Distributed Collaboration of Working Groups in Global Airline Operations: Leveraging Smartphone Push-To-Talk Functionalities

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Agenda

- Research Motivation, Question and Design

- Organization Background

- Literature Review/Theoretical Development

- Data Description and Methodology

- Research Framework and Preliminary Results

- Theoretical and Managerial Implications

- Limitations and Future Research

Research Motivation: Drivers of Distributed Collaboration

- Global competition - particularly in the airline industry

- Knowledge has become the most important organizational asset

- Moore's Law and Digital Convergence
    - ➤ Mobile innovations: greater capabilities, smaller, and cheaper

- Network Effects & BYOD (Bring Your Own Device) in the workplace

- Demographic changes in the workforce with the tech savvy Millennial generation

- Legacy hand-held radios are no longer adequate

Research Question

- How can IT design principles be applied

  ➢for the successful selection &

  ➢implementation of

  ➢mobile, collaborative innovations

  ➢for distributed employees in the organization?

Research Design

- <u>Interpretive</u> perspective

- Research method: <u>Action research</u>

- Data Collection methods (pilot):

  <u>Surveys & Interviews</u>

  ➤Triangulation

Passenger Airport Operations (PAX)
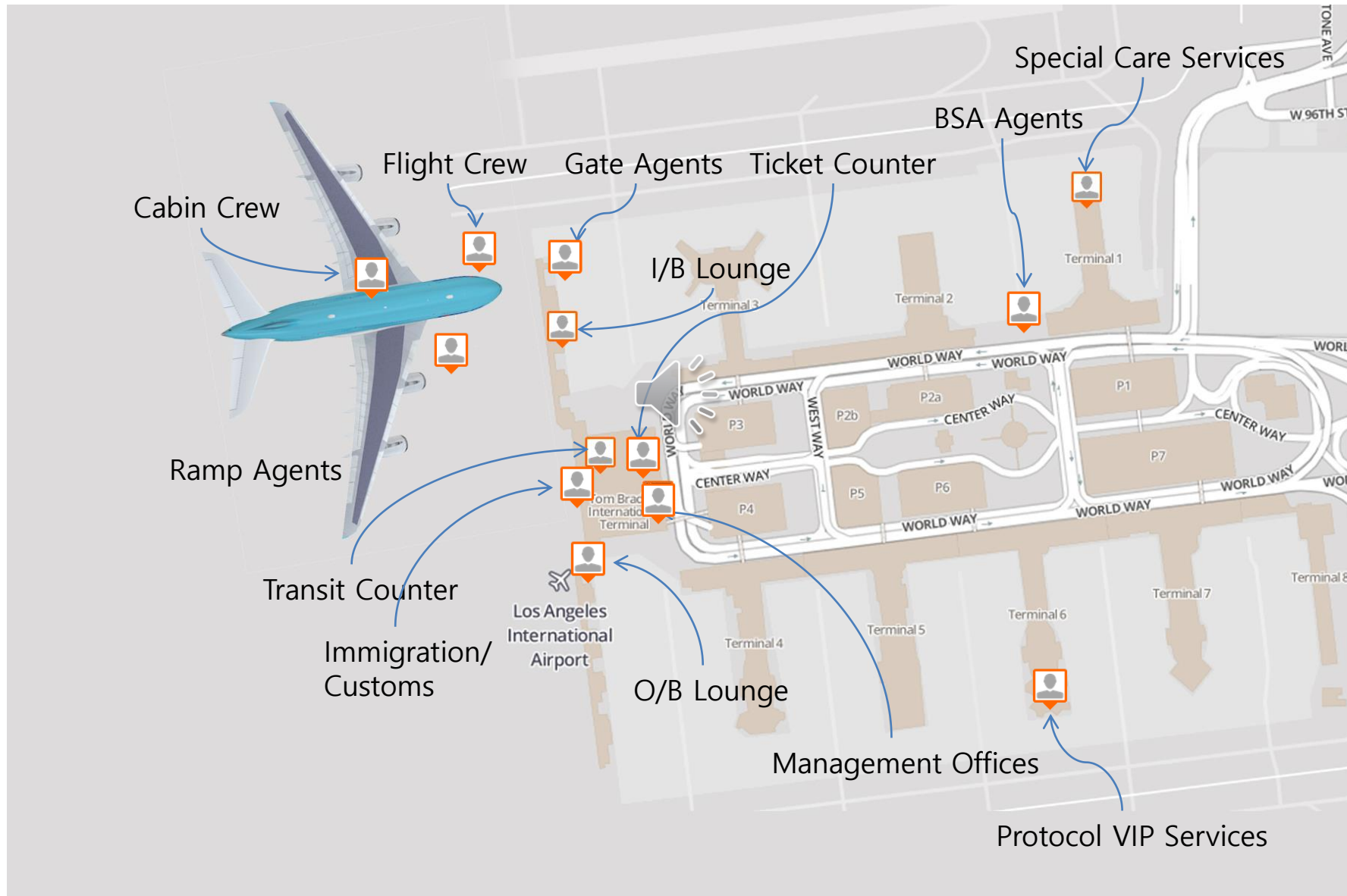
Study Scope – Rethink PAX Communications

Airport Operations

○ Proof-of-Concept

　　○ Replace Legacy Silo Technology

　　○ Smart-Phone Based Push-To-Talk (PTT) Devices

　　○ Business Grade Solution

　　○ High-Noise Areas / Durability / Customer Sentiment

　　○ Support/Maintenance / Security / Privacy

　　○ Equipment Investment / Signal Quality

Current

2-way radio

Shift start
- Device power check
- Device assignment
- Turn on device
- Adjust volume

