Towards the Development of Persuasive Emo-aware Software Applications

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About me


Bachelor in Computer science
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University of San Agustin, Peru
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Assistant professor
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Assistant professor

Agenda

- Introduction
  - Motivation
  - Sensors evolution
- Emotions in software engineering
  - The Happyness framework
  - Challenges
- Persuasive emo-aware software systems
  - Scenarios of usage

We are living in a highly interconnected world

Sensors evolution

IDTechEx 2016
https://www.idtechex.com/

Heart Rate Chest Straps

Armband Calorimetry

GPS Activity trackers

Mobile Tracking apps

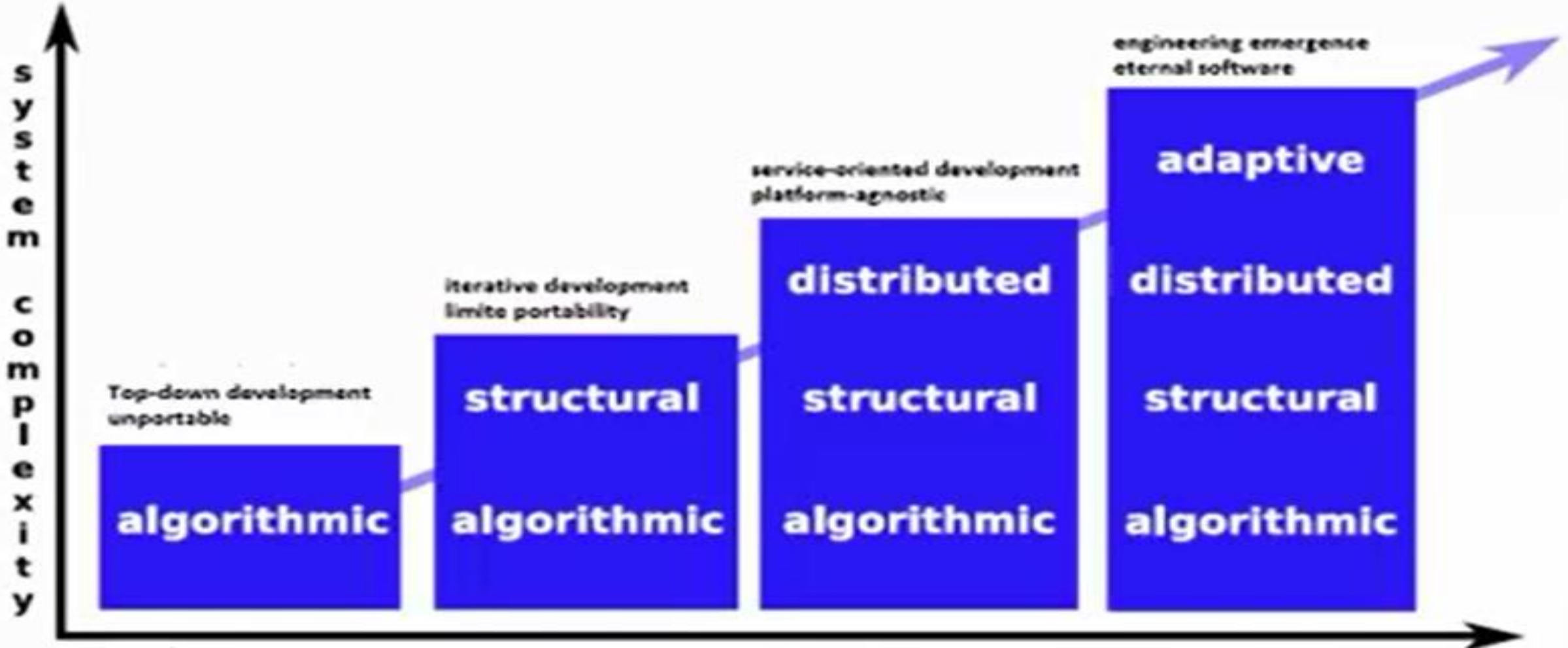
Wireless vital Signs monitors

Wristband/armband Activity trackers

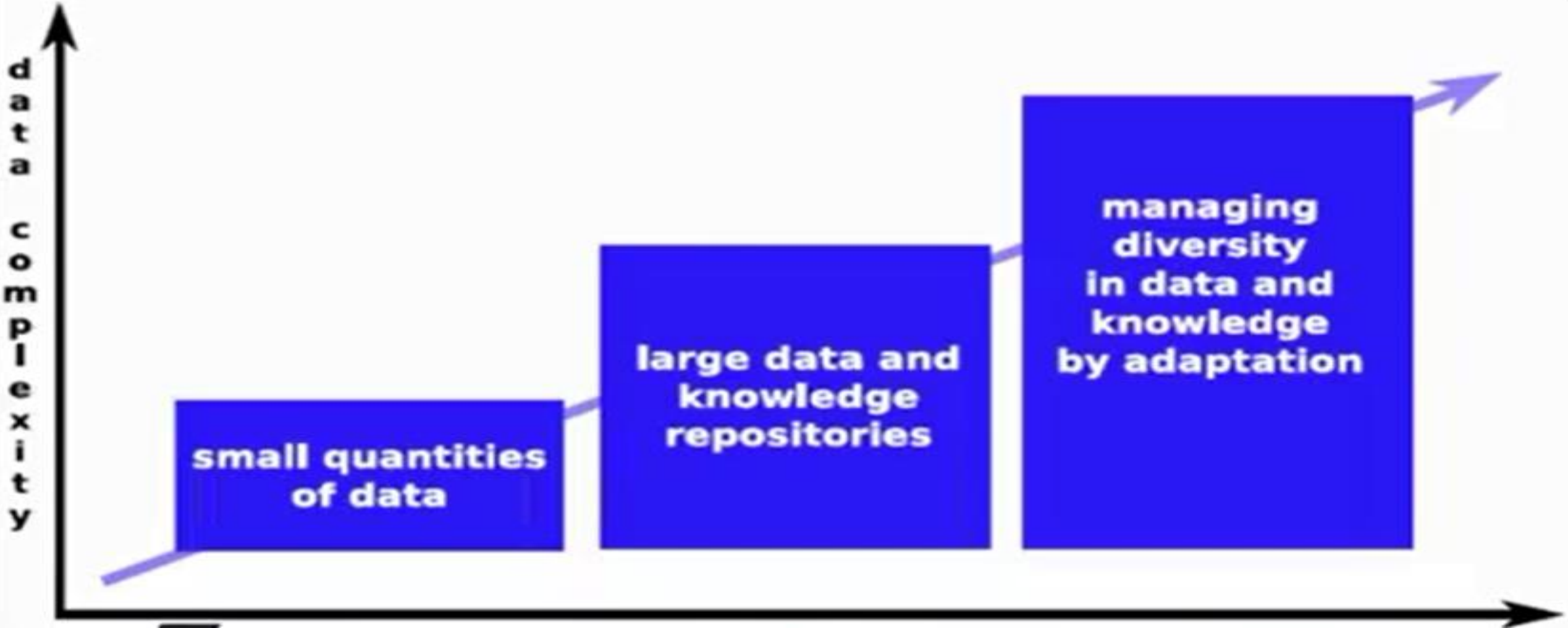
Integrated Solutions/ Smart devices

1980 2000 2006-09 2010 2012 2013 2014-2016 2017-2020

Modern Software Systems



