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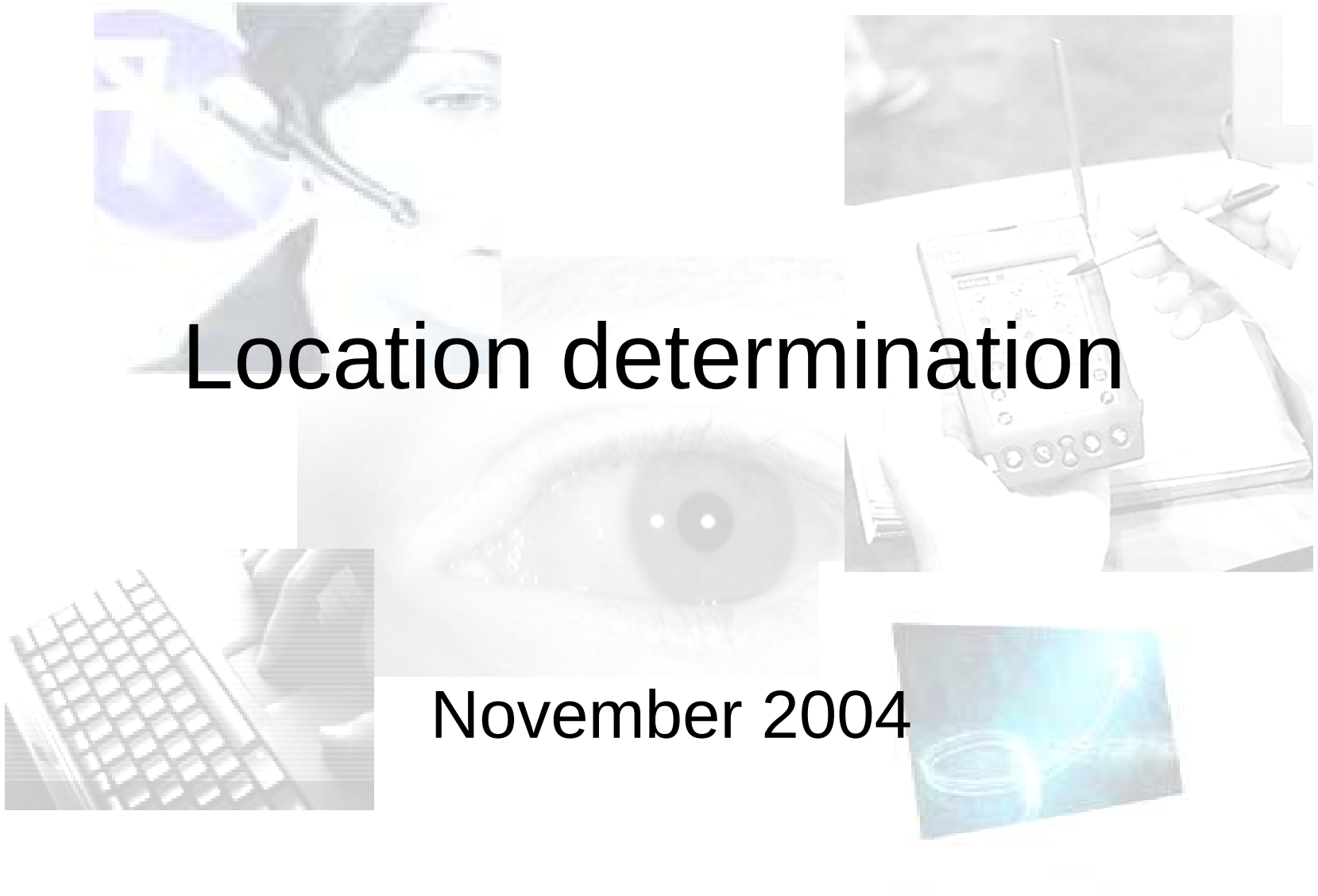

Location determination

November 2004

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Contents

- Introduction
- Definition
- Vision
- Usage scenarios
- Examples of Location determination from single and multiple points
- Challenges – technical, usage, ethical

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Introduction

- Trish Messiter, Director Business Development
- Clarinox Technologies operating since 2001
- Spin-off from $4 million IT consultancy
- Mission: simplify wireless application development
- Melbourne based (41% Australian ICT)
- Key Product ClarinoxBlue
- Agents in Turkey, India, Taiwan and China

