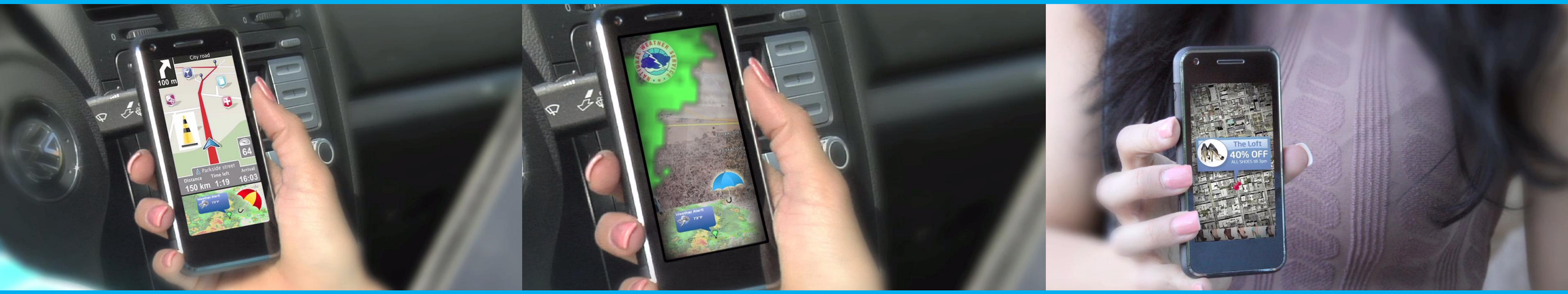
Context-aware Services



Commercial Penetration of Context-Aware Services



Context-Aware Computing: How Does It Actually Work?



The Art of Establishing CONTEXT

Lama Nachman
Senior Research Scientist
Interaction & Experience Research
Intel Labs

