

# MobileSOA



A Service-Oriented Web 2.0 Framework for  
Context-Aware, Lightweight and Flexible Mobile  
Applications

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# Motivation

## Current Problems faced by Enterprises

- Increased mobility of enterprise workers
  - Projections show more than a billion workers to be on the move by 2011<sup>1</sup>
  - Need to ensure normal business in spite of worker mobility

<sup>1</sup>Source : “Worldwide Mobile Worker Population 2007 – 2011 Forecast”, IDC, Dec 2007

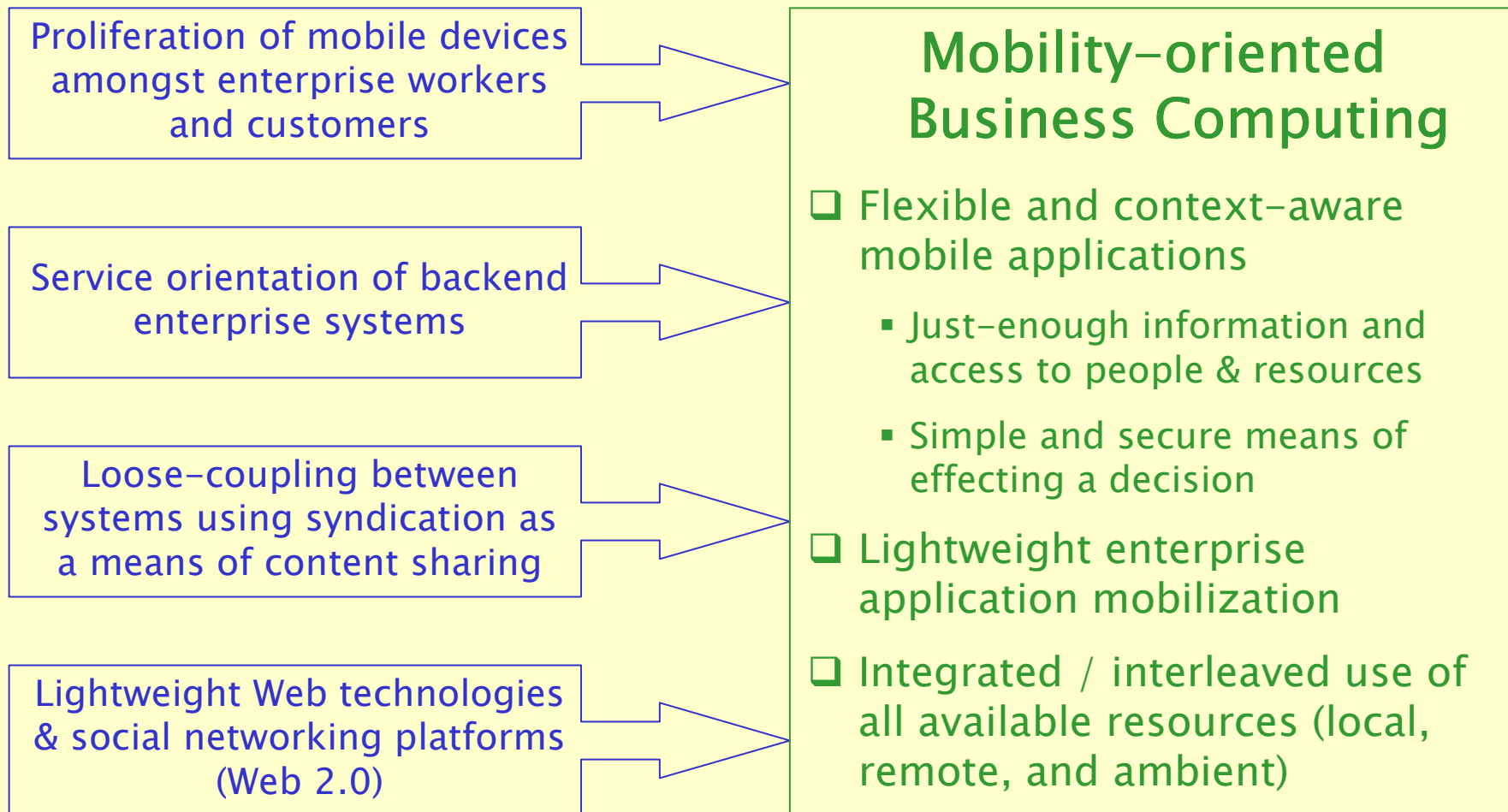
- Increased pace of business
  - Need to make business decisions in real-time
  - Need to have anytime-anywhere access to enterprise systems and workflows
- Increased competition in global business environment
  - Need to increase efficiency of workforce and workflows

How to enable a flexible & mobile enterprise, which operates in real-time ?