Increasing Complexity of Data



One point of friction is merging the rather chaotic exploration and rapid innovation of fitness wearables with the methodical discipline of validation.

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- Introduction
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- Emotions in software engineering
  - The Happyness framework
  - The challenges
- Persuasive emo-aware software systems
  - The KUSISQA project (brief introduction)

Software engineering

"The systematic approach to the **development, operation, maintenance** and **retirement** of **software**"

ANSI/IEEE Std. 729-1983 IEEE Standard glossary of software engineering terminology

Emo-aware Software applications

Consumers
Providers

Wearable technology
Service Oriented Engineering
Mobile computing

Context of use

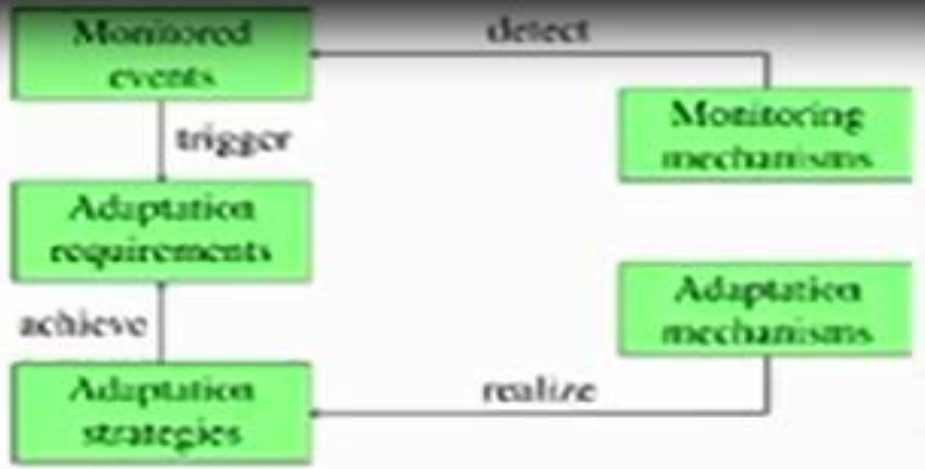
*How **emotions** can be addressed along the **software development process** to **maximize software quality and user experience**?*

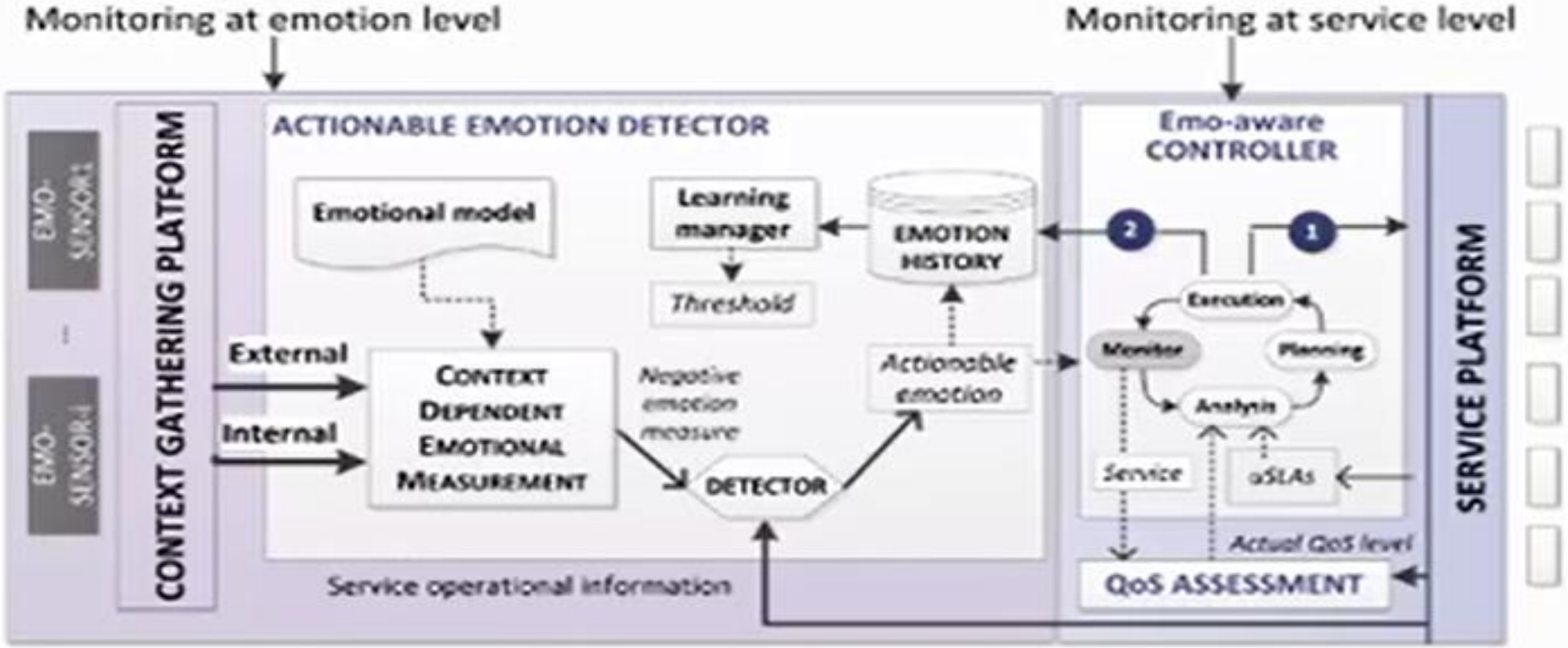
Developers (providers)