Device Sensing Today

Flip UI Based on Accelerometers

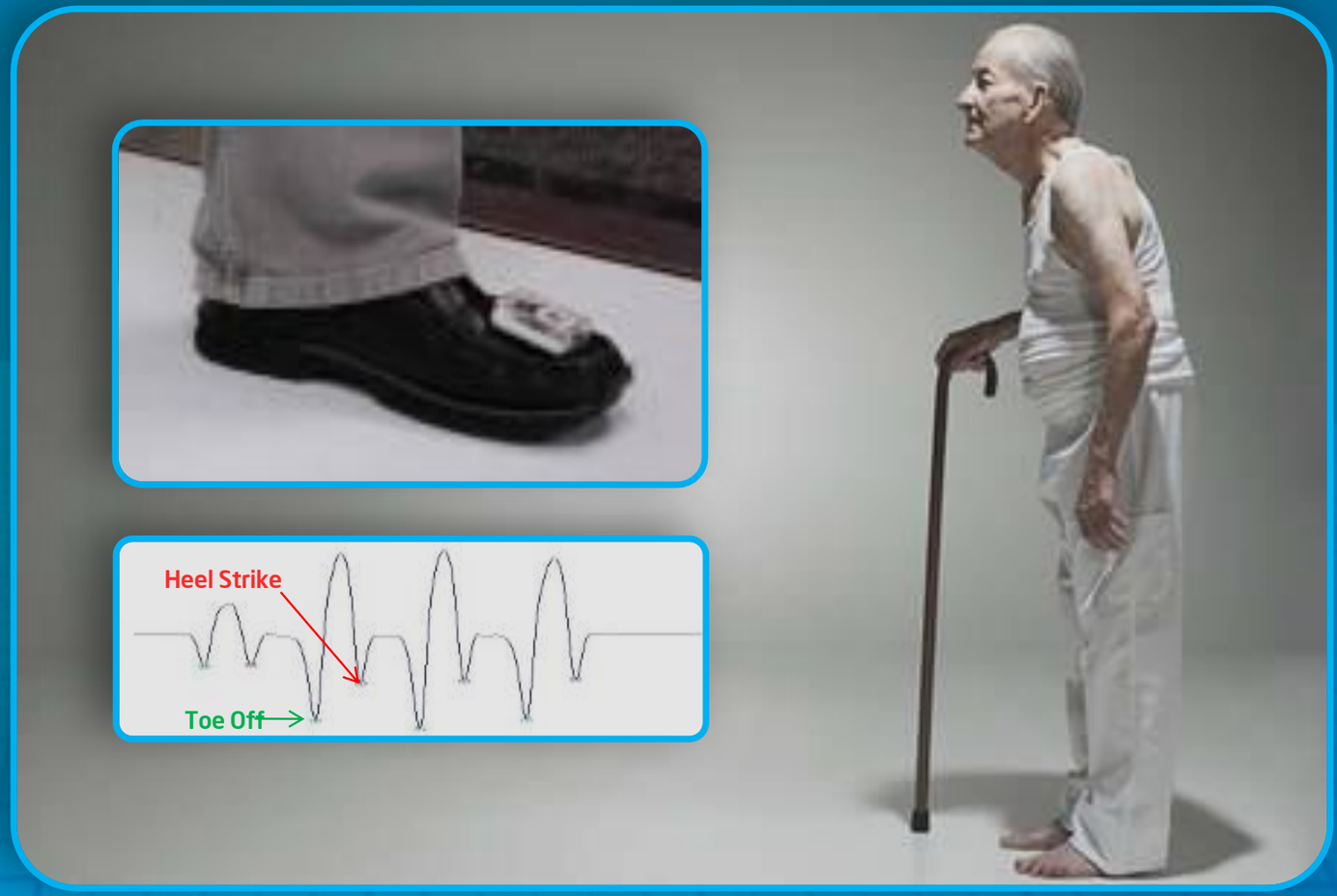
Disable Touch Screen When Close to Ear

GPS Location

Beyond the Device:
Sensing Human Gait

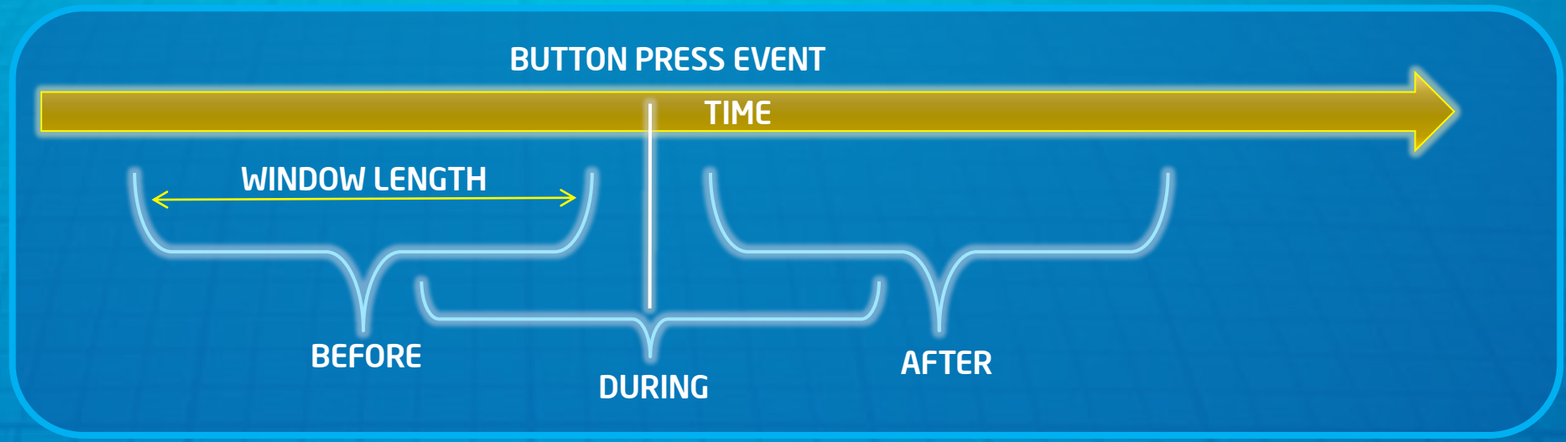
Predicting Life-Threatening Falls *Before* They Happen

Technology Research for Independent Living



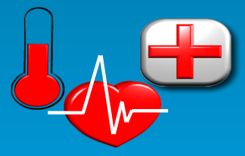
Sensing Who's Holding the Remote

- Unique button codes and sequences
- Button press rate
- Hand shake
- Angle the remote is held