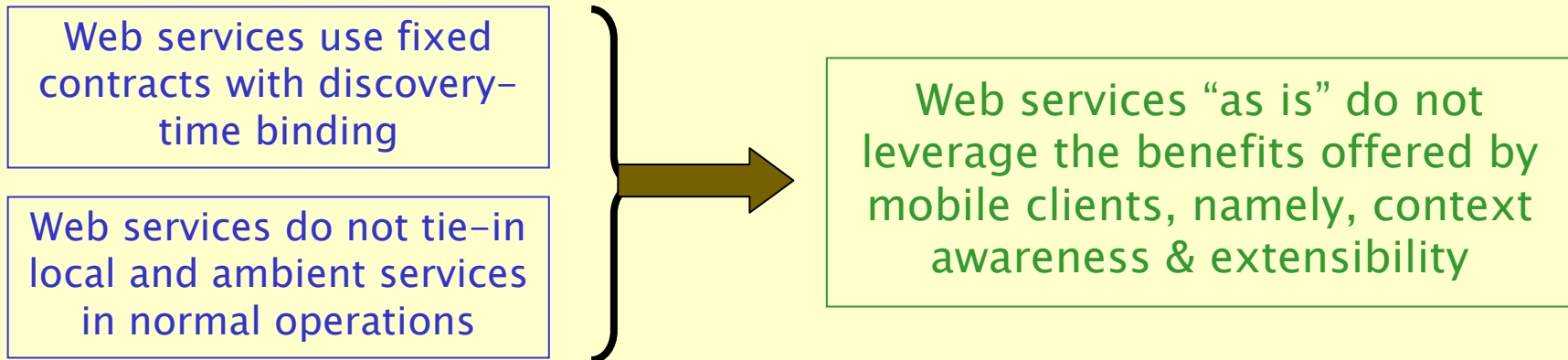
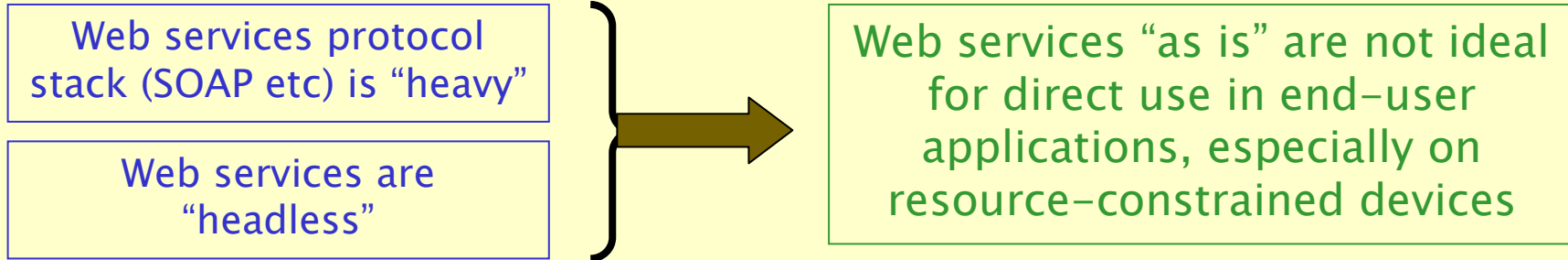


# Motivation

## Technology Trends & Vision



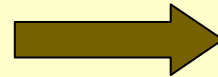
# Why do we need a new approach ?



