

UCPA 2010 - Workshop on User-Centric Pervasive Adaptive Systems



Linking Between Personal Smart Spaces

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Overview

- ▶ What is a PSS?
- ▶ PSSs in Persist
- ▶ Two Scenarios
- ▶ Problems with Determining Proximity
- ▶ Conclusion

What is a PSS?

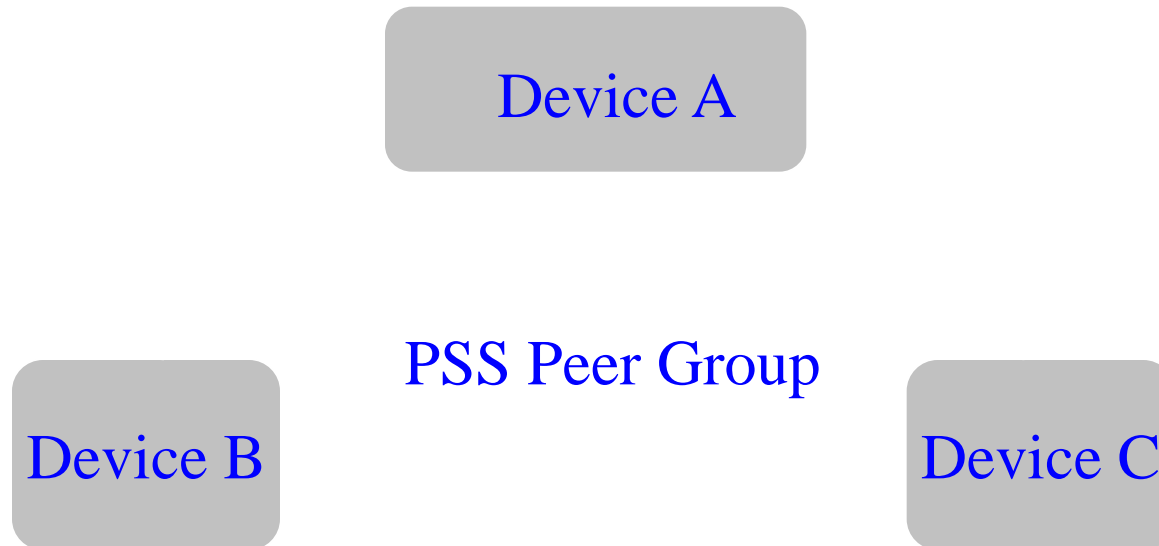
Personal Smart Space (PSS):

- ▶ Classic **fixed smart space** offers pervasive behaviour in a small area with fixed boundary (e.g. Smart House, Smart Office, etc.).
- ▶ Research on **mobile systems** has different focus.
- ▶ Result is “islands of pervasiveness” with no continuity.
- ▶ Personal Smart Space (PSS) introduced to bridge this gap.
- ▶ PSS provides continuity without a high overhead in terms of infrastructure required.

What is a PSS?

Key features:

(1) A PSS is a collection of devices and services linked by an ad hoc network



What is a PSS?

Key features:

(2) A PSS may be mobile or static

- ▶ Static PSS corresponds to classic fixed smart space with fixed boundary (e.g. Smart House, Smart Office, etc.).
- ▶ For mobile PSS, physical boundary moves with user (e.g. John).
- ▶ Architecture for static PSS is identical to that for mobile PSS.

What is a PSS?

Key features:

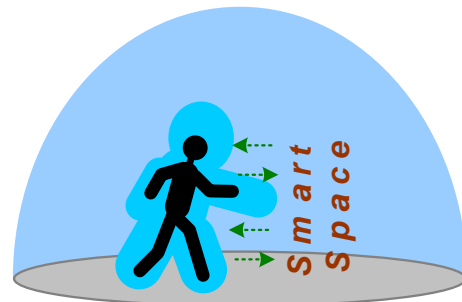
(3) Every PSS has an “owner”

- ▶ For mobile PSS owner is the mobile user.
- ▶ For static PSS owner may be a person (e.g. Smart Home) or an organisation (e.g. Smart Office).