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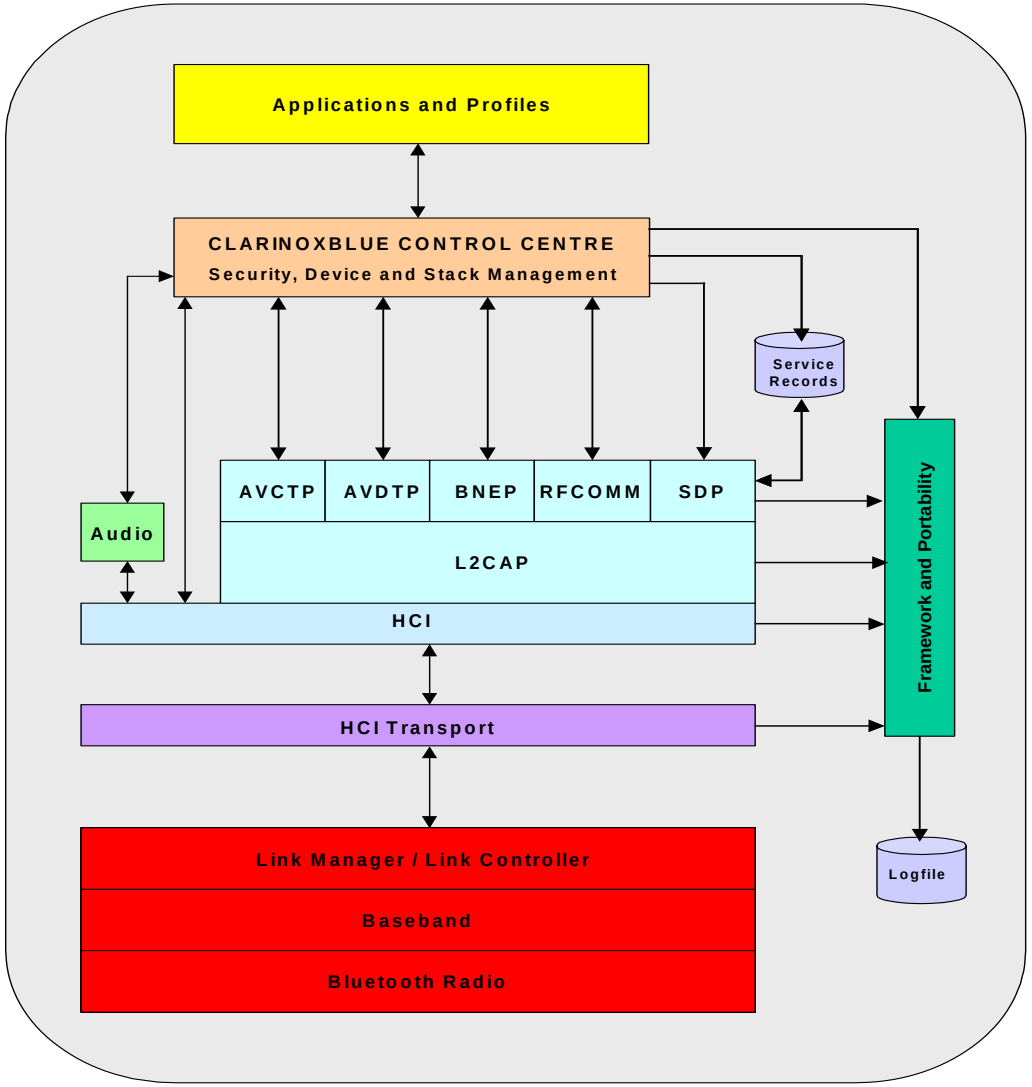
ClarinoxBlue

- Simple API
- Portable
- Faster application development
- MP3
- Local positioning
- Multi profile support



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Definition

- Location Determination: anytime knowing the position, movements or identification of an entity

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Vision

- Ubiquitous
- Omnipresent
- Mobile
- Seamless
- Information rich
- Adaptable to our requirements
- Anywhere
- Anytime

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Usage Scenarios

- Telecommunications, electronics, manufacturing, wearable computing, defense
- Tata Consultancy Services (India)
- Large European Appliance manufacturer
- Universities