# Why do we need a new approach (cont'd) ?

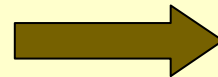


Web services security model is connection-oriented



Heterogeneous networks and discontinuous operations compromise this model

Enterprise tasks are collaborative and information-intensive



Mobile device UI is not good for exploratory data search or access to multiple apps simultaneously

Enterprise users need just-in-time access to apps, info & resources



Mobile device app frameworks & enterprise app mobilization approaches do not address this

# Contributions of this Work



A client-side framework (MobileSOA) that:

- Virtualizes local, remote and ambient services in a uniform manner
- Enables lightweight access to virtualized services from Web 2.0 front-ends
- Provides in-built mobile context awareness
- Provides enhanced enterprise / backend control over services deployment, availability and execution
- Enables lightweight mobile application deployment for providing just-in-time, targeted applications
- Provides an open presentation layer for easy integration with user-generated and personalized content



# MobileSOA Framework Overview

- Virtualized Services
  - Local, remote and ambient services are virtualized in a uniform manner and categorized as abstract services
    - Invocation-time binding of abstract service to concrete service interfaces
    - Separation of concerns – service functionality & service implementation
  - RESTful SOA primitives used for invoking all services
- Access from Web 2.0 front-ends
  - Single-point asynchronous interface (Mailbox) for declaratory applications
    - Abstract service invocation using RESTful SOA primitives
  - Supports both application-initiated (“pull”-type) and framework-initiated (“push”-type) interactions



# MobileSOA Framework

## Overview (cont'd)

- Context awareness
  - Mobile context is collected, and periodically fed to backend
  - Context used at three points:
    - Backend → Choose applications / services to deploy / provision
    - Client → Tailor content and application options presentation
    - Client → Bind abstract to concrete services
- Enhanced enterprise / backend control
  - Application-level secure sessions
    - Three levels of security – device, user, application
  - Context based service provisioning, and availability control through policy updates