During shift
- Carry device
- PTT transmission
- Adjust volume
- Place device

End shift
- Turn off device
- Hand in device
- Power device

Proposed

Shift start
- Power on device
- Device battery check
- Device assignment
- PTT application login
- Earpiece connection
- Device placement
- PTT device check
- Adjust volume

During shift
- Hands free device
- PTT transmission
- Adjust volume

End shift
- Device handling
- PTT application logout
- Disconnect earpiece
- Turn off device
- Hand in device
- Power device

Earpiece

PTT Mic

Smartphone
(with PTT application)

BYOD considerations
- PTT application install
- Data usage
  - Corporate data plan
  - Monthly Subsidies
- Power usage
- Login management

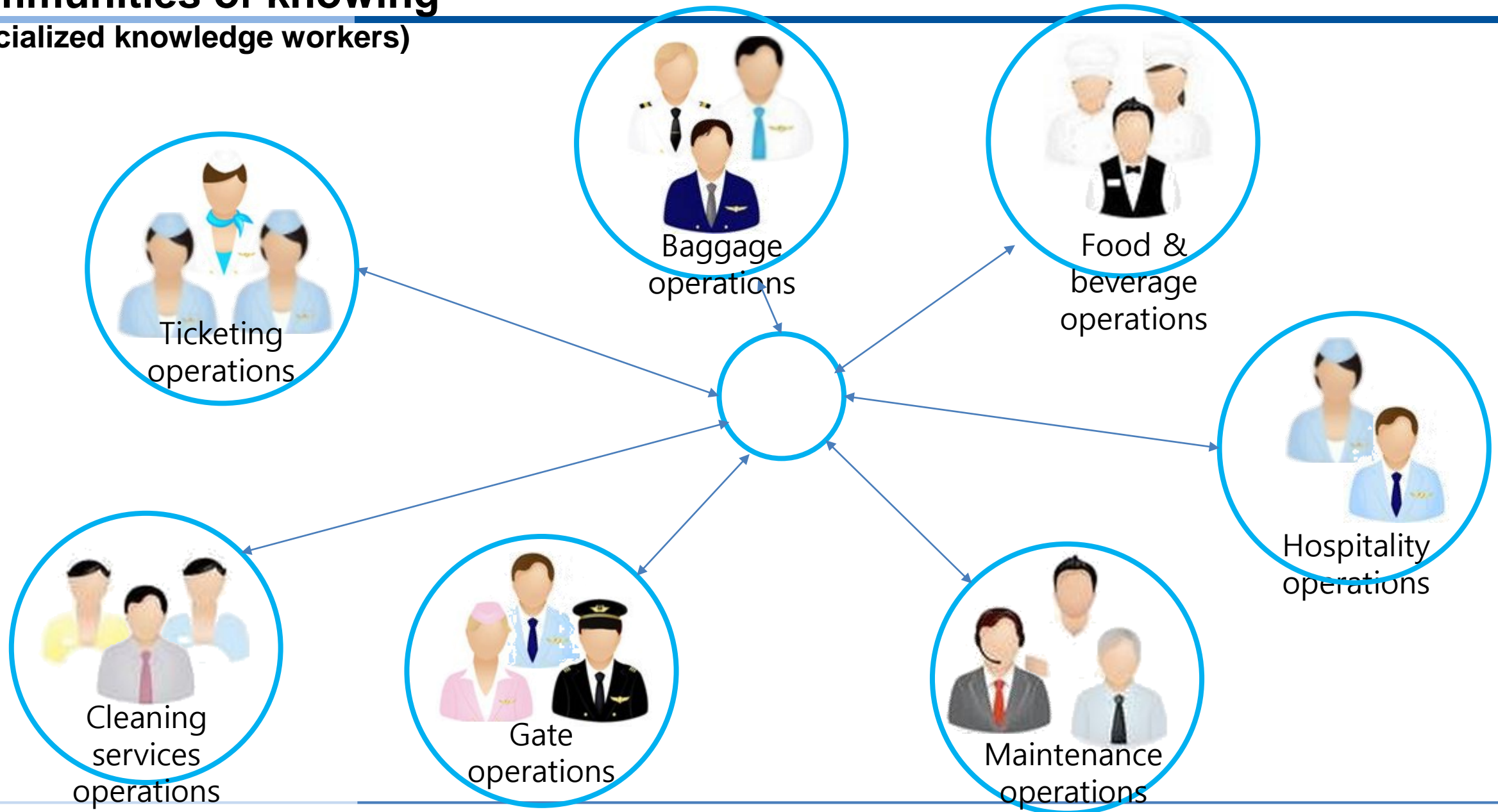# Literature Review/Theoretical Development

- <u>Multidisciplinary teams</u> have multiple views and expertise for more opportunities (Kilduff et al. 2000)
  - ➤ *Different perspectives compared to less diverse teams*
  - ➤ *Competing ideas for solving problems and creating new ideas* (Boland and Tenkasi 1995; Brown and Duguid 1991)

- <u>Knowledge</u> needs to be managed across boundaries (Carlile 2002)
  - – Enables employees with <u>different expertise</u> to <u>change</u> their own respective bases of knowledge (Carlile 2002)