Time pressure, technically difficulties, bugs and communication with colleagues and customers.

End-users (consumers)

- Development of Self-adaptive Software Systems Guided by Emotion
- Usability and Software Testing Based on Emotions


Monitored events
detect
Monitoring mechanisms
trigger
Adaptation requirements
achieve
Adaptation mechanisms
Adaptation strategies
realize


Monitoring at emotion level
Monitoring at service level
ACTIONABLE EMOTION DETECTOR
Emo-aware CONTROLLER
EMO-SENSOR1
EMO-SENSOR2
CONTEXT GATHERING PLATFORM
Emotional model
Learning manager
EMOTION HISTORY
Threshold
External
Internal
CONTEXT DEPENDENT EMOTIONAL MEASUREMENT
Negative emotion measure
DETECTOR
Actionable emotion
Execution
Monitor
Planning
Analysis
Service
aSLAs
Actual QoS level
QoS ASSESSMENT
Service operational information
SERVICE PLATFORM

Using Emotions to Empower the Self-adaptation Capability of Software Services

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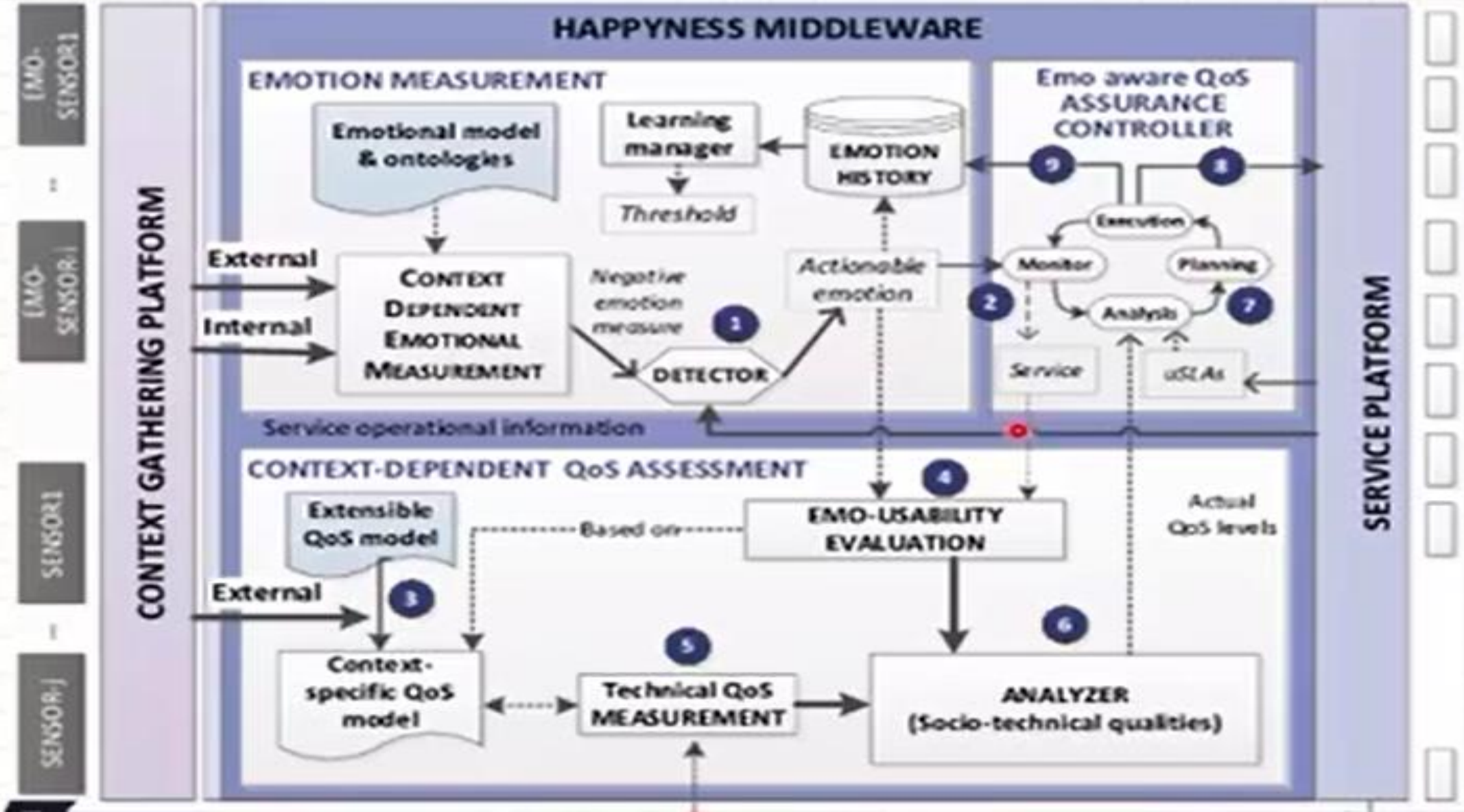
Abstract—Traditional self-adaptive systems research has focused on external contextual aspects such as performance, system reaction to environment. In this paper, we introduce the idea of measuring emotions in order to empower the adaptability of software services at runtime. We present two type of monitoring mechanisms and an adaptive adaptation strategy, which were implemented as part of the HAPPYNESS middleware. A preliminary test using data from the Empatica repository was