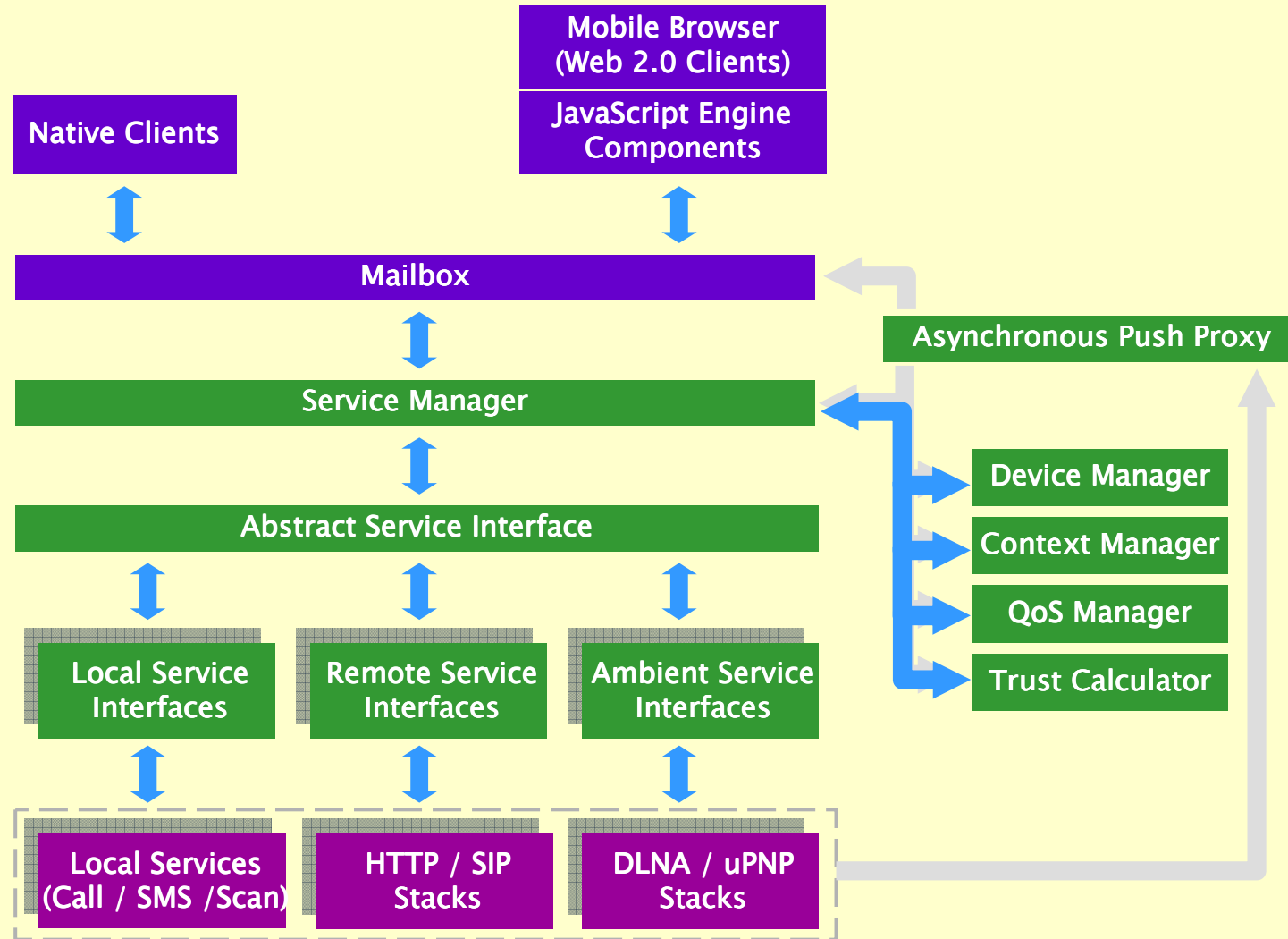
# MobileSOA Framework

## Overview (cont'd)

- Lightweight application deployment
  - Web 2.0 applications pushed across using enhanced ATOM feeds
    - Enhancement: Added “SOA actions” that map to abstract service invocations
    - For access to contextual services, information, resources, people and backend enterprise system actions
    - Provides back channel to enterprise systems
  - Action-based updates to applications using feed mechanism
  - Enables zero-footprint, zero-development effort enterprise application mobilization
- Open presentation layer
  - Mailbox interface allows any Web 2.0 application to interface with it