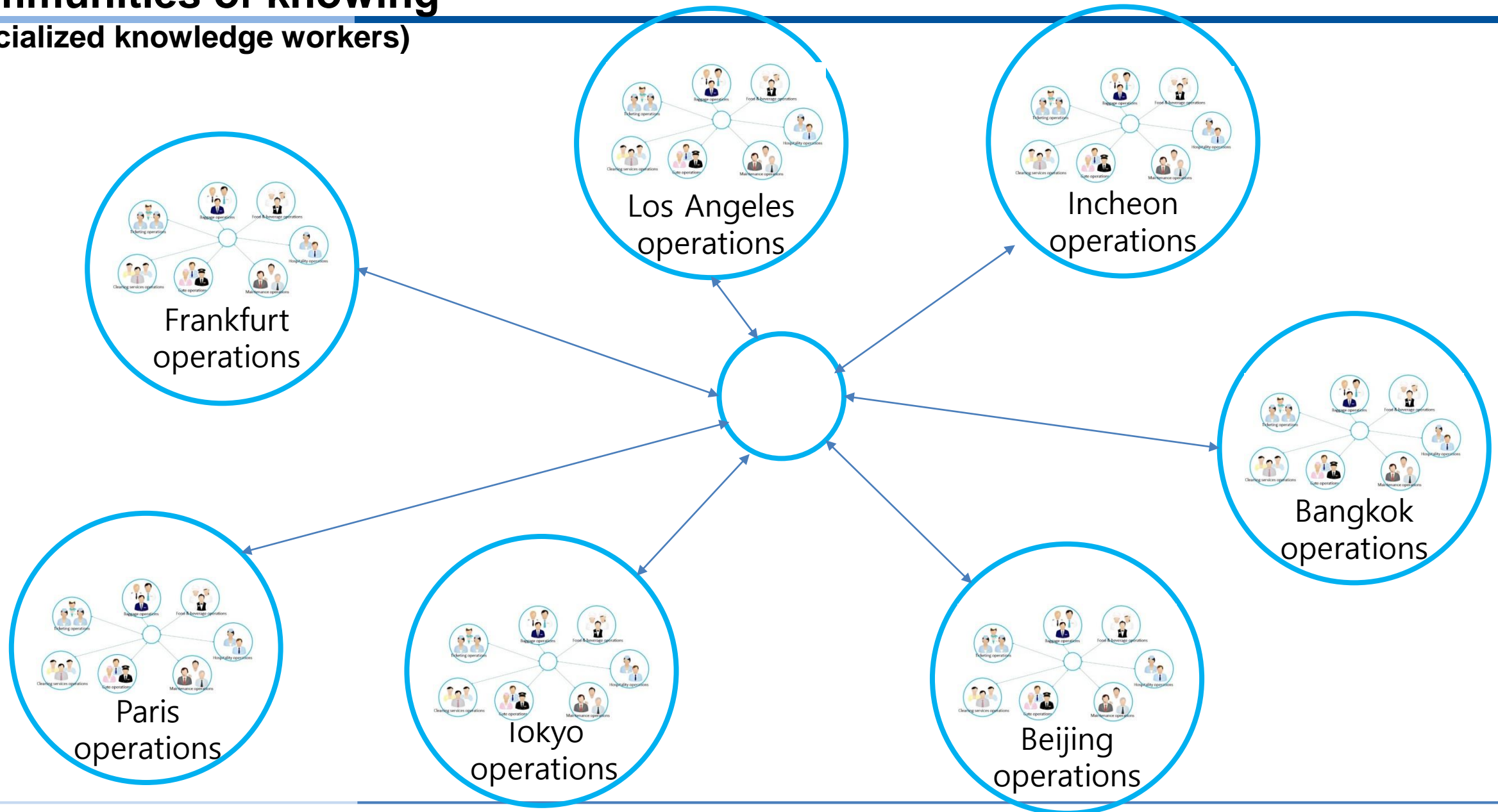# Literature Review/Theoretical Development

- <u>New ideas</u> involve the exchange of information and views from <u>various perspectives</u> (Boland and Tenkasi 1995)

- However, employees tend to associate themselves and behave according to <u>their own groups</u> (Chatman and Flynn 2001)

- The use of <u>IT design principles</u> should help enable the development and spanning of <u>knowledge across groups</u>.

- Furthermore, team level <u>conflict can be reduced</u> with the help of IT-enabled communication and coordination <u>within groups</u> (Hinds and Bailey 2003).

Communities of knowing
(specialized knowledge workers)

Local peer-to-peer collaboration

Baggage operations

Food & beverage operations

Ticketing operations

Hospitality operations

Cleaning services operations

Gate operations

Maintenance operations

Communities of knowing
(specialized knowledge workers)

Global peer-to-peer collaboration

Los Angeles operations

Incheon operations

Frankfurt operations

Bangkok operations

Paris operations

Tokyo operations

Beijing operations

Communities of knowing
(specialized knowledge workers)

Global cross-business-line collaboration

Shipping operations

Passenger operations

Cargo operations

Hotel operations

Corporate operations

Vendor operations

Maintenance operations

Terms & Definitions

- *Perspective Making:* the making of ideas within one's own group
  (Faraj and Sproull 2000, Boland and Tenkasi 1995)
  - ➤ *Unifying Knowledge*

- *Perspective Taking*: the taking of ideas from outside one's own group (Boland and Tenkasi 1995)
  - ➤ *Expanding Knowledge*