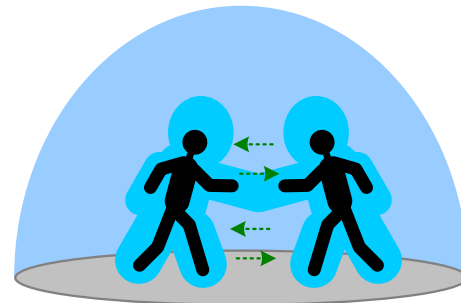
What is a PSS?

(4) A PSS must be able to interact with other PSSs via the ad hoc network

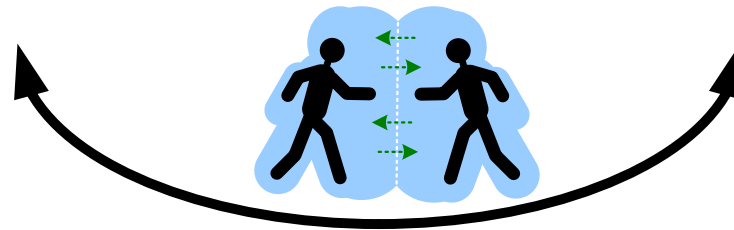
- ▶ As user moves around his/her PSS may interact with those of other users and/or static PSSs.



a) PSS - Fixed
PSS



b) PSS - PSS
via Fixed PSS



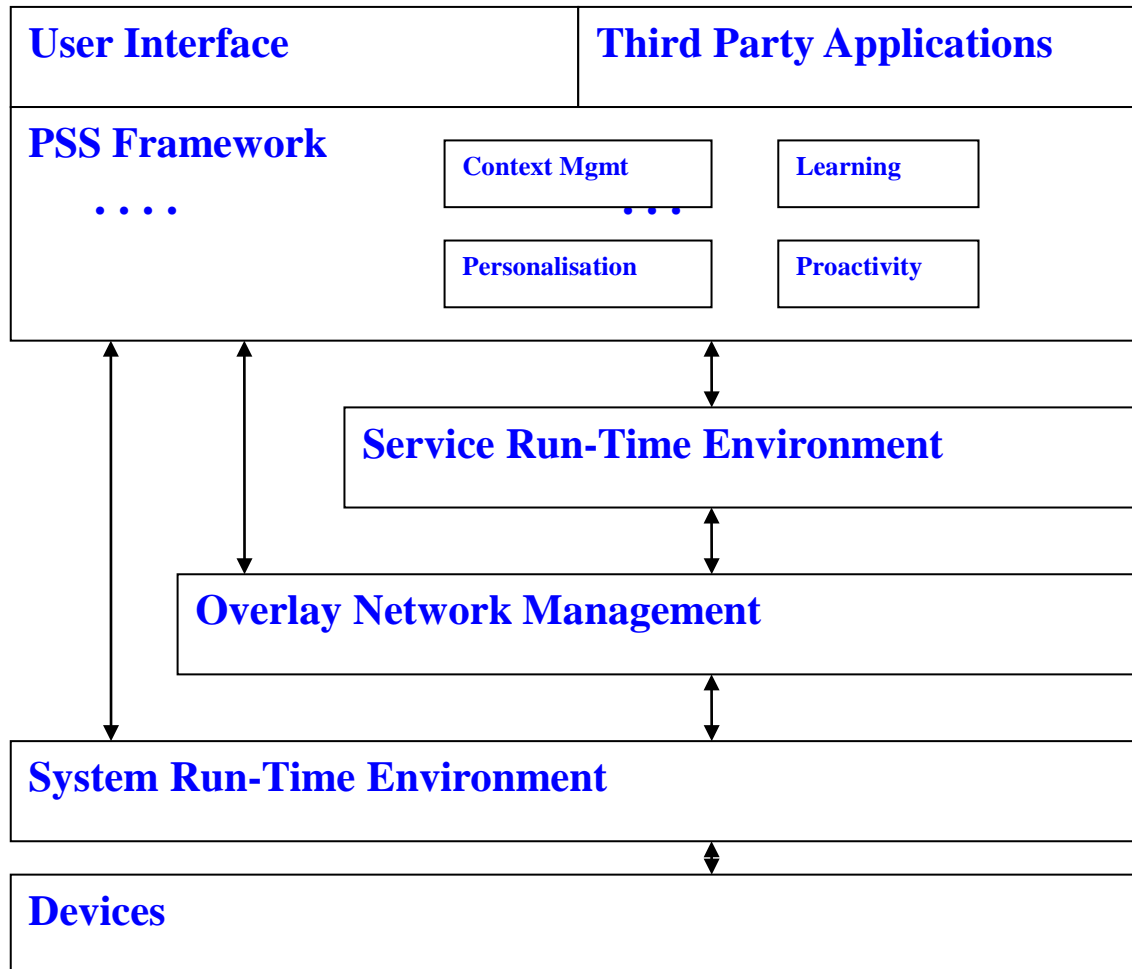
c) PSS - PSS

What is a PSS?

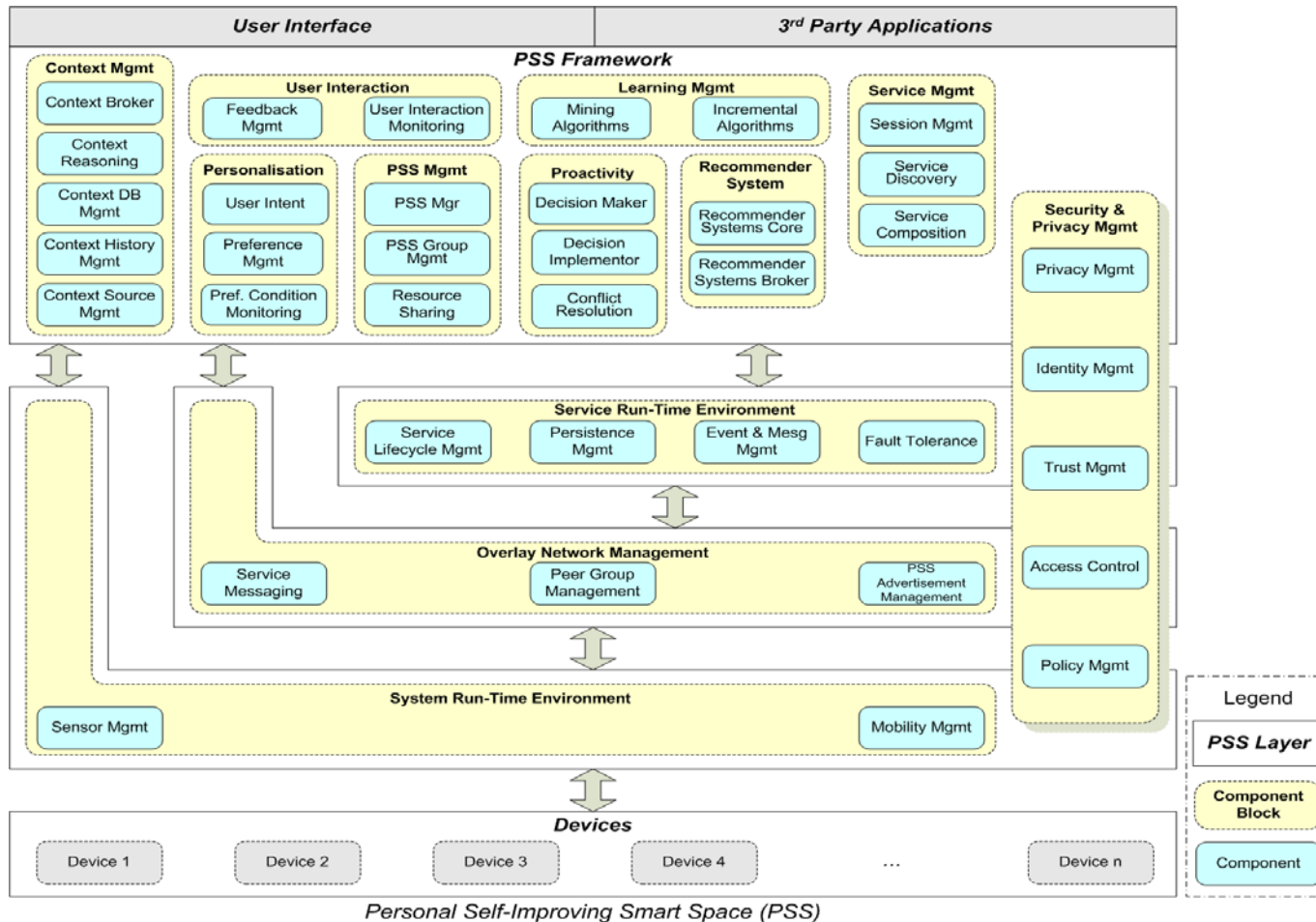
Key features:

- (5) A PSS must be able to adapt its behaviour according to the current context and the preferences of the user.**
 - ▶ Each PSS (both static and mobile) maintains a set of user preferences of its owner.
 - ▶ User preferences depend on context and are used to adapt the behaviour of the system according to the current context, e.g. pref. room temperature. Even static PSS (e.g. room) may have prefs.
 - ▶ Thus a PSS must be context aware and personalisable.
- (6) A PSS must be self-improving and able to learn by monitoring the user.**
- (7) A PSS must protect the privacy of its owner.**
- (8) A PSS must be able to make available any of its services for other PSSs to share.**
- (9) A PSS may obtain information from another PSS if it is prepared to divulge it.**

PSSs in Persist – Basic View of Architecture



PSSs in Persist – More Detailed View of Architecture



Two Scenarios

Memory Support

- ▶ **PSS offers a practical way of identifying other people.**
- ▶ **User may be informed discreetly via mobile phone earpiece or spectacles with display.**
- ▶ **Arthur has difficulty remembering names. When he meets his friend Bill, his PSS tells him Bill's name through his earpiece.**

Two Scenarios

Personalised advertisement

- ▶ **Idea of personalised ads when user passes a shop is not new.**
- ▶ **However, PSS provides ability for user to control such ads and allow only ones that are useful in user's current context.**
- ▶ **As Jack approaches shopping mall, his PSS decides whether to allow ads and, if so, what Jack's current priorities are, e.g. if Jack is going to buy some whisky, it might advertise a special offer on whisky in one of the shops.**

Problems with Determining Proximity

- ▶ PSSs establish communication over ad-hoc networks
- ▶ PSSs advertise their existence to other PSSs
 - Includes Digital Personal Identifier (DPI)
- ▶ What is the ‘most relevant’ proximity to establish communication between PSSs?
 - Close Proximity – Bill needs to be within ‘greeting distance’ of Arthur
 - Wide Proximity – May wish to establish communication with Station PSS asap to receive departure information



Problems with Determining Proximity

- ▶ We have experimented with both
 - ▶ ad-hoc wifi (~30 metres)
 - ▶ Bluetooth (~5 metres)
- ▶ PSS communication operates over both
- ▶ PSS can personalise communication range
 - ▶ Context Management
 - ▶ Personalisation Management
 - ▶ Learning Management

Conclusion

- ▶ PSS is attractive concept for building pervasive systems.
- ▶ Persist has developed an architecture and implemented prototypes based on the PSS concept.
- ▶ Identifying other users (PSSs) when they are nearby is useful functionality on which range of new services can be built.
- ▶ However, problem of determining proximity needs to be **satisfactorily** solved to facilitate this.



Thank you!

... any questions?

