

Collaborative Development Environments

Grasping the collective knowledge

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Collaboration

- ✦ “to work jointly with others or together especially in an intellectual endeavor” - Merriam-Webster
- ✦ “Collaboration is a recursive process where **two or more people** or organizations **work together** in an intersection of common goals — for example, an intellectual endeavor that is creative in nature—by sharing knowledge, learning and building consensus. resources”. - Wikipedia

“GroupWare”

- ✧ Groupware **assists...**
- ✧ **...**human interaction...
 - ✧ Communication
 - ✧ Collaboration
 - ✧ Coordination
- ✧ ...through **technology**.

GroupWare Matrix

Same time
synchronous

Different time
asynchronous

Same place
colocated

Face to face interactions

decision rooms, single display
groupware, shared table, wall displays,
roomware, ...

Communication + coordination

email, bulletin boards, blogs,
asynchronous conferencing, groups
calendars, workflow, version control,
wikis, ...

Different place
remote

Remote interactions

video conferencing, instant messaging,
chats/MUDs/virtual worlds, shared
screens, multi-user editors, ...

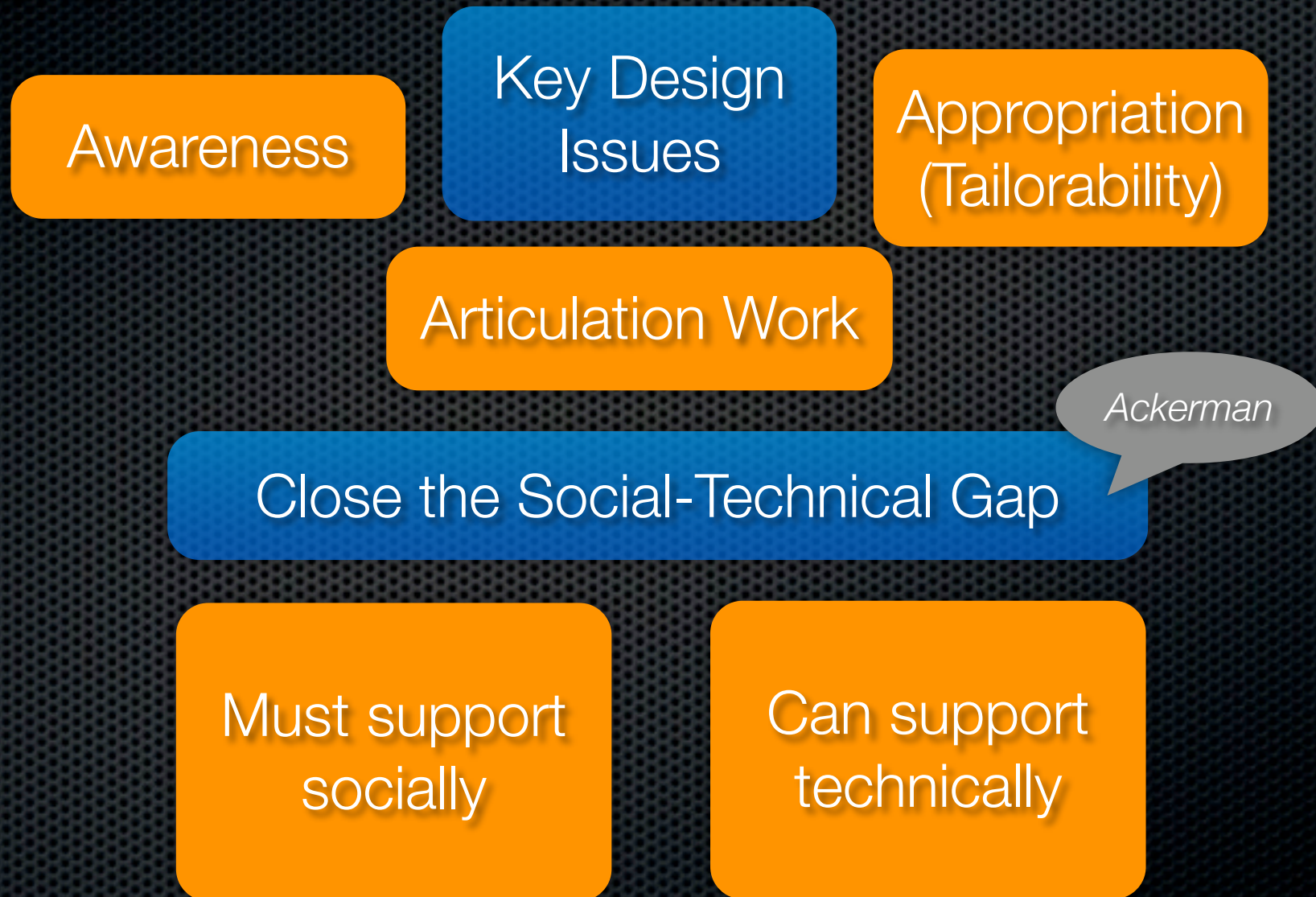
Continuous task

team rooms, large public display, shift
work groupware, project
management, ...