Hard Sensing

The Inference Pipeline

Raw Data		Feature Extraction	Classification	Inference
	Accelerometer	• Std dev (x,y,z) • Mean, min, max (gravity angle)	Decision Tree	• Running • Sitting • Walking
	Physiological	• GSR features • HR features	Decision Tree	• Stressed • Relaxed • Startled
	Audio	• MFCC • Std dev • Dynamic range • Bandwidth	GMM	• Chatting • Listening to music • Commuting
	Video	• Intensity gradients • Contours • Color	• Kernel Machine • Bayesian Net • Sparse Bundle Adjustment	• John is in front of me • In the break room • Playing cards

Fusing Hard Sensing with Soft Sensing

HARD SENSING

In Front of Laptop

Running, Walking, Sitting, etc

Commuting, Chatting, Listening to Music, etc

Dark, Light, Indoor, Outdoor

Location (GPS, WIFI, BT)

Activity Fusion Algorithm

SOFT SENSING

Device Activity: Call, Editing, Surfing, Email

Calendar: free, In meeting, etc

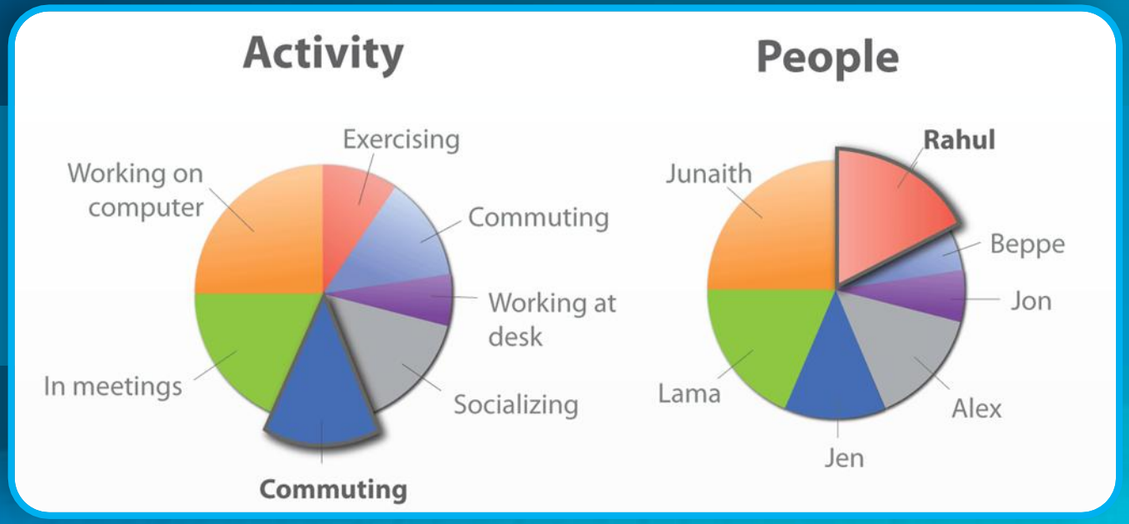
Browsing

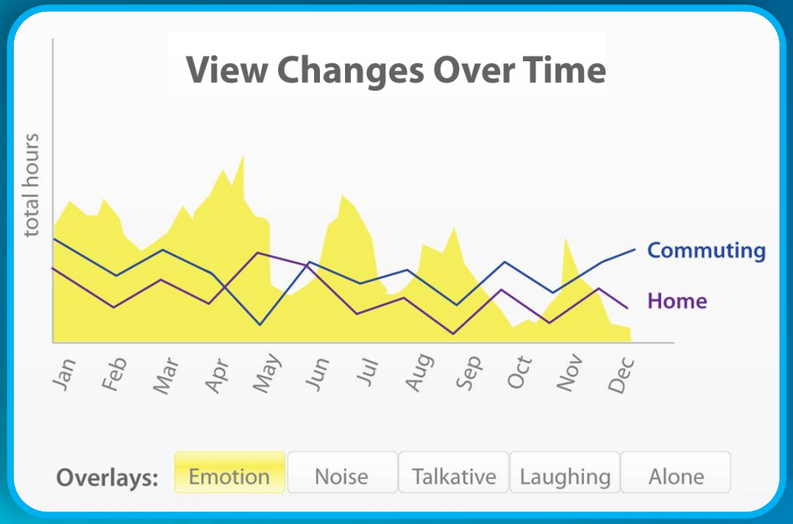
Social Networking

Animating a Person's Current Activity

Aggregating Context ...