- *IT Design Principles:* IT functionalities designed for enabling the unification and expansion of knowledge of distributed, multidisciplinary teams (Berente et al. 2008; Yoo et al. 2008)

- *Group Performance:* efficacy and efficiency of problem solving and innovation for the organization (Alegre et al. 2006)

2X2 Perspective Matrix   Research Framework

Perspective Taking

Synchronous

Asynchronous

Perspective Making
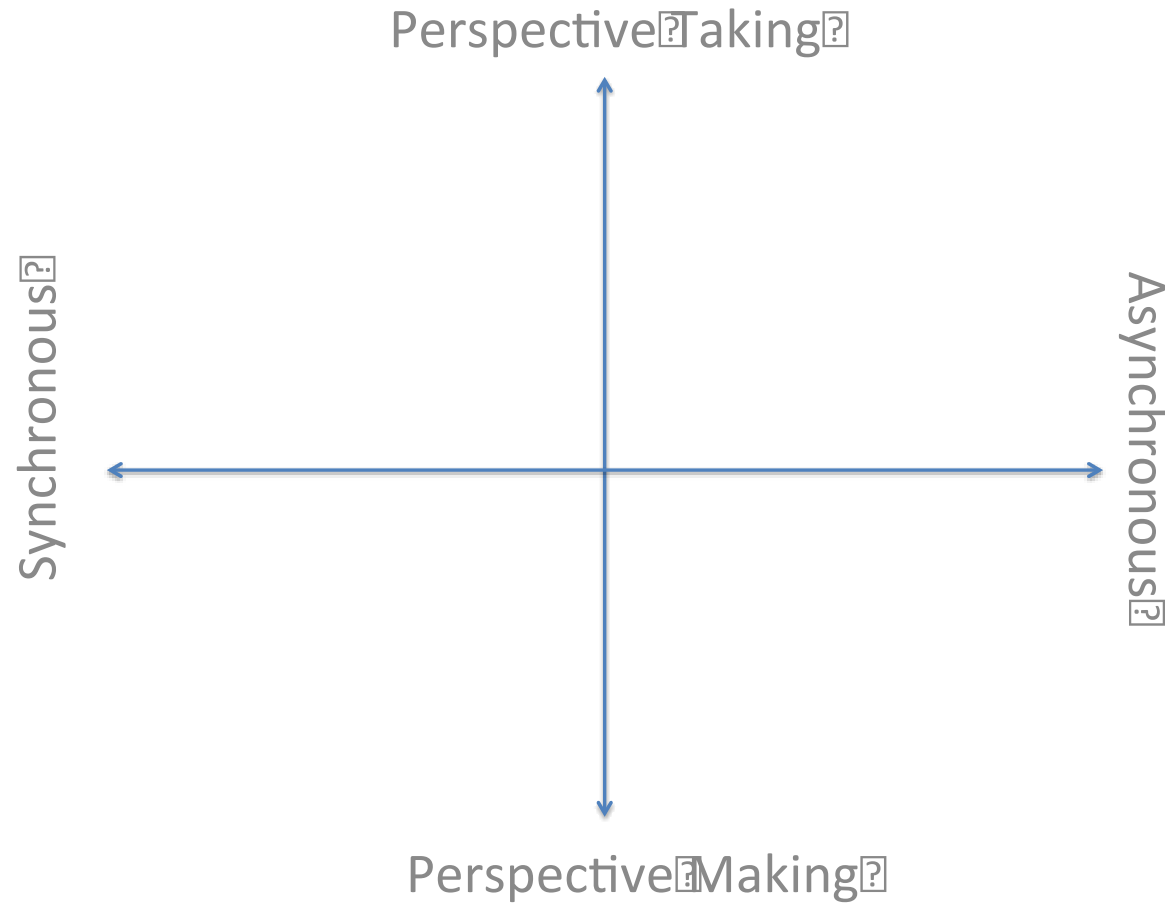
Six IT Design Principles: **Unifying** Knowledge

1) Semantic Coherence	Enables the convergence of multiple pieces of information into one unified, meaningful form (inserting, merging, attaching, copying/pasting)
2) Spatial Traceability	Enables the cross-sectional tracing of emergent changes in content which are interdependent (e.g. notifications)
3) Temporal Traceability	Enables the tracing or auditing of changes in information back in time (searching time-stamped content)

- Shared context can mitigate the effects of task conflict on a team's ability to coordinate knowledge (Hinds and Mortensen 2005)

Six IT Design Principles: Expanding Knowledge

(Berente et al. 2008)

|	
4) Synchronization	Enables the translation of different perspectives or representations created by different groups so that handoffs go smoothly (e.g. keywords, tags, and categories)
5) Representational Flexibility	Enables the translation of multiple representations from different media into other forms of media based on what provides the best affordance for the particular situation (ability to select optimal tool or app)
6) Regenerativity	Enables the reconstruction of representations or models using different forms for deeper understanding (e.g. different layers of Google Maps views: map, earth, traffic)

By enabling the taking in of outside perspectives, the use of IT functionalities contribute to the team's ability to:
- Process and generate increased ideas (Boland et al. 2007)
- From greater volume of diverse knowledge sources

Pre-Test Framework

- Model developed using constructs drawn from the literature
- Email survey for collecting data
- Pretest with members of various organizations
- Pilot Test
- Full implementation of survey
- Cross-check survey data with project archival data and semi-structured interviews