(UX) in context-aware environments. In particular, we measure stress by monitoring physiological data (electrodermal activity, physical activity and skin temperature) of end-users (service consumers). The concept builds on the strength of recent technological advances in emotion measurement tools, non-obtrusive and ubiquitous monitoring technology. We present two type of monitoring mechanisms and an adaptation strategy

2017 IEEE/ACM 2nd International Workshop on Emotion Awareness in Software Engineering (SEmotion)

The Happyness framework



HAPPYNESS: An Emotion-aware QoS Assurance Framework for Enhancing User Experience

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Abstract—**In this paper, we introduce the idea of exploiting the emotional information as a key element in providing personalized context-aware software services and consequently enhancing quality of User Experience(UX). We argue that emotional measurements can be integrated in Quality of Service (QoS) assurance frameworks. The idea builds on the strength of technological advances in emotion measurement tools, non-obtrusive and ubiquitous monitoring technology.**

Index Terms—**stress measurement, User Experience, QoS, context awareness, monitoring.**

sensors that capture changes in physiological activities (e.g. FEEL [8], E4 Wristband [9]), and many others.

Our framework extends the generic QoSMOS architecture [10][11], which considers the reliability and performance properties as main parameters for optimizing the adaptive services provision. Another similar works that also focused only on technical service quality aspects are [12][13].

II. EMOTION-AWARE QOS ASSURANCE: A NEW APPROACH

DOI: 10.1109/ICSE-C.2017.137
Conference: 2017 IEEE/ACM 39th International Conference on Software Engineering (ICSE)

The framework focuses on **emotions** as the principal asset for **continuous enhancement of UX.**

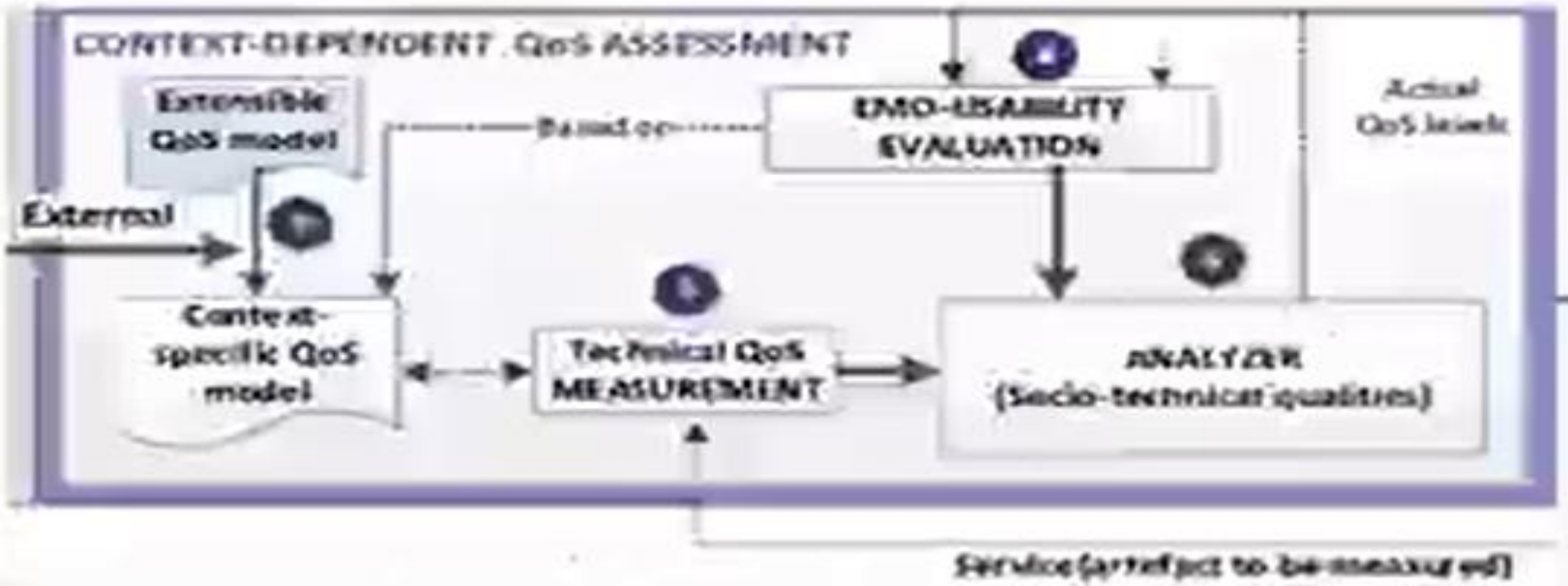
Emotion measurement

Real time stress measurement:

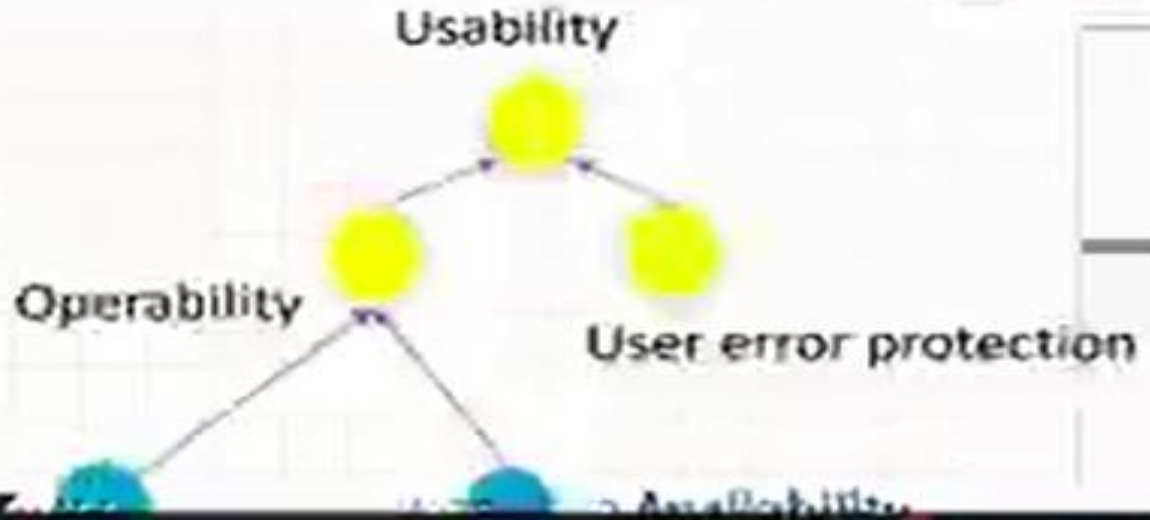
- Levels of stress (multi-class)
- Efficient response time

Stress detection

Context-dependent QoS assessment



Interdependencies between social and technical dimensions



Functional

Stress detection

Towards Real-Time Automatic Stress Detection for Office Workplaces

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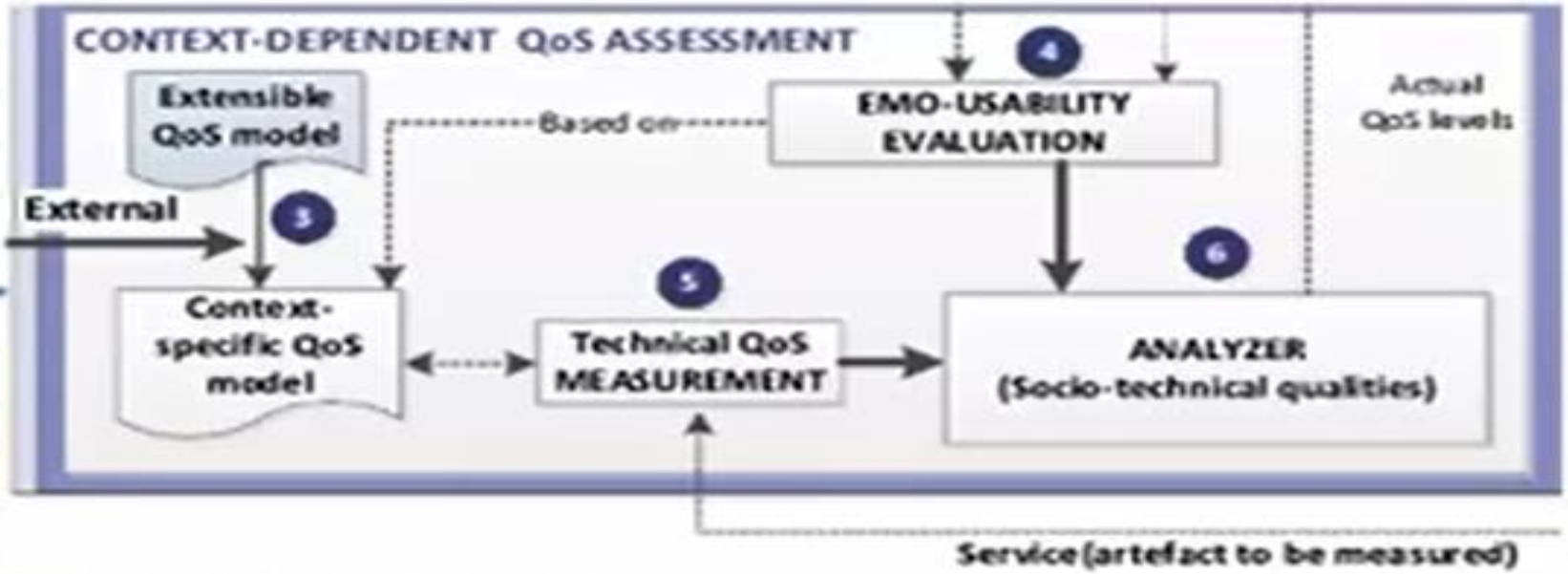
Information Management and Big Data. SIMBig 2018

