> Managing Information <

Personal Information Environments based on iROS

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INF-M3 - Seminar/Ringvorlesung - Wintersemester 2007/2008

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Agenda

- Personal Information Environments
- Security
- Intelligent Environments

Digital Life

- wide variety of computational devices
- spreading knowledge and activities
- gap between practice and paradigm

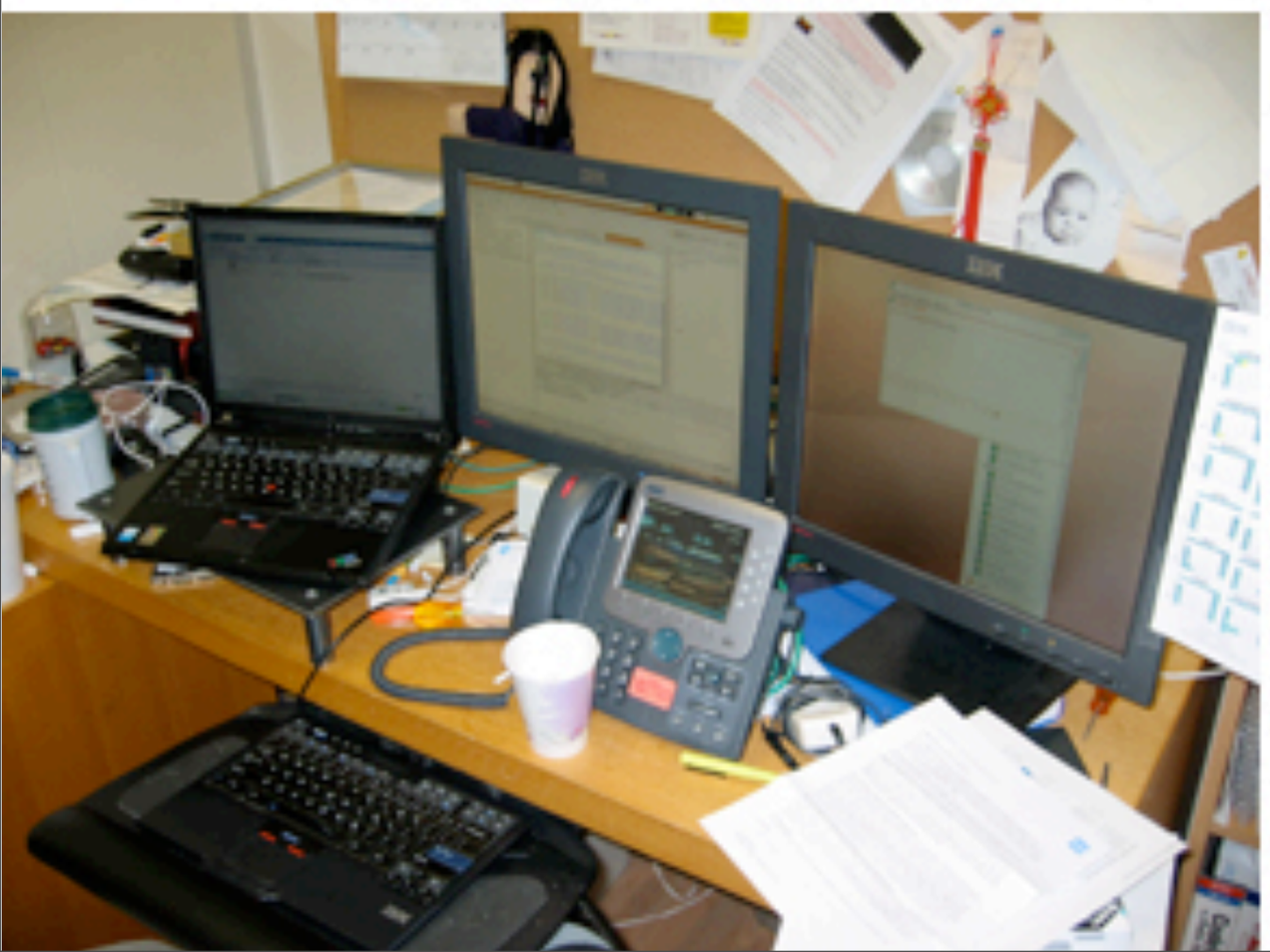

Übergreifende Systemarchitektur


IR - Cam 1
Livestream from Rescue 1


IR - Cam 1
Livestream from Rescue 1


IR - Cam 1
Livestream from Rescue 1
Current Streams


Übergreifende Systemarchitektur



[Pierce2007]

Spreading Knowledge and Activities

- laptops
- desktop PCs
- cellphones
- PDAs
- wall-size displays
- electronic whiteboards
- tabletops
- wearables
- etc.