# MobileSOA Framework

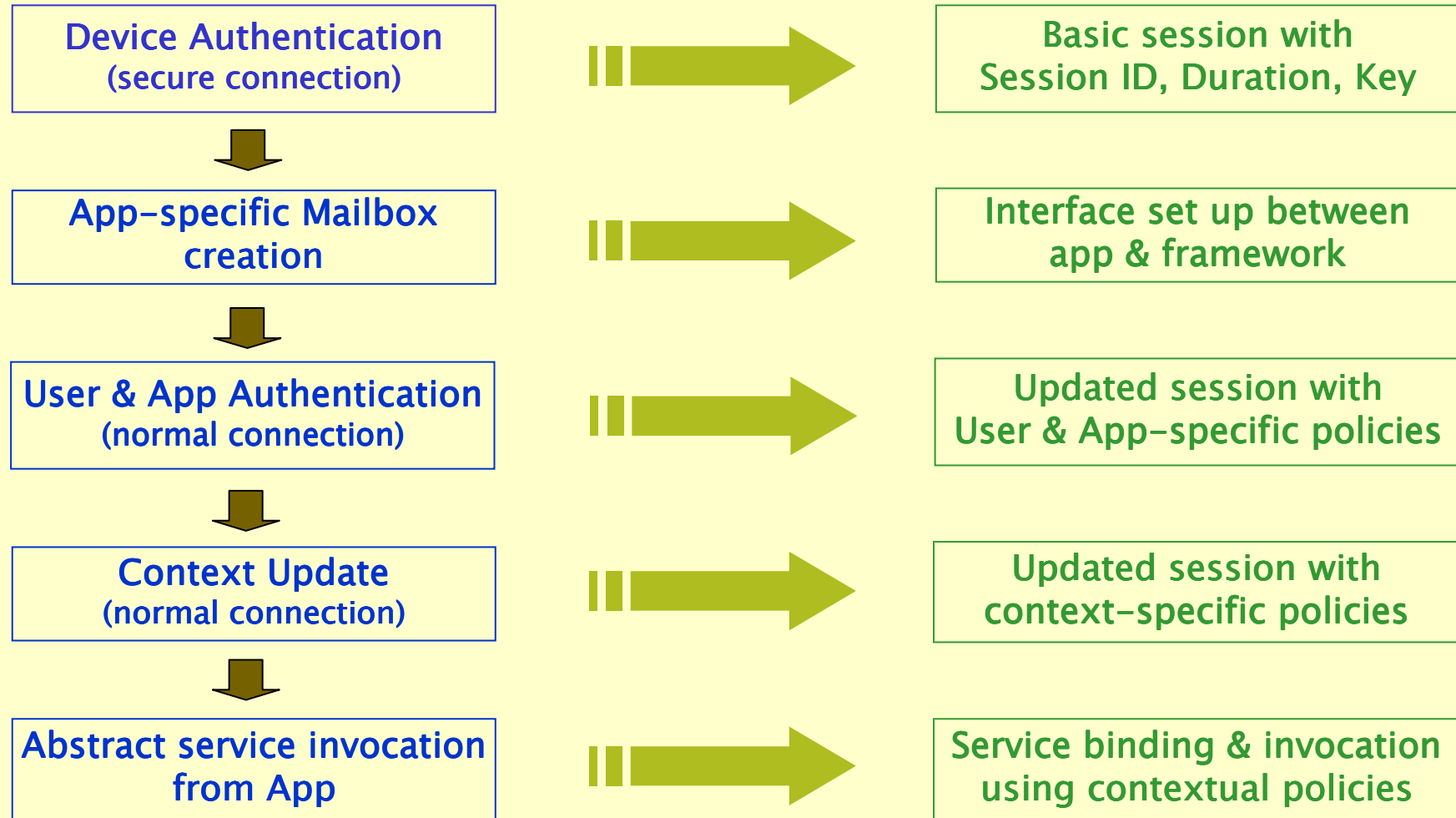
## System Architecture & Components





# MobileSOA Framework

## Operation Overview





# MobileSOA Framework

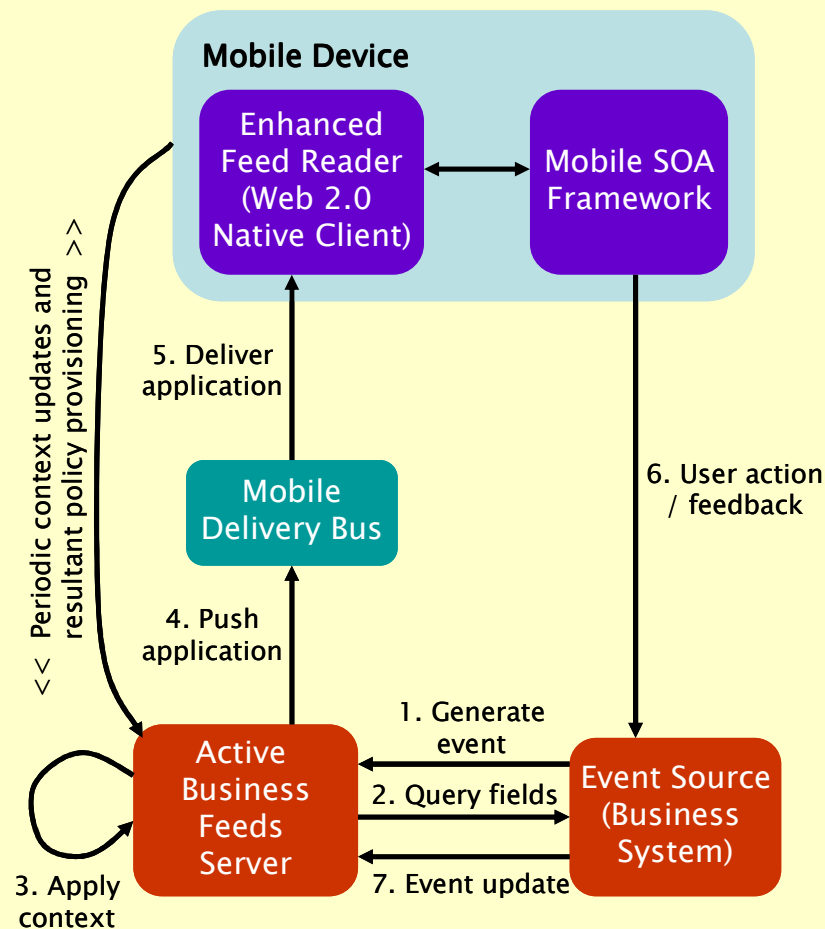
## Other Features

- **Optimized service discovery**
  - Updated list of allowable services maintained on client
    - Local lookup to map abstract services → distributed UDDI
    - Updated by backend, through policy updates, based on context updates
- **Extreme postponability of service binding**
  - Binding possible at three points
    - Enterprise backend → During application generation
    - Client device → During application instantiation
    - Client device → During service invocation
- **Backend / framework initiated applications on client devices using asynchronous push**