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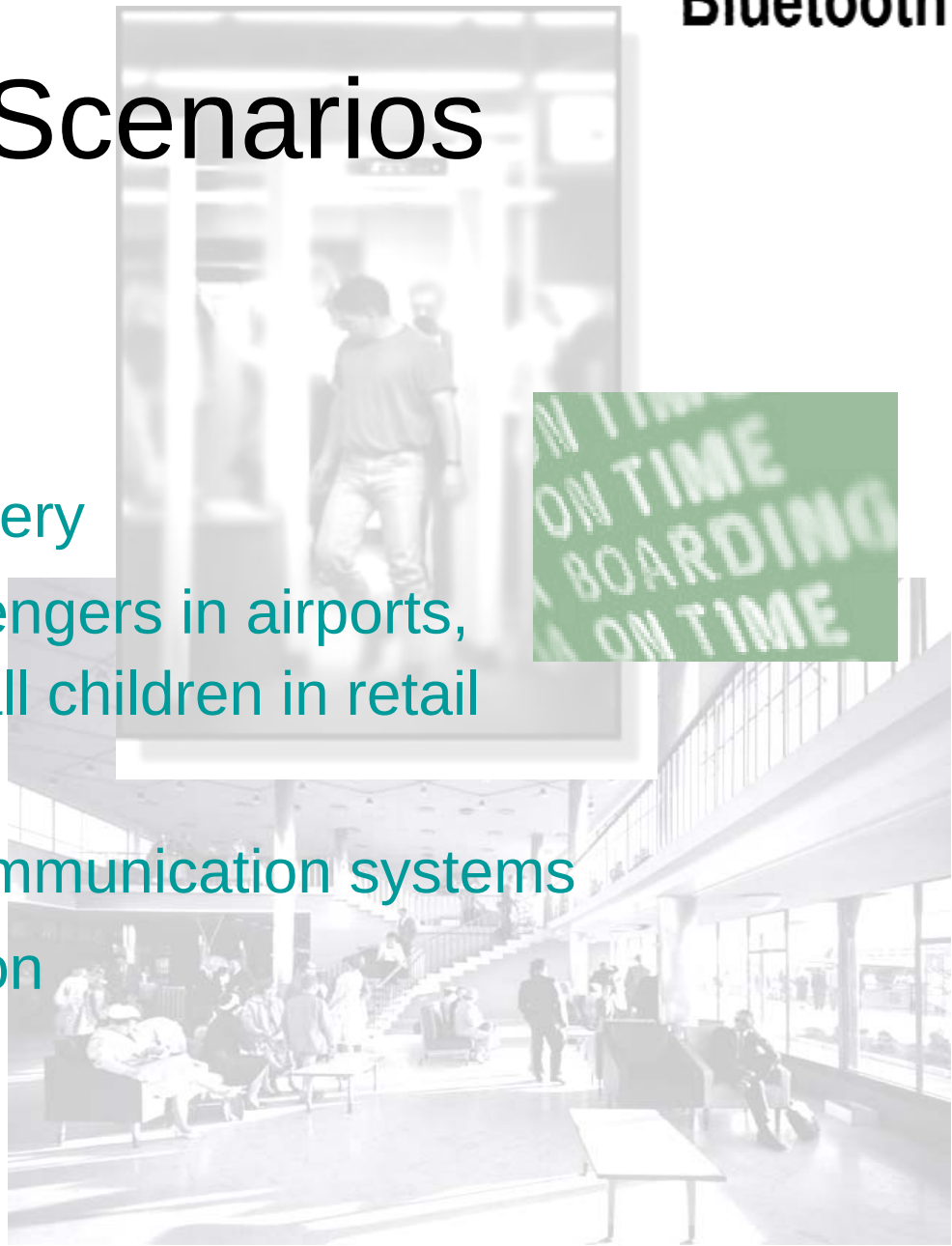
Usage Scenarios

- Audio tour systems
- Smart loyalty cards
- Hospital information delivery
- Tracking of assets, passengers in airports, patients in hospitals, small children in retail outlets
- Confined space voice communication systems
- Location-based notification



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Examples

- Determination of location within an indoor environment from a single point – personnel tracking
- Determination of location via a network of devices – a proximity based wireless audio content delivery system

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Example 1: Clarinox location determination

- Personnel tracking Proof of Concept
- No infrastructure
- Over 100m outdoors
- Approx 80m indoors (busy shopping centre)
- Accuracy within 5-10%