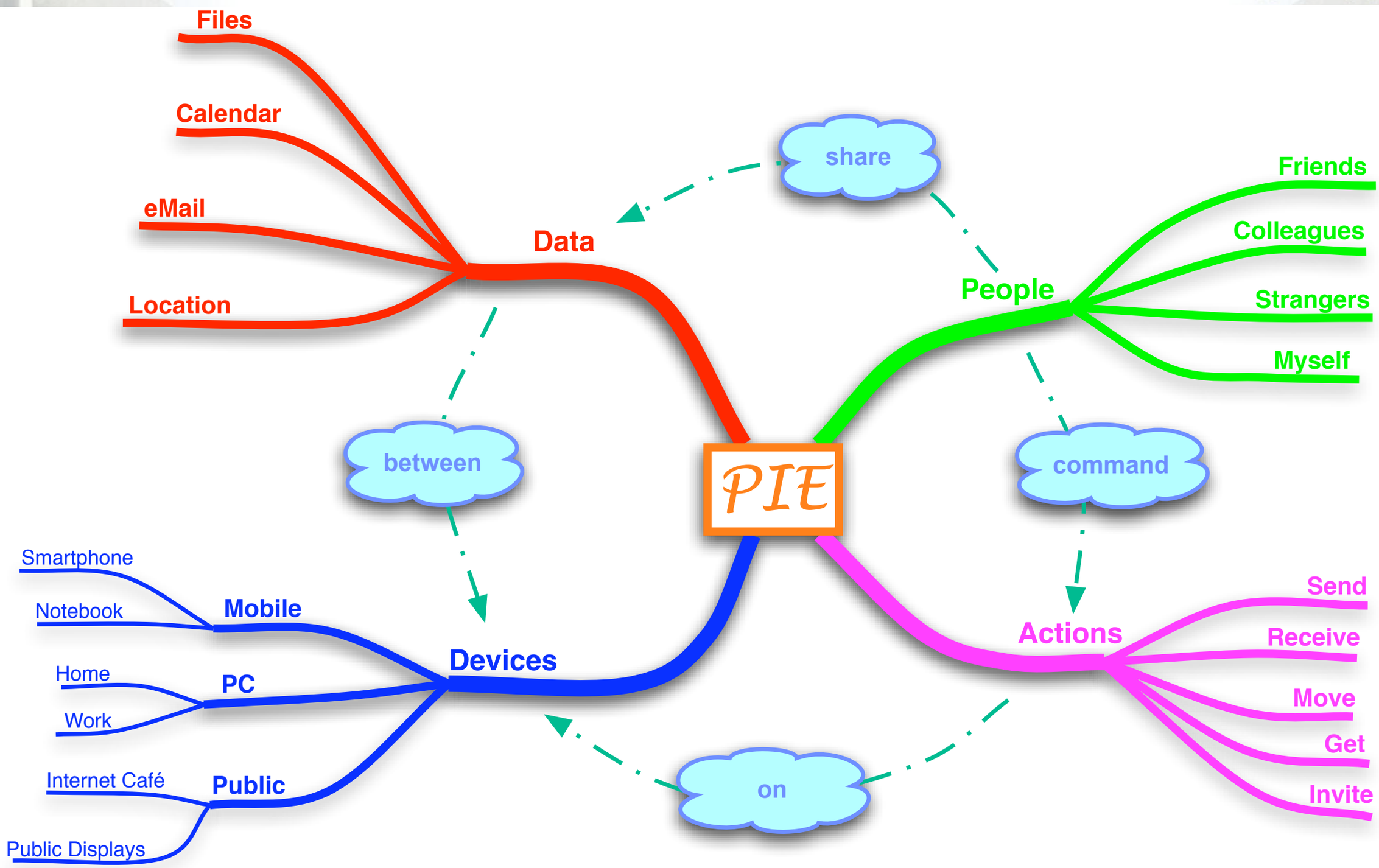
Ubicomp: status quo

- Multiple devices do not sync well
- Data is often transferred “by hand“
- Remote file access is difficult