# Active Business Feeds

## A Sample MobileSOA Application



- Demonstrates lightweight deployment of applications
- Enables rapid tactical decision making
  - Uses composite application model
    - Provides task-based relevant collaboration options, information and server actions in unified interface
  - Provides interleaved access to local and remote services
  - Uses syndication for application and content distribution
    - Real-time usage of user feedback to update applications, services and content

# Active Business Feeds

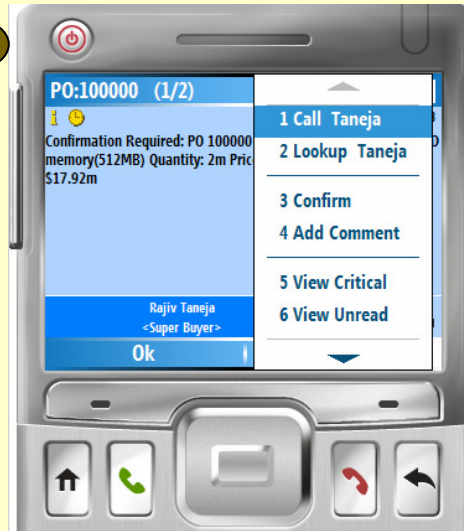
## Screen Shots – Backend-initiated task management



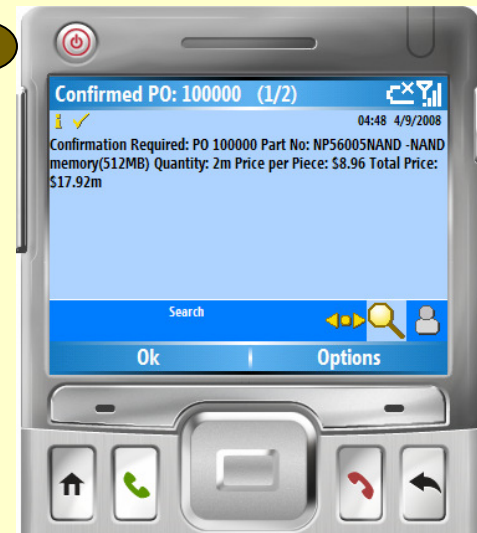
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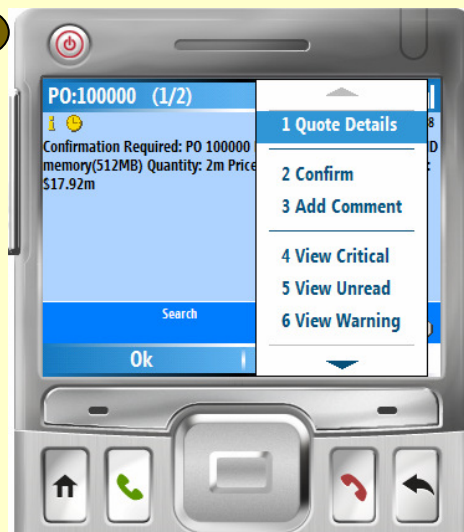
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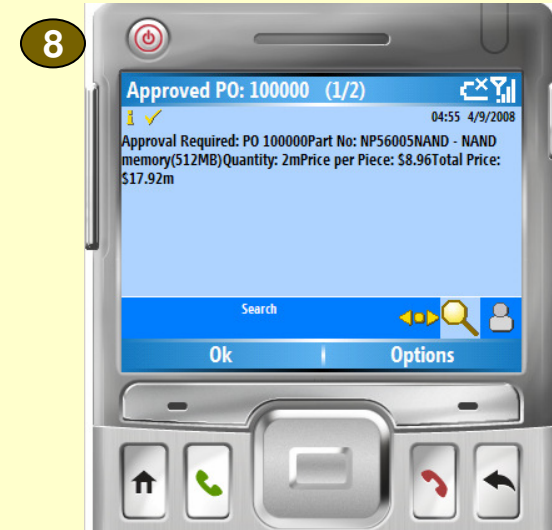
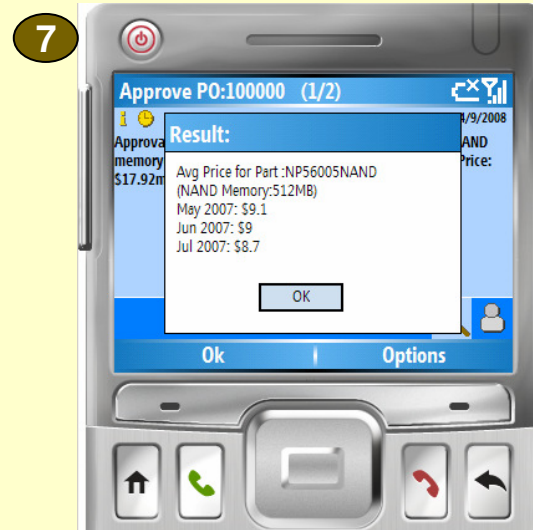
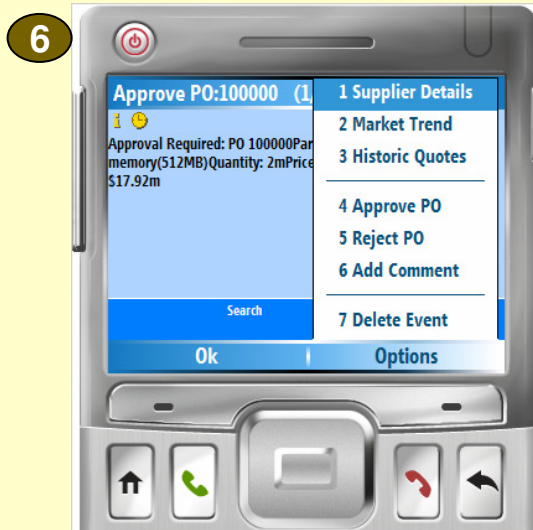
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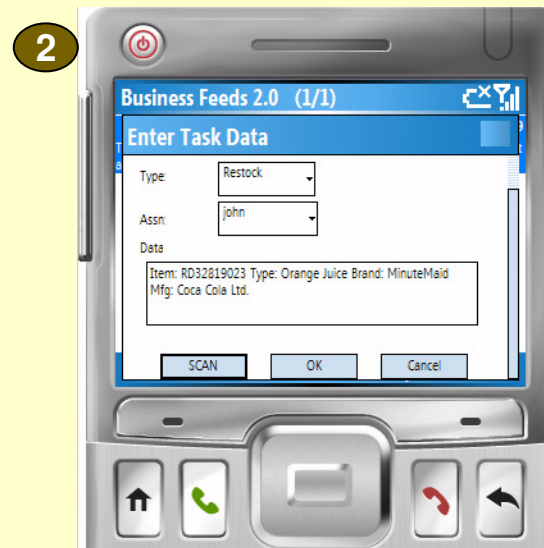
# Active Business Feeds