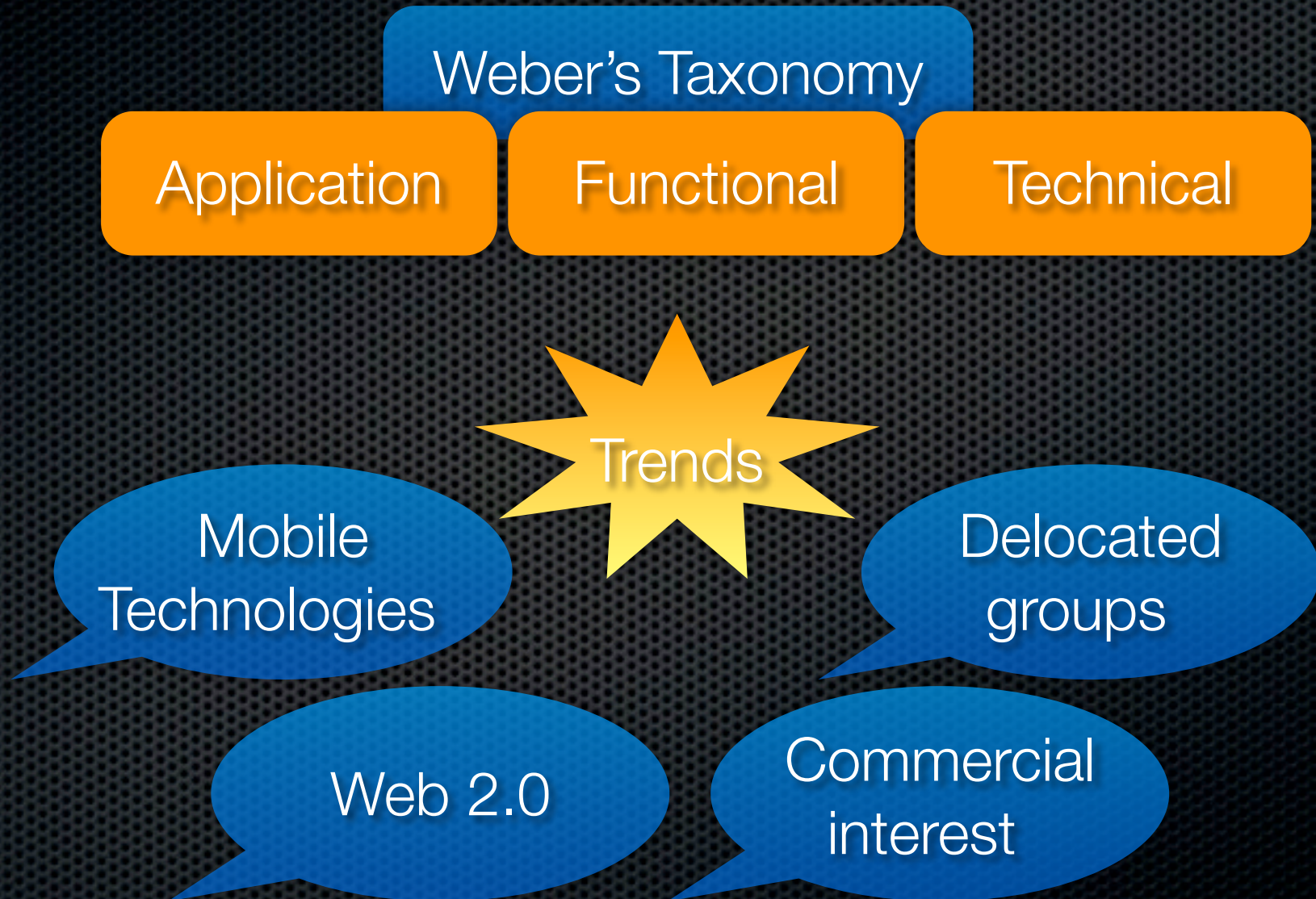
Computer-Supported Collaborative Work (CSCW)

- ✦ Groupware failed to provide effective, widely adopted tools.
- ✦ Better understanding of how groups work together.
- ✦ “CSCW combines the **understanding of the way people work in groups** with the **enabling of technologies** of computer networking, and associated hardware, software, services and techniques” - P.Wilson
- ✦ “CSCW is the scientific discipline that **motivates and validates groupware design**” - Greenberg.

CSCW



CSCW



Collaborative Software Engineering

- ✦ Projects are inherently cooperative.
- ✦ Development of a shared understanding.
- ✦ Humans are slow and error-prone
 - ✦ Language is expressive but ambiguous
 - ✦ Memory skips details
 - ✦ Can't keep track of everybody

Collab. SE Goals

- ✦ Establish the scope and capabilities of a project.
- ✦ Converge towards a final architecture and design
- ✦ Manage dependencies among activities, artefacts and organizations.
- ✦ Reduce dependencies among engineers
- ✦ Identify, record and resolve errors
- ✦ Record organizational memory

Collaboration in Software Engineering

Unstructured

Occasional, sporadic and informal conversation concerning a piece of software

Structured

Focus on formal or semi-formal artefacts (models, documents and code)

Model-based Collaboration

Enterprise Architect, Visio, ConceptDraw,

Tools

Collaboration Infrastructure

Eclipse, Visual Studio, WebDAV, Marvel, ...