Context-dependent QoS assessment



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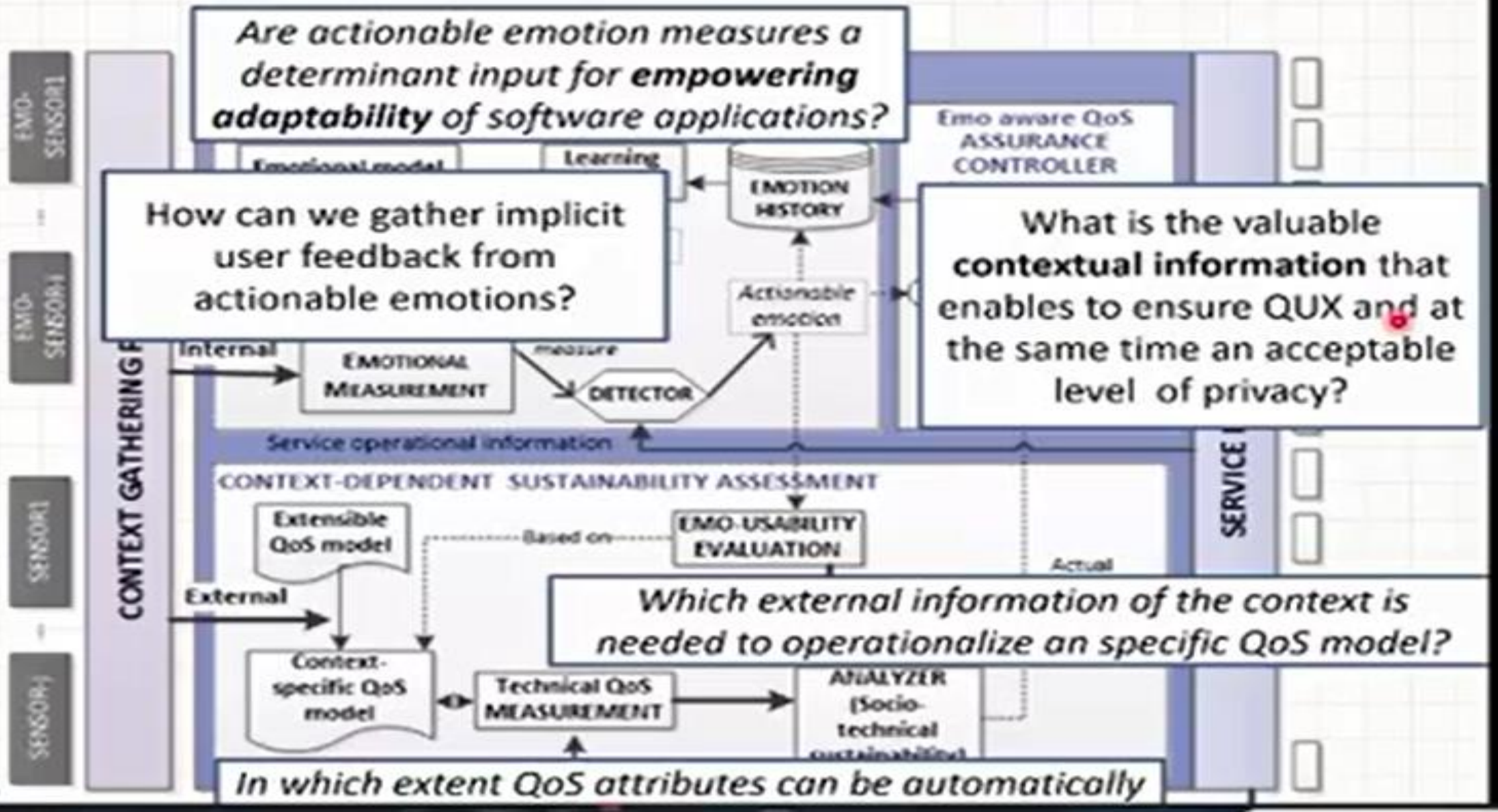
Characterizing the contribution of quality requirements to software sustainability

Nelly Condori-Fernandez, Patricia Lago

Show more

Challenging the Happyness framework



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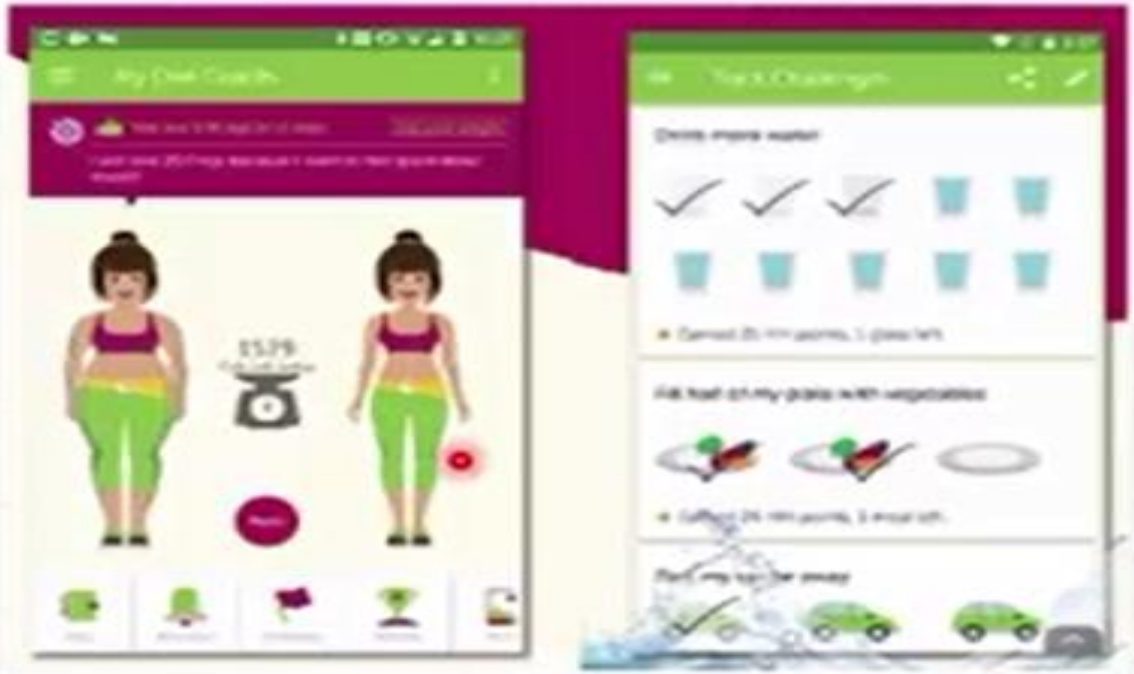
TRANSTHEORETICAL MODEL

- **Precontemplation** — Not Ready
  Not aware, uninformed, no intention to change
- **Contemplation** — Getting Ready
  Aware problem exists, are thinking about changing
- **Preparation** — Ready
  Intention to take action to change
- **Action** — 6 Months
  Make modifications in their behavior
- **Maintenance** — 6 Months - 5 years
  Have made modifications, prevent relapse
- **Termination** — Lifetime