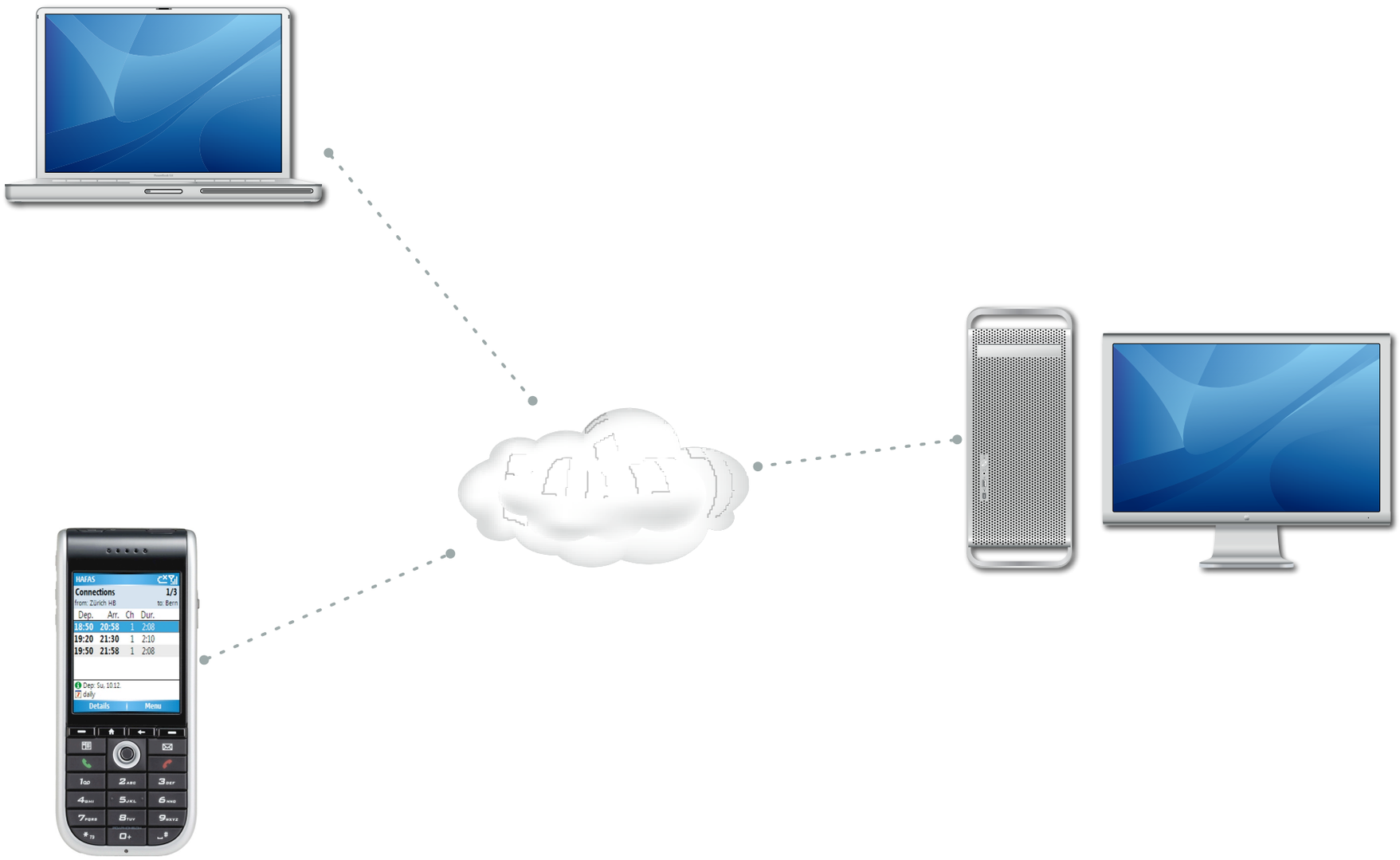
Closing the Gap

- offers challenges and opportunities
- access to personal data and information
- from personal computers
  to *personal information environments*

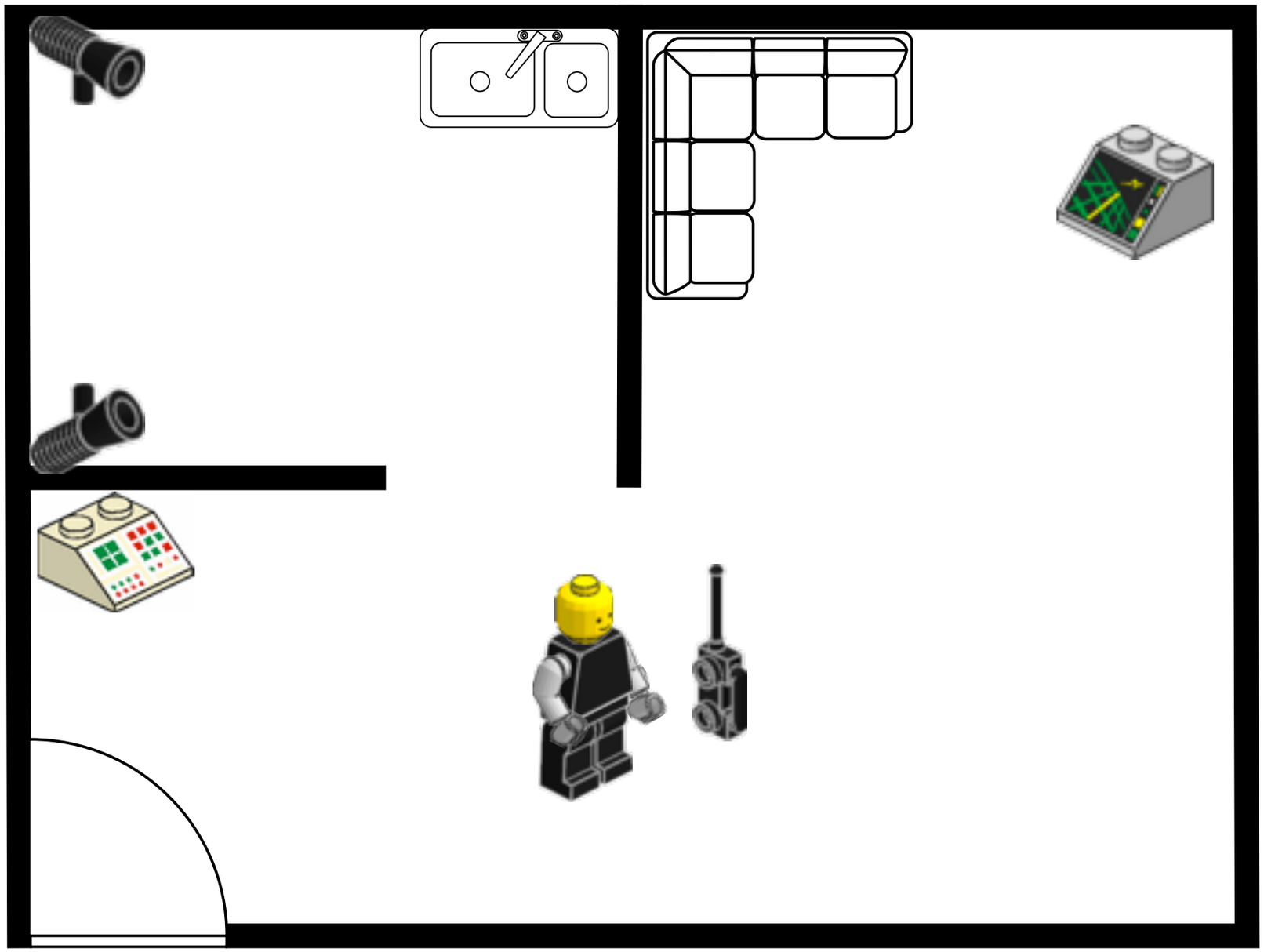
[Pierce2007]