Study Phases
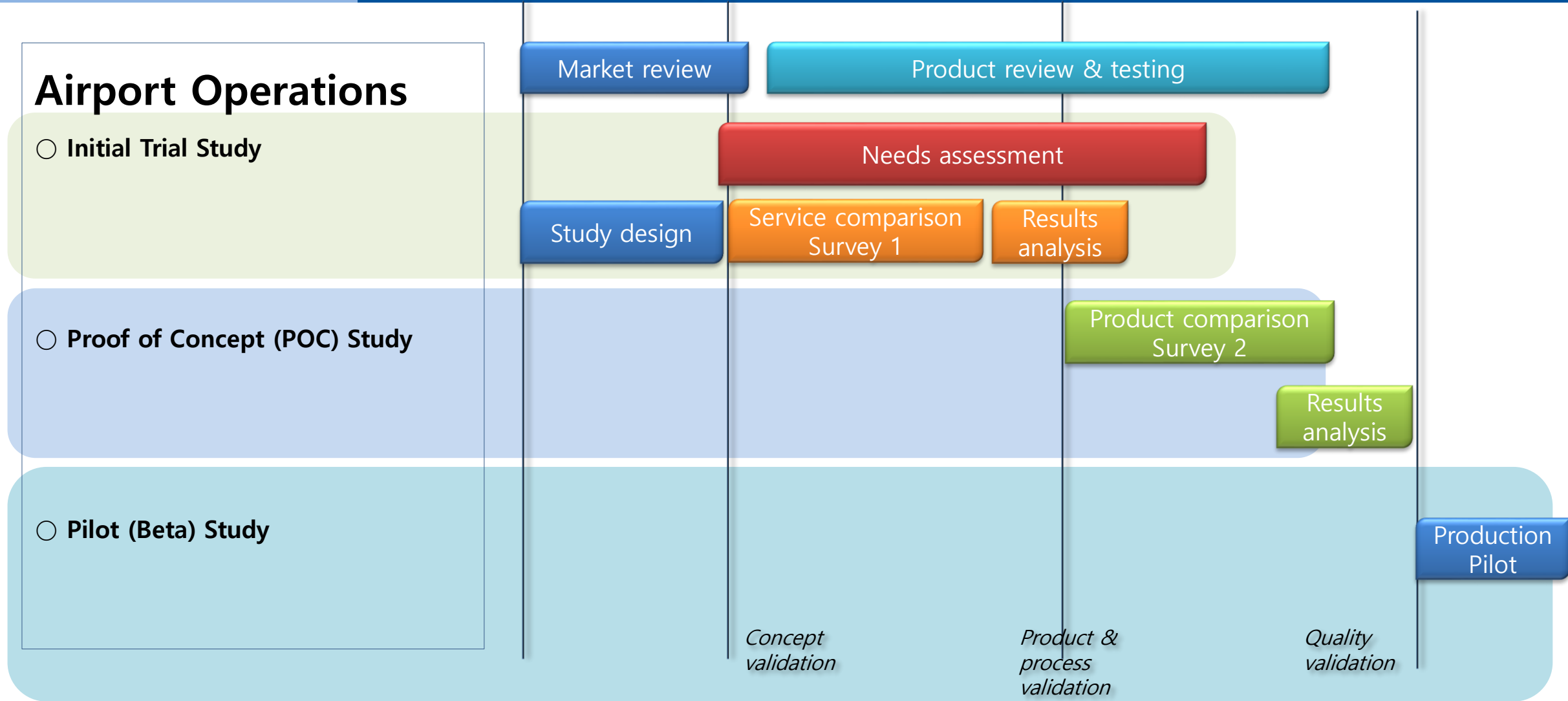
Participants

Trial Study Sample Profile

Description		Frequency	Percent
Gender	Male	5	56%
	Female	4	44%
Team	Korea Corporate	3	33%
	US Airport	3	33%
	US Corporate	3	33%
Product	Voxer	9	33%
	Wave	9	33%
	GroupTalk	9	33%

Pilot Study Sample Profile

Description		Frequency	Percent
Gender	Male	8	36.4%
	Female	14	63.6%
Team	PAX Outbound	11	50.0%
	PAX Inbound	11	50.0%
Product	AT&T	8	36.4%
	Voxer	14	63.6%

(PAX = Passenger Airline Operations)

Proof-of-Concept (Pilot) Study

| CONSTRUCTS	ITEMS
Voice Quality and Interference	4
Signal Consistency	
Message Comprehension	
Noise Interference	
Message Delivery	
Easy of Use	6
Device Usability	
PTT App Navigation	
PTT App Persistence	
Battery Performance	
Job performance without	
Earpiece required	
Earpiece Sentiment	2
Can PTT replace 2-Way Radio	
Rate effectiveness PTT/2Way	
Suggestions	1

N=22, 2 Airport Operations Groups

- **Operational quality (Y= observed N=not observed)**
- **Open-ended explanation for each observation**
- **Platform feature rating (1=very poor to 5=fantastic)**

Push To Talk Application Evaluation (April 2013) - VOXER PTT				
Your Name			1: Very Poor 2: Poor 3: Acceptable 4: Very Nice 5: Fantastic	1: Very Poor 2: Poor 3: Acceptable 4: Very Nice 5: Fantastic
Your Email Address				
Team [Inbound or Outbound]				
VOXER PTT [Thursday/Friday]	Y/N	Please explain	Please provide a score on Voxer	Please provide a score on 2 Way Radio
Voice Quality and Dead Spots Issues				
Were there any areas that you had problems with signal? (If yes, describe which area)				
Could you hear all incoming voices clearly?				
Were there any situations/areas that you could not hear clearly due to noise?				
Were there any situations where you missed any voice message sent from others?				
Easy of Use				
Was the Smartphone device easy to use in general?				
When you want to talk, could you quickly get to a Group talk screen?				