## Screen Shots (cont'd) – Backend-initiated task management



# Active Business Feeds

## Screen Shots (cont'd) – Mobile-initiated task management





# Conclusions and Future Work

## Conclusions

- The MobileSOA framework:
  - Provides mechanism for uniform virtualization of local, remote and ambient services on mobile device
  - Facilitates deployment of context-aware, flexible mobile applications
    - Employ Web 2.0 front-ends, and access virtualized services through lightweight RESTful service-oriented primitives
  - Enables zero-footprint, zero-development effort mobilization of enterprise applications

## Future Work

- Asynchronous “push”-based invocation of enterprise apps
- Mashup framework



# Thank You !

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# Additional Information



# Active Business Feeds

## Use Cases

### White-Collar Use Case

- **Global purchasing process of Motorola**
  - Purchase request processing involving multiple globally distributed stakeholders
  - Access to multiple backends – BAM, ERP, BI

### Blue-Collar Use Cases

- **Backend-initiated task management on retail shop-floor**
  - Replenishment of coins at POS
- **Mobile-initiated task management on retail shop-floor**
  - Replenishment of shelves based on task generated by scanning product barcode from mobile device



# Active Business Feeds

## Implementation Details

- Process followed for business application mobilization

### Business Analyst

- Identifies points to be mobilized in the business system/application

### SOA developer/Architect

- Adapts identified points to generate events and publish them to provided ATOM publish interface
- Exposes appropriate Actions and Query services as SOA services if not already so

### ABF System Admin

- Configures the application/system on ABF database by adding application identifier and query service URIs into corresponding tables

- Application mobilization experience data

- Each app requires ~2 weeks to be mobilized (3 data points)
- ABF and MobileSOA framework currently available on Windows Mobile 6 and Linux devices of Motorola