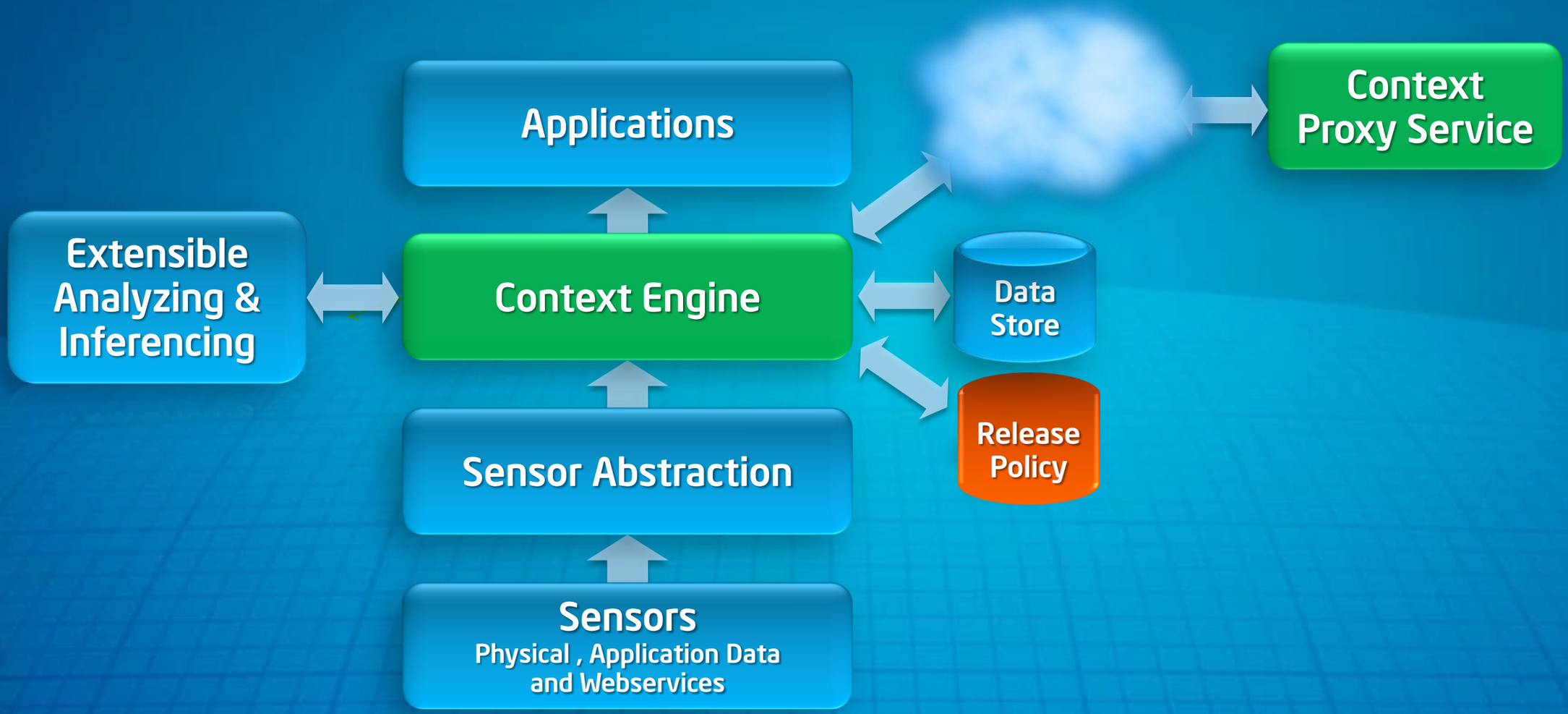
... Over Time





... Across Devices

Cognitive Framework for Managing Context



The Platform Implications of Context

Always-on sensing and computing

Low-power sensors and I/O

Effective workload partitioning

Optimized primitives for context

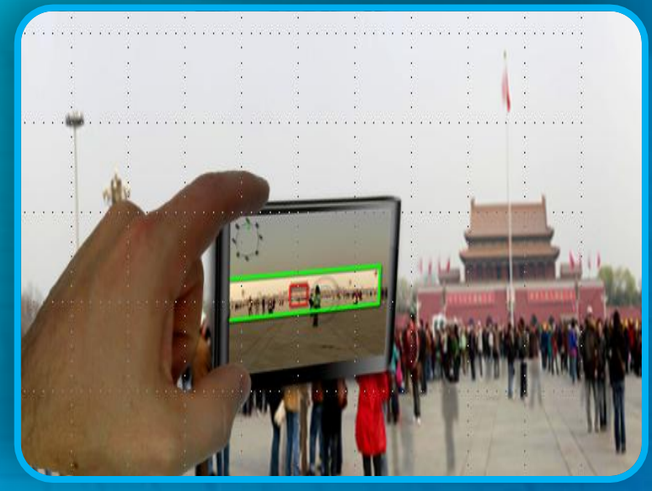
Is the Market Ready For All of This Context?

Experiencing

CONTEXT AWARENESS

Genevieve Bell

Intel Fellow and Director
Interaction & Experience Research
Intel Labs



Discovering What People Love

Learn from Experience

Learn by Asking and Seeing

Learn by Doing