Qualitative Data – Tag Cloud

Top 10 Concerns
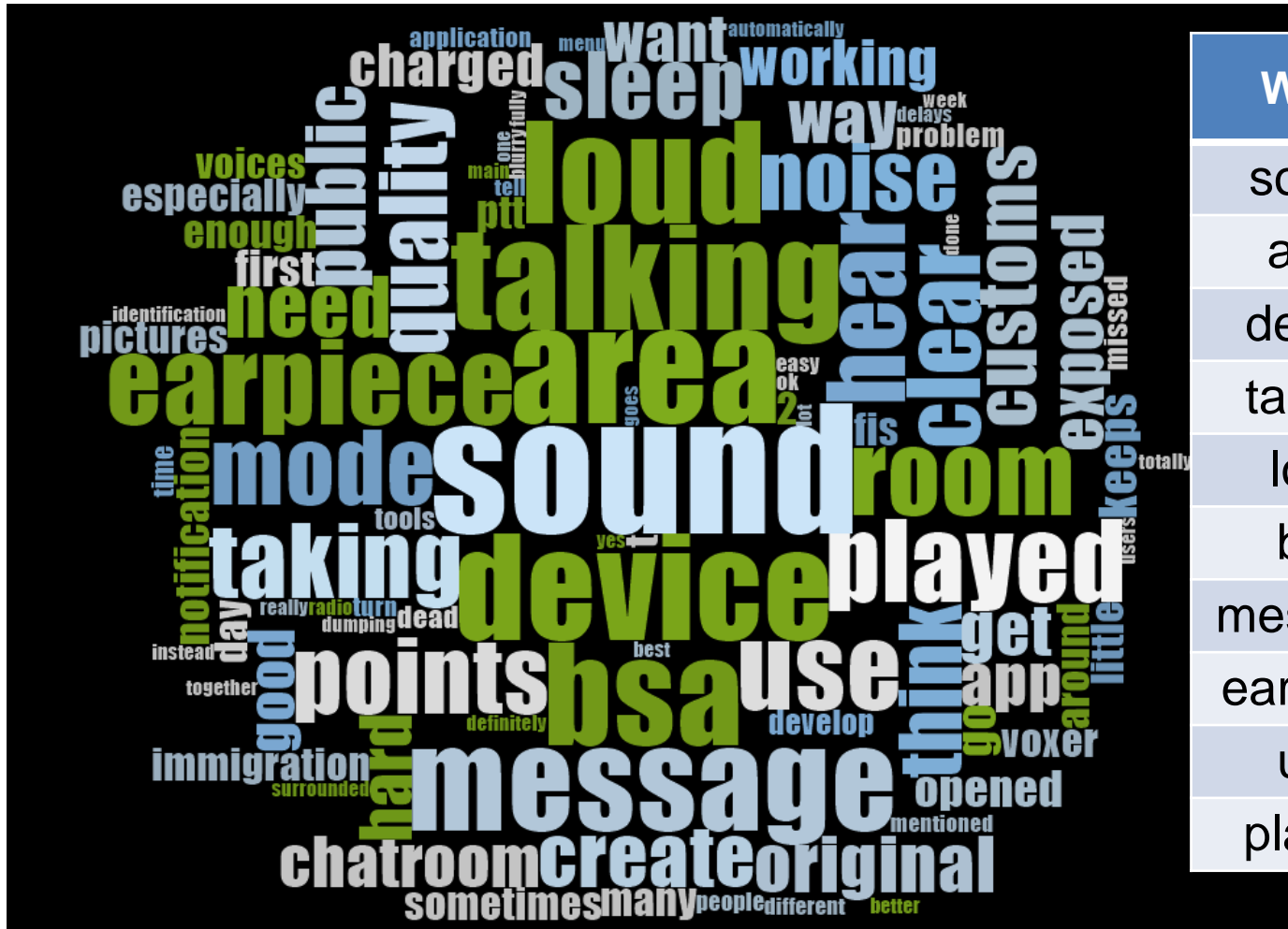
Word	Weighted Percentage (%)	Unifying	Expanding
sound	3.25	X	
area	2.79	X	
device	2.66	X	
talking	2.64	X	
loud	2.59	X	
bsa	2.59		X
message	2.52		X
earpiece	2.16		X
use	2.13	X	
played	2.11		X