Files
Calendar
eMail
Location
Data
share
Friends
Colleagues
Strangers
Myself
People
between
PIE
command
Smartphone
Notebook
Mobile
Home
PC
Work
Devices
Internet Café
Public
Public Displays
Actions
Send
Receive
Move
Get
Invite
on

File exchange

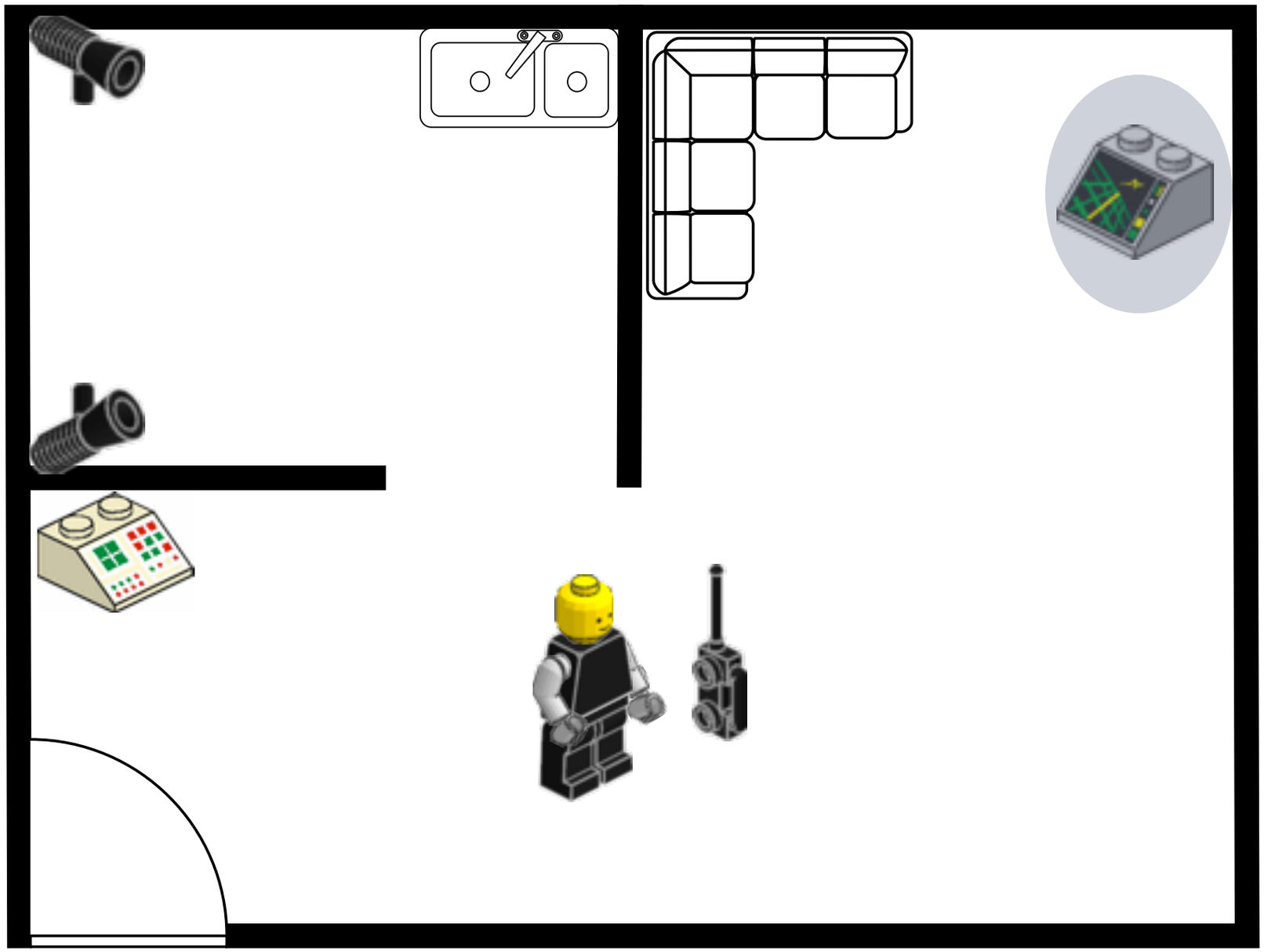


Your Home in Your Hand



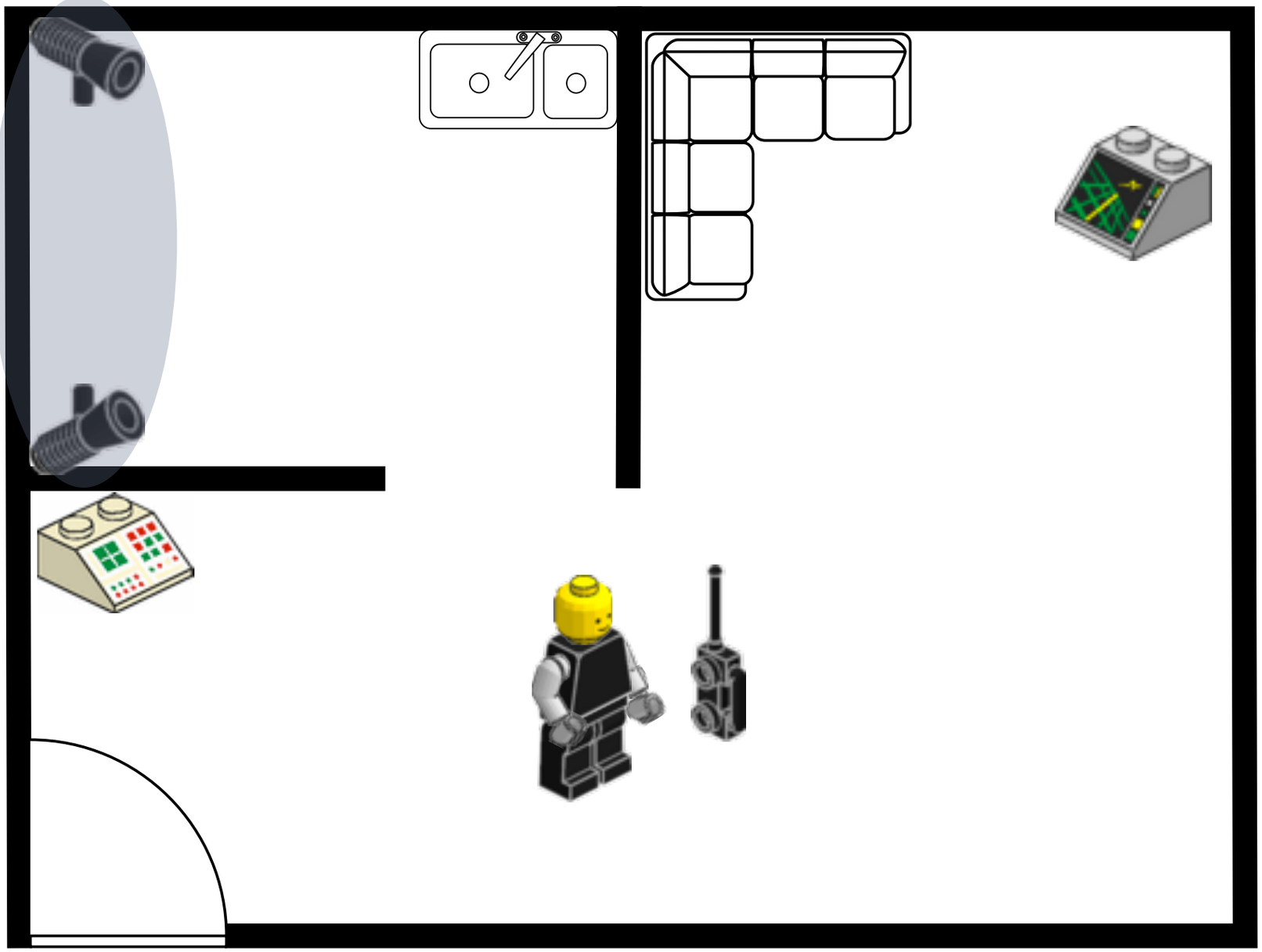
[Dreyer2007]

Your Home in Your Hand



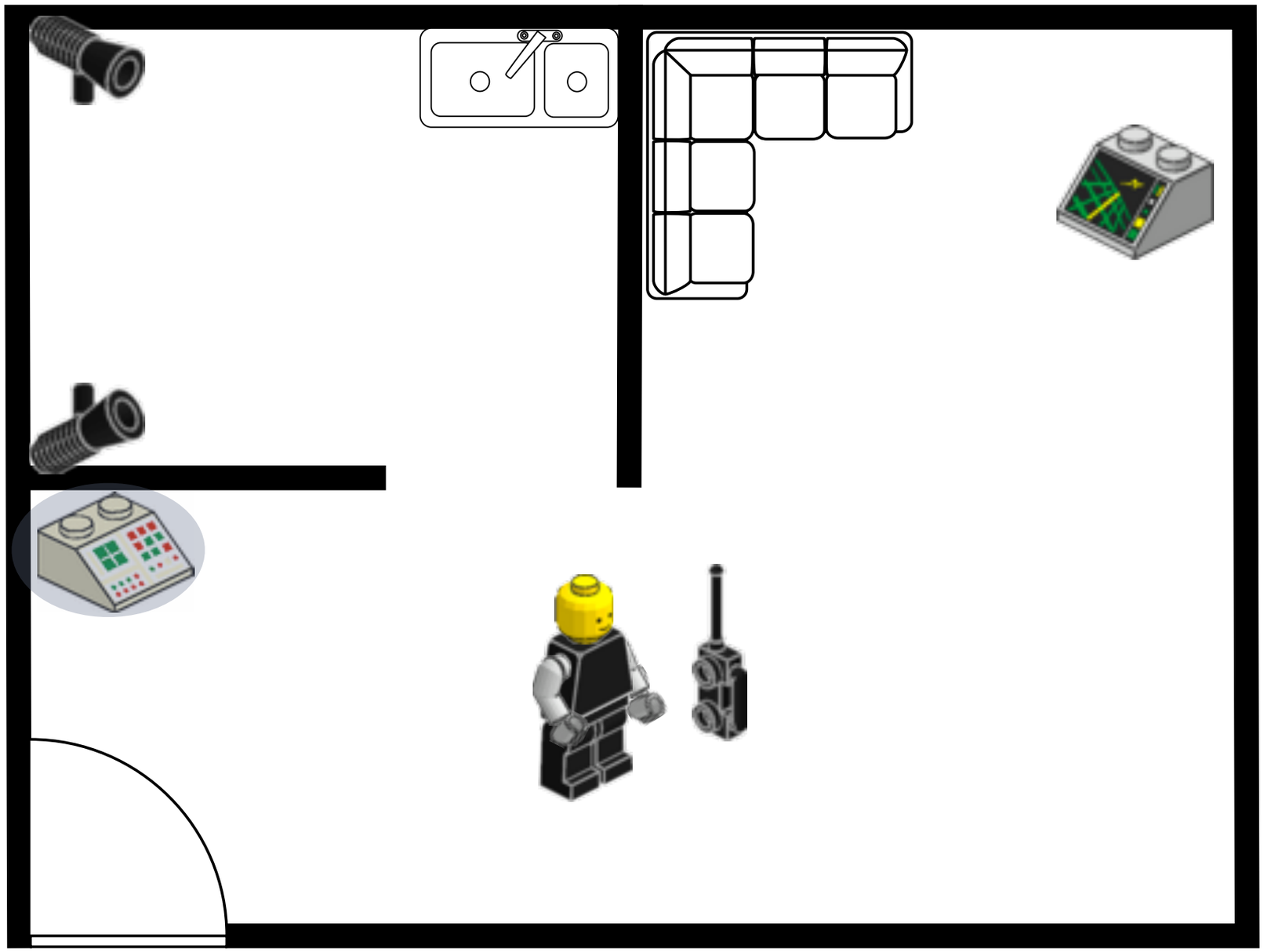
[Dreyer2007]