Learn Through Engagement

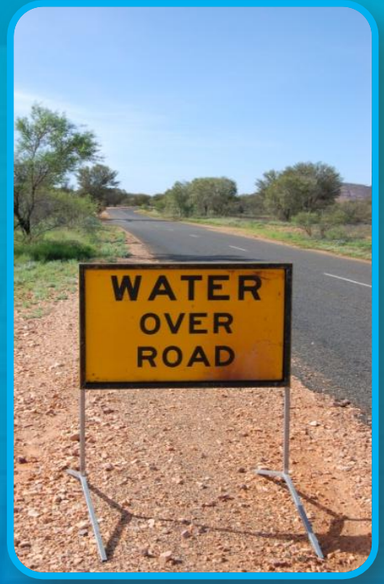
Make Sense of It All

Designing Experiences They'll Love

Conceptualize & Design → Validate & Iterate → Integrate & Build → Validate & Iterate

You Say Context, I Say Life ...

We often see “context” as a technical problem
... but context is also everyday life

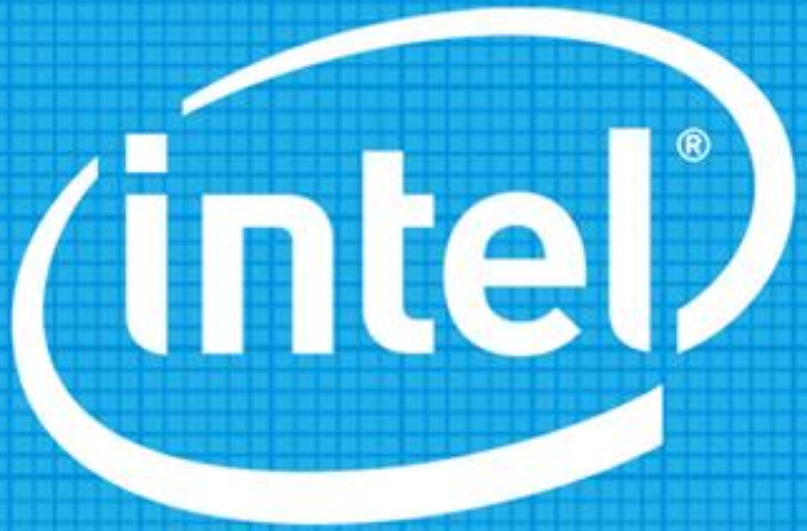


The Future Computing Experience:
Context is Everything

One more thing ...


The ultimate form of sensing


CONTEXT-AWARE
COMPUTING
This is
going to be
BIG!



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