Results of PTT Rating Correlations

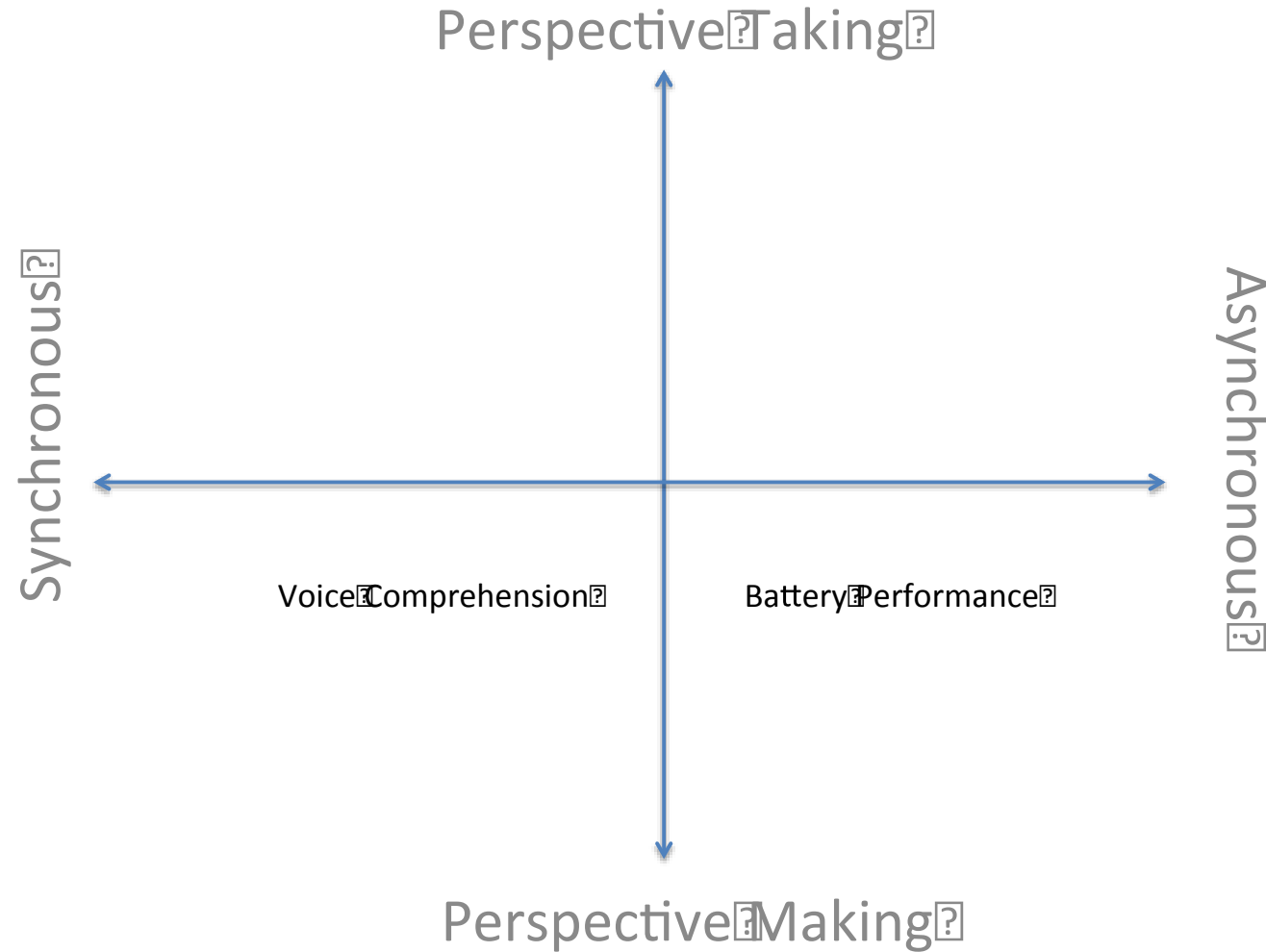| Feature	Linear dependency/relationships	r *
Signal Consistency (PT/Sync)	Message Comprehension (PM/Sync)	0.673**
Signal Consistency (PT/Sync)	Noise Interference (PT/Sync)	0.608**
Signal Consistency (PT/Sync)	PTT App Persistence (PM/Async)	0.512*
Message Comprehension (PM/Sync)	Noise Interference (PT/Sync)	0.724**
PTT App Persistence (PM/Async)	PTT App Navigation (PT/Async)	0.465*
PTT App Persistence (PM/Async)	Sentiment job performance w/o earpiece (PT/Sync)	-0.482*
Sentiment job performance w/o earpiece (PT/Sync)	Sentiment-earpiece required (PM/Sync)	0.494*
Sentiment-earpiece required (PM/Sync)	Device Usability (PT/Async)	-0.524*

* Pearson's correlation coefficient (r)