Your Home in Your Hand



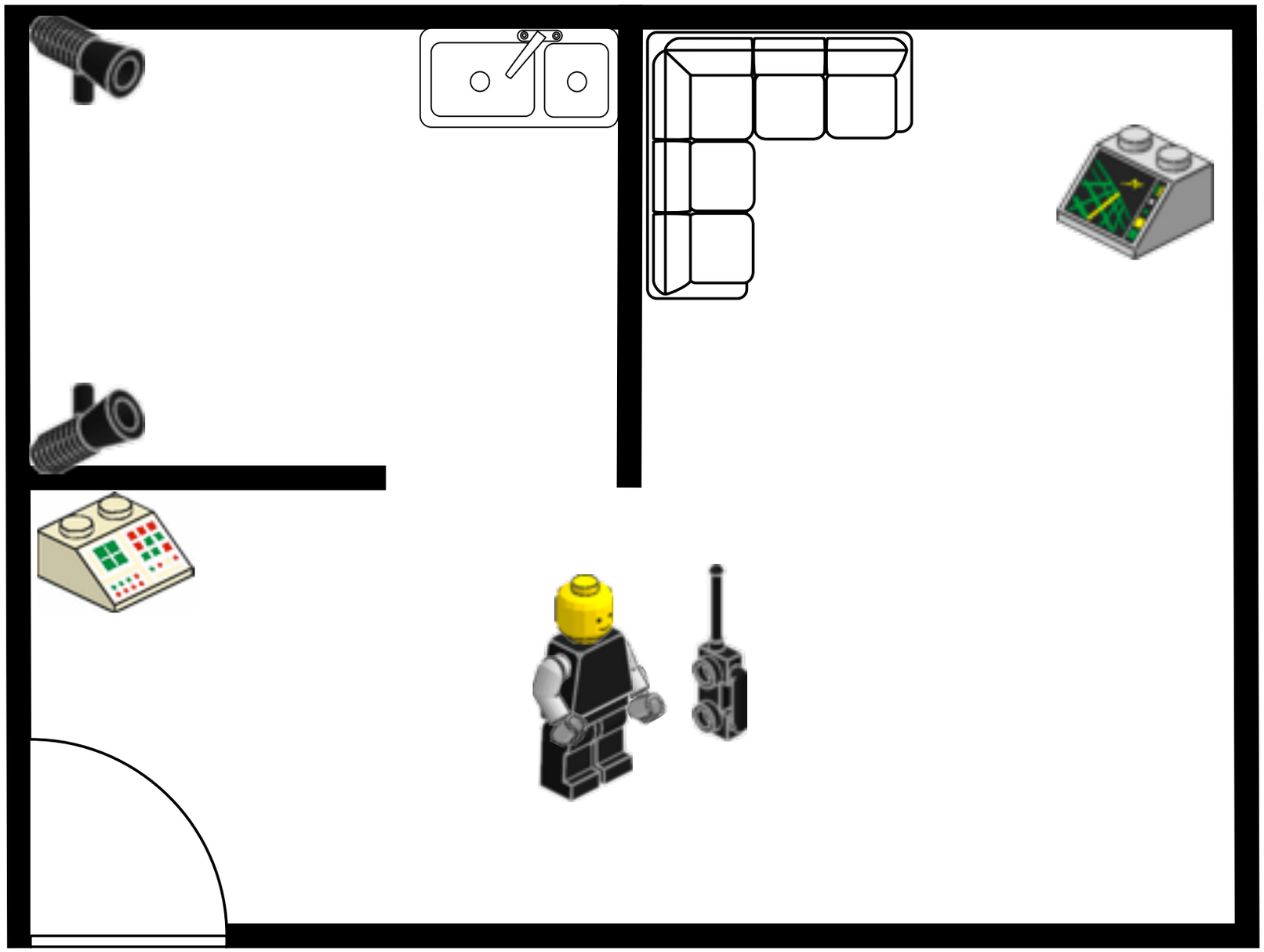
[Dreyer2007]

Your Home in Your Hand



[Dreyer2007]