Persuasive emo-aware systems

MODELS, PRINCIPLES OF PERSUASION

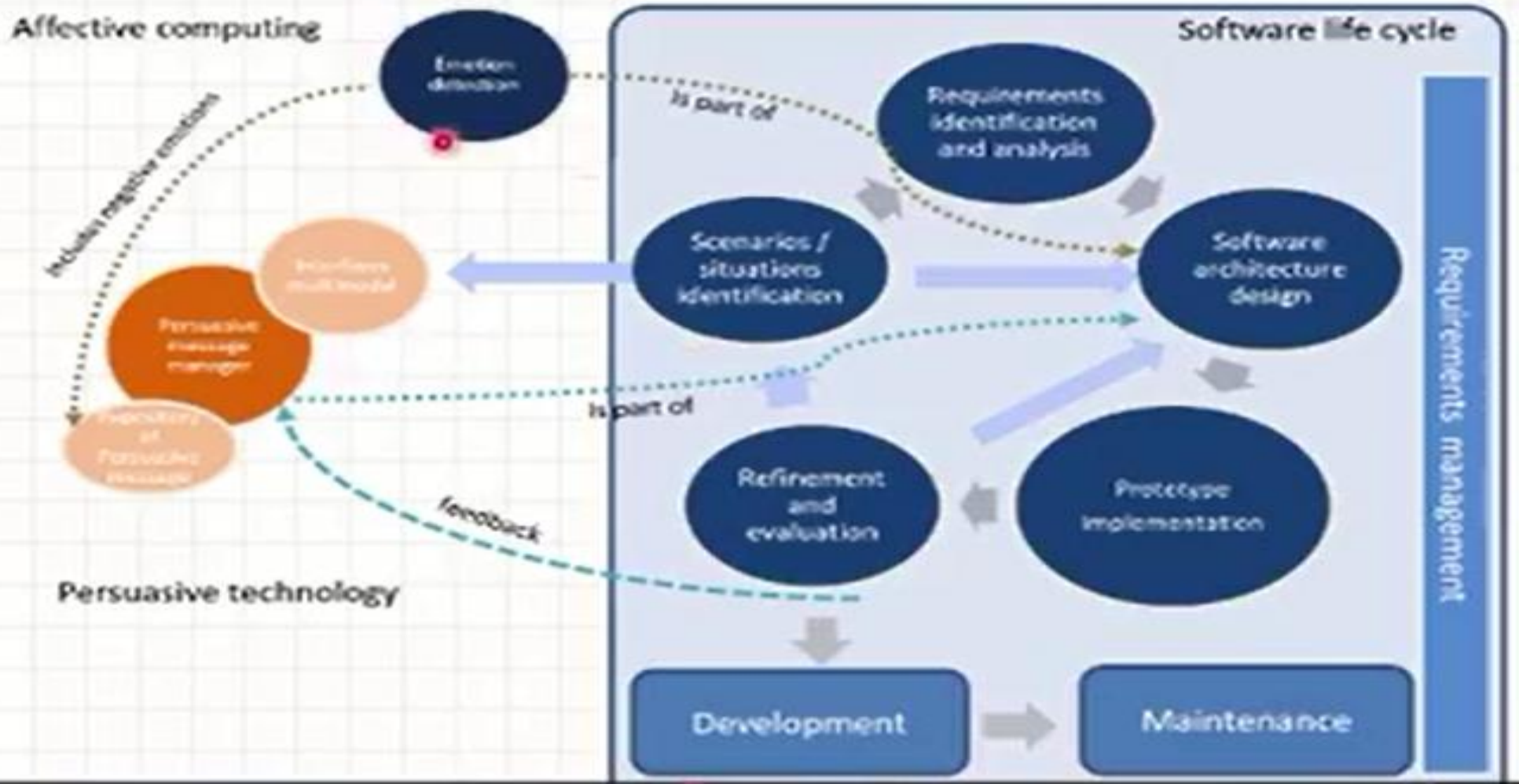
EMO-AWARE SOFTWARE SYSTEMS

PERSUASIVE EMO-AWARE SYSTEMS

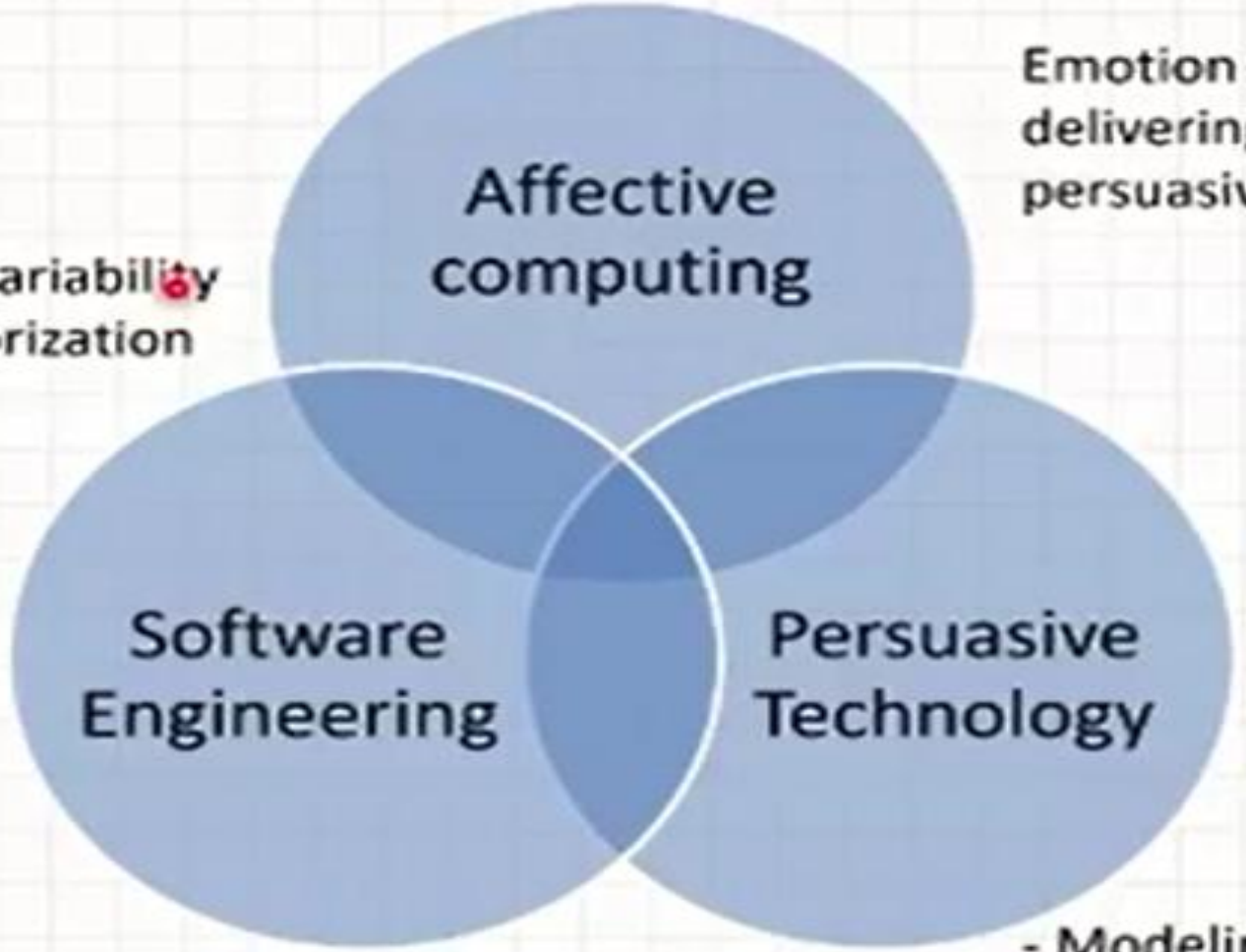
- Transtheoretical Model of behavior change
- the Goal-setting Theory
- The Fogg Behavior Model
- The PSD Model
- Principios de Cialdini