IT Design Principles for PTT Functionalities

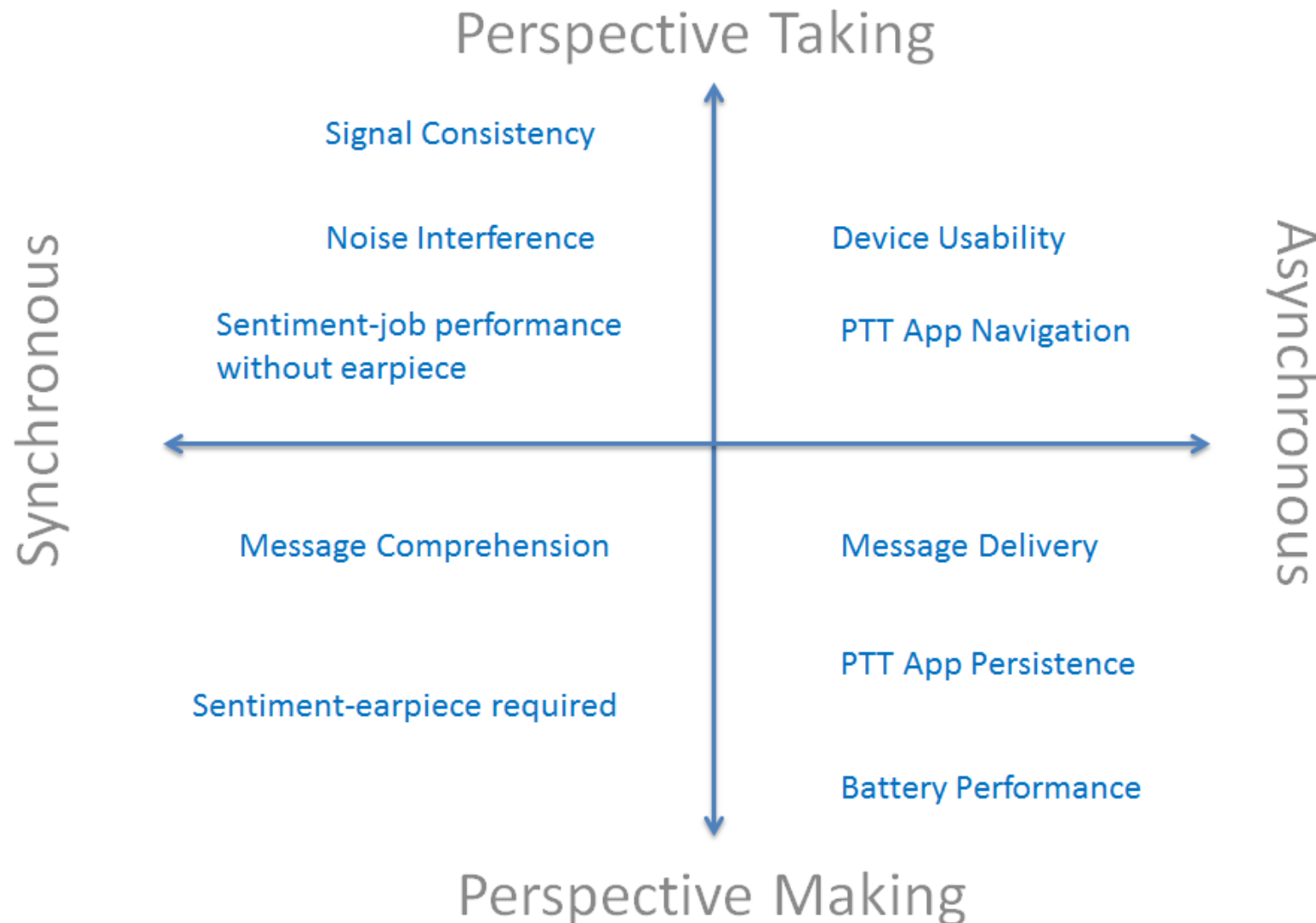| Functionality	Design Principle	Perspective	Affordance	Synchronous	Asynchronous
Signal Consistency	Spatial Traceability	Perspective Taking	Expanding Knowledge	X	
Message Comprehension	Semantic Coherence	Perspective Making	Unifying Knowledge	X	
Noise Interference	Synchronization	Perspective Taking	Expanding Knowledge	X	
Message Delivery	Temporal Traceability	Perspective Making	Unifying Knowledge		X
Device Usability	Representational Flexibility	Perspective Taking	Expanding Knowledge		X
PTT App Navigation	Regenerativity	Perspective Taking	Expanding Knowledge		X
PTT App Persistence	Spatial Traceability	Perspective Making	Unifying Knowledge		X
Battery Performance	Temporal Traceability	Perspective Making	Unifying Knowledge		X
Sentiment-job performance without earpiece	Representational Flexibility	Perspective Taking	Expanding Knowledge	X	
Sentiment-earpiece required	Semantic Coherence	Perspective Making	Unifying Knowledge	X	

2X2 Perspective Matrix

Perspective Taking

Synchronous

Asynchronous

Voice Comprehension   Battery Performance

Perspective Making

2X2 Perspective Matrix

Perspective Taking

Signal Consistency

Noise Interference

Sentiment-job performance without earpiece

Device Usability

PTT App Navigation

Synchronous

Asynchronous

Message Comprehension

Message Delivery

PTT App Persistence

Sentiment-earpiece required

Battery Performance

Perspective Making

Theoretical Implications

- Able to break down the "black box" of IT use to show "what" IT material affordances are being used and "how".

- IT tools designed to support innovative collaboration must consider the dialectics between unity and variety of knowledge.

- IT design principles can reveal the importance of asynchronous in addition to synchronous collaboration.

Managerial Implications

- Managers should be aware of which IT functionalities unify and/or expand knowledge.

- Able to assess an organization's use of IT functionalities
  - How teams are using or not using IT functionalities
    - Including functionalities underutilized, missing, or not working as designed
  - Insights for improving collaborative performance and future design

- Able to assess the collaborative needs of groups vs. the functionalities enabled through the use of IT tools.

- Comparison of one organization's use of IT functionalities relative to other organizations.

Limitations and Future Research

- Full implementation of survey

- Sample Size

- Cross-check survey data with project archival data and semi-structured interviews

- PLS to test the model

- Future IT enabled affordances.

Concluding Remarks

- Researchers and managers alike should
  be aware of two IT enabled affordances:
  – perspective making for unifying knowledge
  – perspective taking for expanding knowledge.

- The proper selection and use of a range of IT
    functionalities should help enable the unification and
    expansion of collaborative knowledge for
    multidisciplinary teams.

- IT Design Principles and the 2X2 Perspective Matrix can
    provide greater understanding for researching and
    managing the selection and use of IT functionalities.

Questions

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