Your Home in Your Hand



[Dreyer2007]

Key Characteristics

- Not every device is suitable for every kind of data
- Data should be handled different on different devices
- Devices are not always accessible

What we need

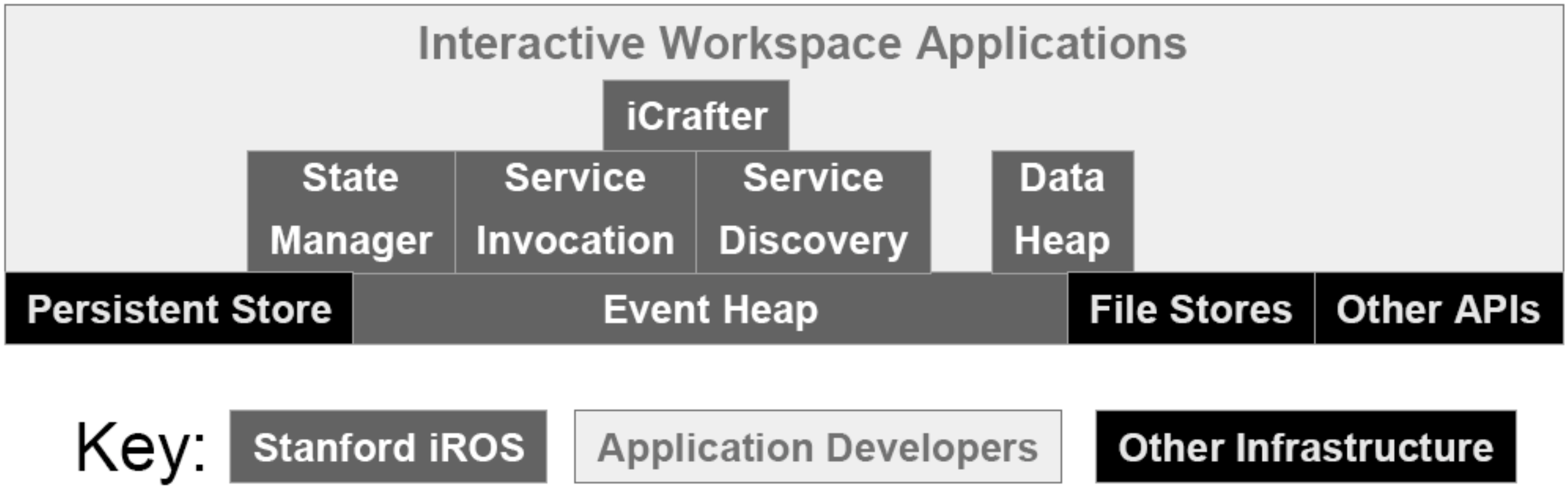
- A platform for exchanging information
- Context aware devices:

  “What kind of data could/should be displayed?“

What we have got

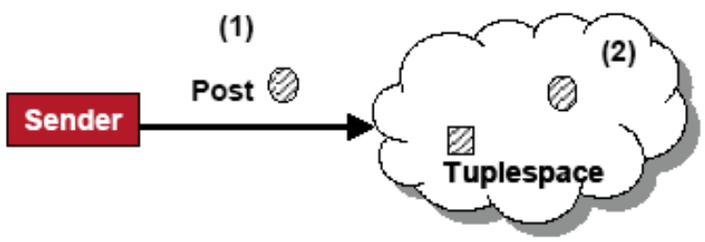
- cellphones, laptops, PCs, powerwalls, etc.
- A network connecting them
- iROS (i.e. EventHeap)

iROS (reprise)

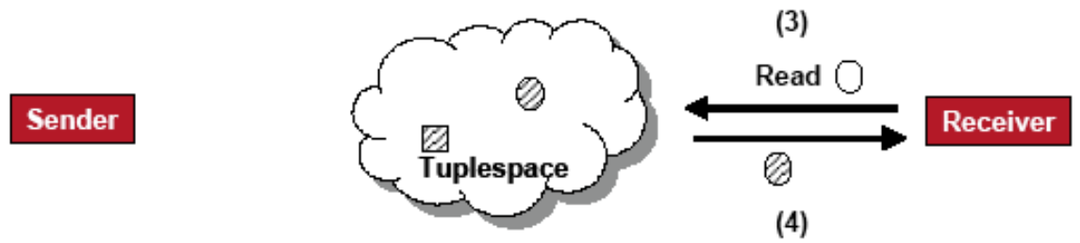


[Johanson2002]

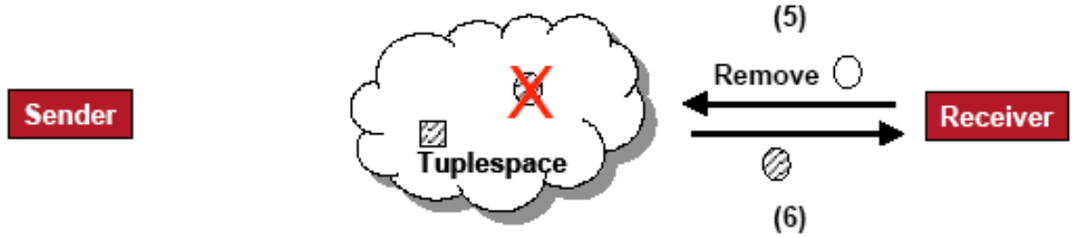
Tuple Spaces



(a) Sender places a 'circle type' tuple (1); Tuple becomes available in the tuplespace (2);



(b) Receiver submits read request for 'circle type' tuple (3); Tuplespace returns copy of 'circle type' tuple submitted in step 1 (4)



(c) Receiver submits take request for 'circle type' tuple (5); Tuplespace returns copy of 'circle type' tuple submitted in step 1 and removes copy in tuplespace (6)

[Johanson2004]

EventHeap

Tuple Spaces

\+ Flexible Typing

\+ Expiration

\+ FIFO, At Most Once

\+ Subscription

\+ [...]