Development of persuasive emo-aware systems

Contex model in design and run time



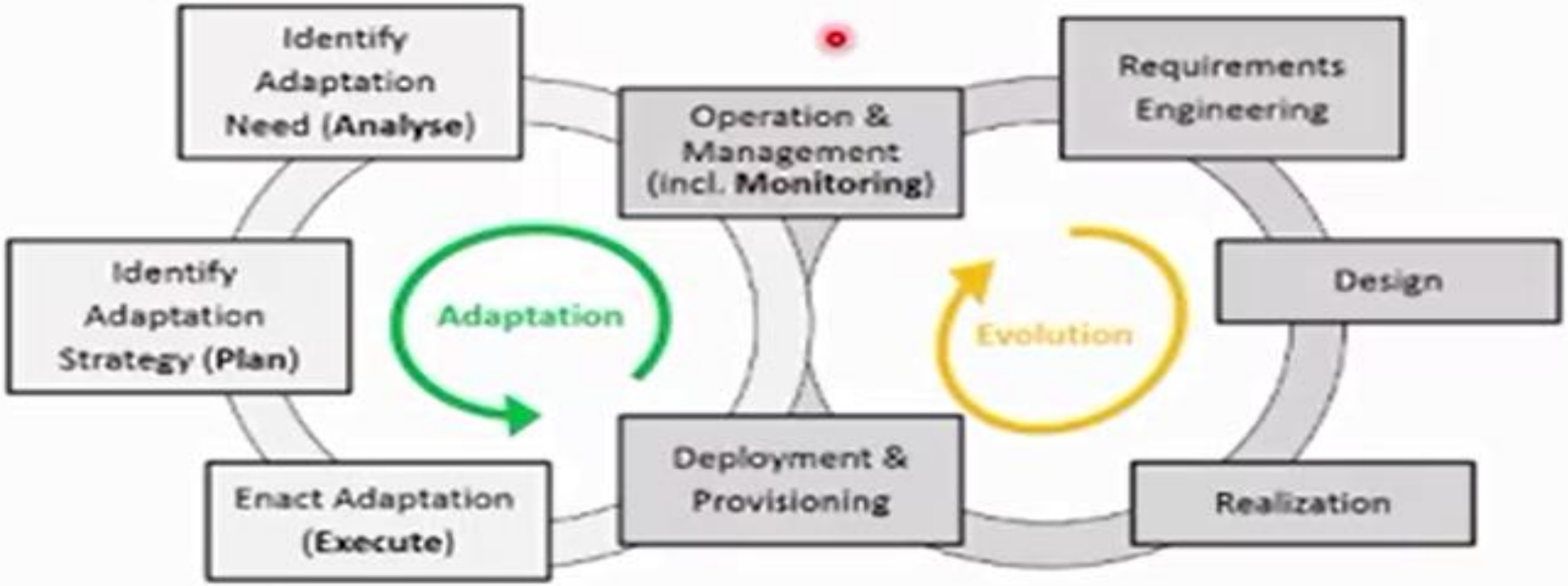
How to increase the efficacy of persuasive emo-aware systems?



Emotion as an asset for delivering (self)-adaptive persuasive messages

- Modeling context variability
- Predictive monitorization

- Modeling context variability


Identify Adaptation Need (Analyse)
Operation & Management (incl. Monitoring)
Requirements Engineering
Identify Adaptation Strategy (Plan)
Adaptation
Evolution
Design
Enact Adaptation (Execute)
Deployment & Provisioning
Realization

SENSORS

CONTEXT GATHERING PLATFORM

QUALITY ASSURANCE

SERVICE BASED MOBILE APPLICATION

Emotional sensors

Scenarios

Self-regulation emotions in the education domain:

KUSISQA

Smart car parking system

Medication adherence

GRUPO BANCO MUNDIAL

FONDECYT

KUSISQA: Supporting to the Emotion Regulation within the Teaching and Learning process by means of a Context-aware Persuasive System

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