Process-centred Collaboration

Arcadia, Oz, Conversation Builder, Endeavours, PivotalTracker...

Collaboration Awareness

Seesoft, Palantir, Lighthouse, Jazz, ...

Collaboration in Software Engineering



Trends

Integrating Web
and Desktop
environments

Capturing rationale
argumentation

Broader participation
in design

Using novel
communication and
presence techs.

Improved
assessment of
collaboration tech.

Open Issues

- ✦ Knowledge is lost.
- ✦ Engineers recurrently tackle with understanding problems.
- ✦ Different tools provide sparse results with variable quality.
- ✦ Collective knowledge is not harnessed at its best.
- ✦ Tacit knowledge is not captured and shared as effectively as it could be.

Software Knowledge

- ✦ Software development is a highly social process.
- ✦ “Lots of [useful] information is kept on people’s minds”
- ✦ Experts are seldom available and don’t want to be disturbed.
- ✦ Available explicit knowledge (code, docs, artefacts) is often incomplete or is unsuitable.

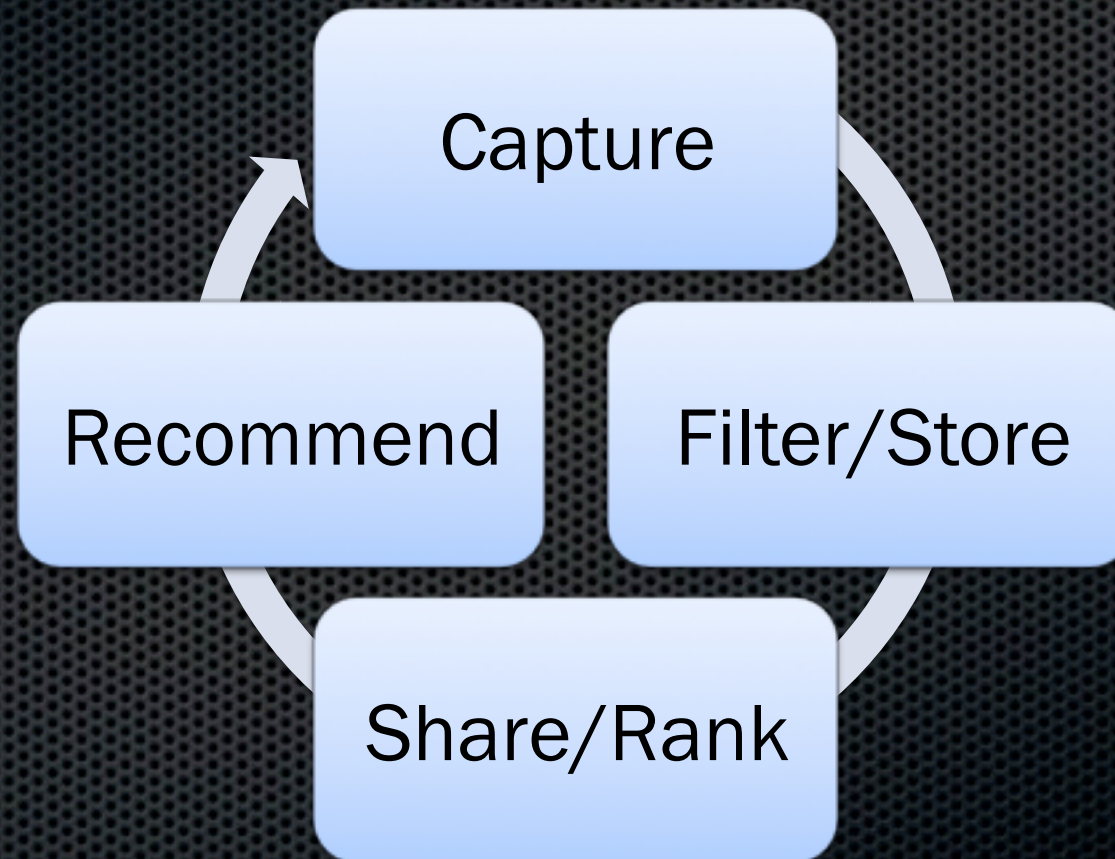
Collective vs. Collected

- ✧ Collected Knowledge Systems
 - ✧ User-generated content
 - ✧ Human-machine synergy
 - ✧ Increasing returns with scale
- ✧ From “Collected” to “Collective”
 - ✧ Emergent knowledge

Grasping the Community

- ✧ Capturing the learning path
 - ✧ “where to go”, “where not to go”
- ✧ Ranking
 - ✧ “Natural Selection”
- ✧ Recommendation
 - ✧ “Collective Knowledge Reuse”
- ✧ Generic Knowledge-base search
 - ✧ “google-like” search

Knowledge Cycle



Thank You