= EventHeap

Content Aware Devices

- not everything could/should be displayed
- classification of data
- information filtering

Device Classes

Devices differ in

- Screen size
- Memory
- Portability

Trust Classes

- Trusted Environment? (yes/no)
- Trusted Device? (yes/no)

Enhancing the iROS (Step 1)

- Additional meta-information to
  - Events and
  - Fields
- Devices
  - know about themselfes and
  - decide wether to display or not

Enhancing the iROS (Step 2)

- No trust in devices or environment
- Add the ability to (selectively) encrypt events
- devices and users authenticate against a trusted instance

XML Encryption

```
<?xml version='1.0'?>
  <PaymentInfo xmlns='http://example.org/paymentv2'>
    <Name>John Smith</Name>
    <CreditCard Limit='5,000' Currency='USD'>
      <Number>4019 2445 0277 5567</Number>
      <Issuer>Example Bank</Issuer>
      <Expiration>04/02</Expiration>
    </CreditCard>
</PaymentInfo>
```

```
<?xml version='1.0'?>
  <PaymentInfo xmlns='http://example.org/paymentv2'>
    <Name>John Smith</Name>
    <EncryptedData Type='http://www.w3.org/2001/04/xmlenc#Element'
     xmlns='http://www.w3.org/2001/04/xmlenc#'>
      <CipherData>
        <CipherValue>A23B45C56</CipherValue>
      </CipherData>
    </EncryptedData>
</PaymentInfo>
```

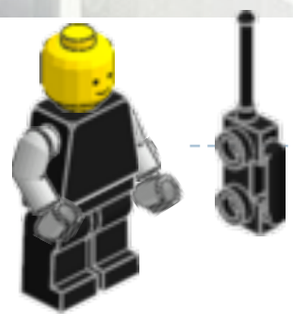
[Imamura2002]

More on XML Encryption

```
<?xml version='1.0'?>
  <PaymentInfo xmlns='http://example.org/paymentv2'>
    <Name>John Smith</Name>
    <CreditCard Limit='5,000' Currency='USD'>
      <EncryptedData xmlns='http://www.w3.org/2001/04/xmlenc#'
       Type='http://www.w3.org/2001/04/xmlenc#Content'>
        <CipherData>
          <CipherValue>A23B45C56</CipherValue>
        </CipherData>
      </EncryptedData>
    </CreditCard>
</PaymentInfo>
```

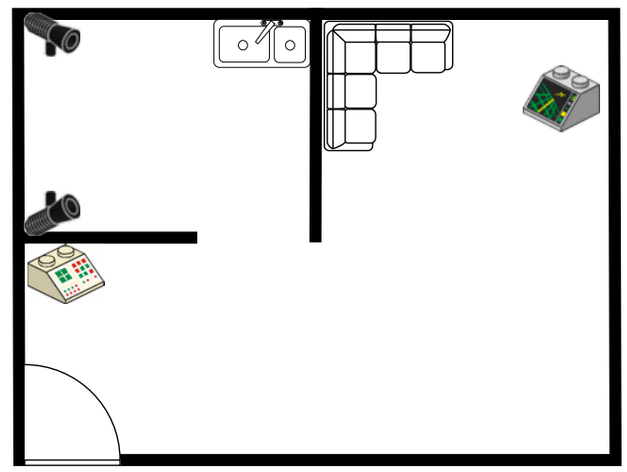
+ more

[Imamura2002]



Goal: Intelligent Home

- A Personal Information Environment
- Managing files, information and actions
- Delivering seamless interaction
- Securing information and actions



What to do?

- Build a Framework for PIE
- Based on iROS
- make iROS native XML speaking?
- implement PKI infrastructure for untrusted environments

Challenges

- Web 2.0: centralization vs. distribution
- Complexity?
- Usability?

Opportunities

- A platform for secure interaction
- a step towards ubiquitous computing
- Everything, anytime, anywhere

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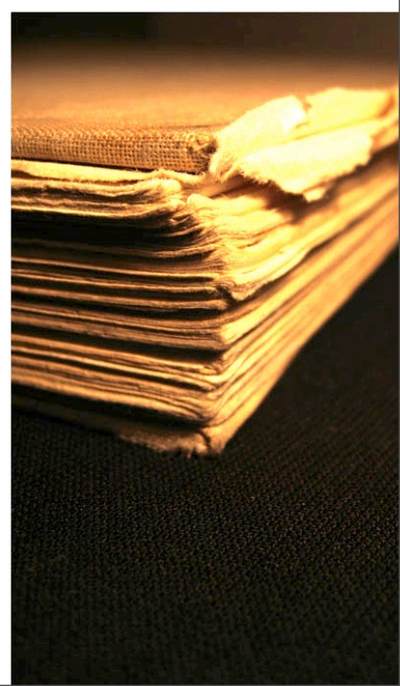

Personal Information Environments based on iROS

Personal Information Environments based on iROS

PC **people** cellphone
command **event heap** remote
access **iROS** ubicomp
privacy **file exchange**
laptop **trust** XML
encryption