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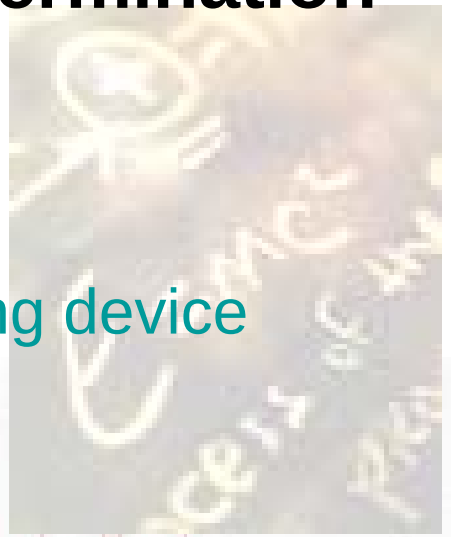
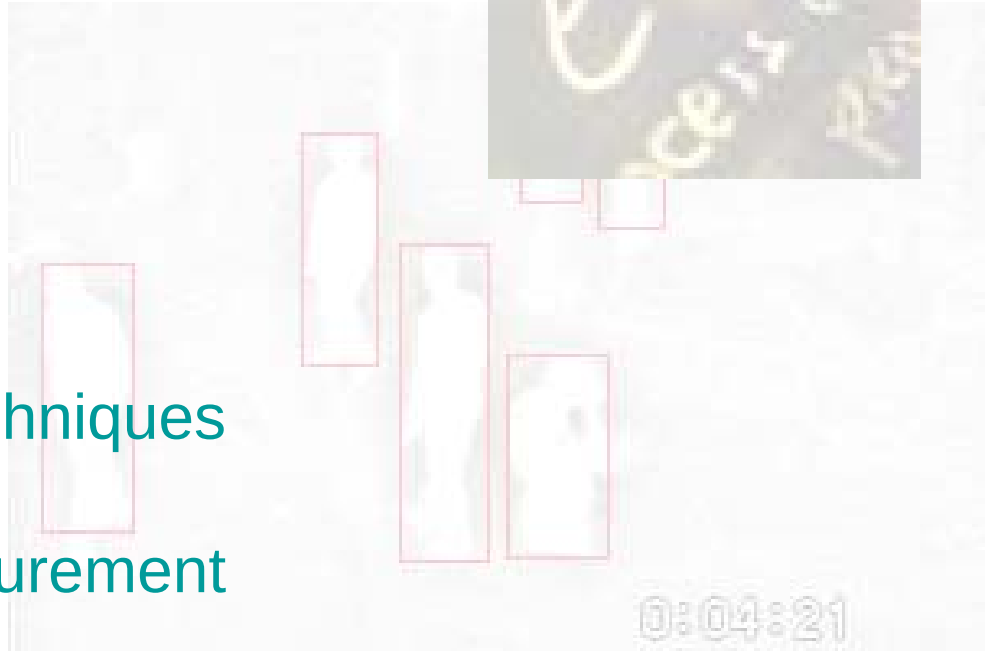
Example 1: Clarinox location determination



- Tag and tracking device both mobile
- Position of tag relative to position of tracking device
- Multiple antennae
- Complex algorithm
- Proprietary smoothing techniques
- Angle and distance measurement



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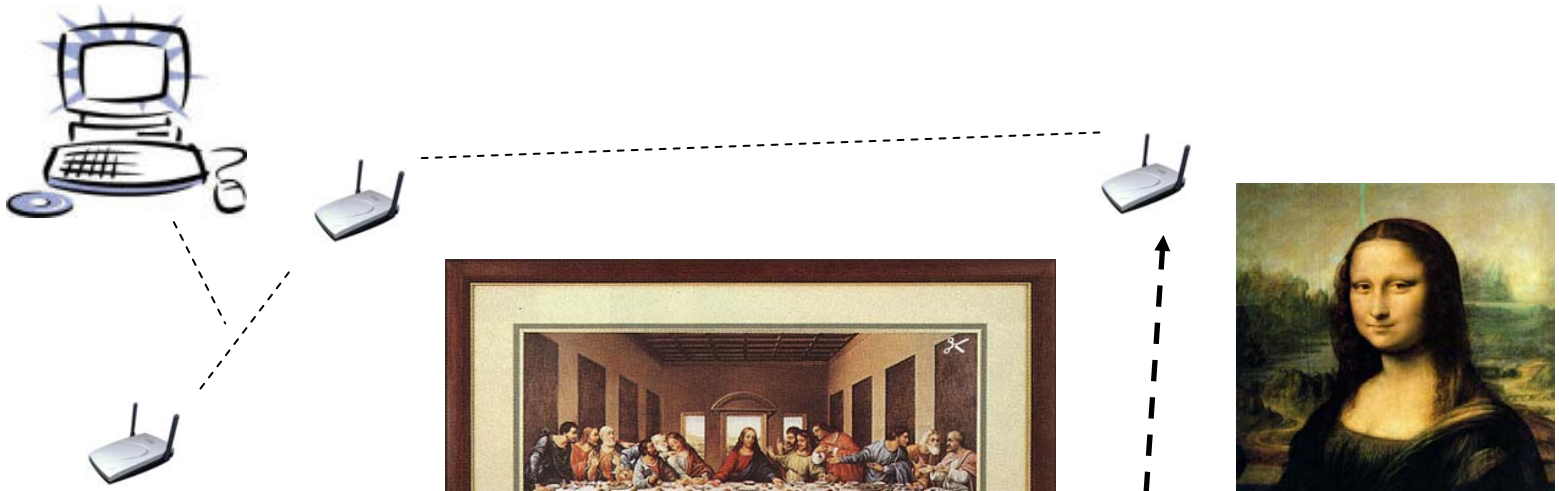
Example 2: Clarinox location determination



Location determination via network as part of flexible audio tour system

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Example 2: Clarinox location determination

- Visitors can wander freely while the audio tour adjusts to their demands
- High quality sound
- Eliminate the problem of listening to the end of the information first
- Audio stream starts at the beginning for every visitor

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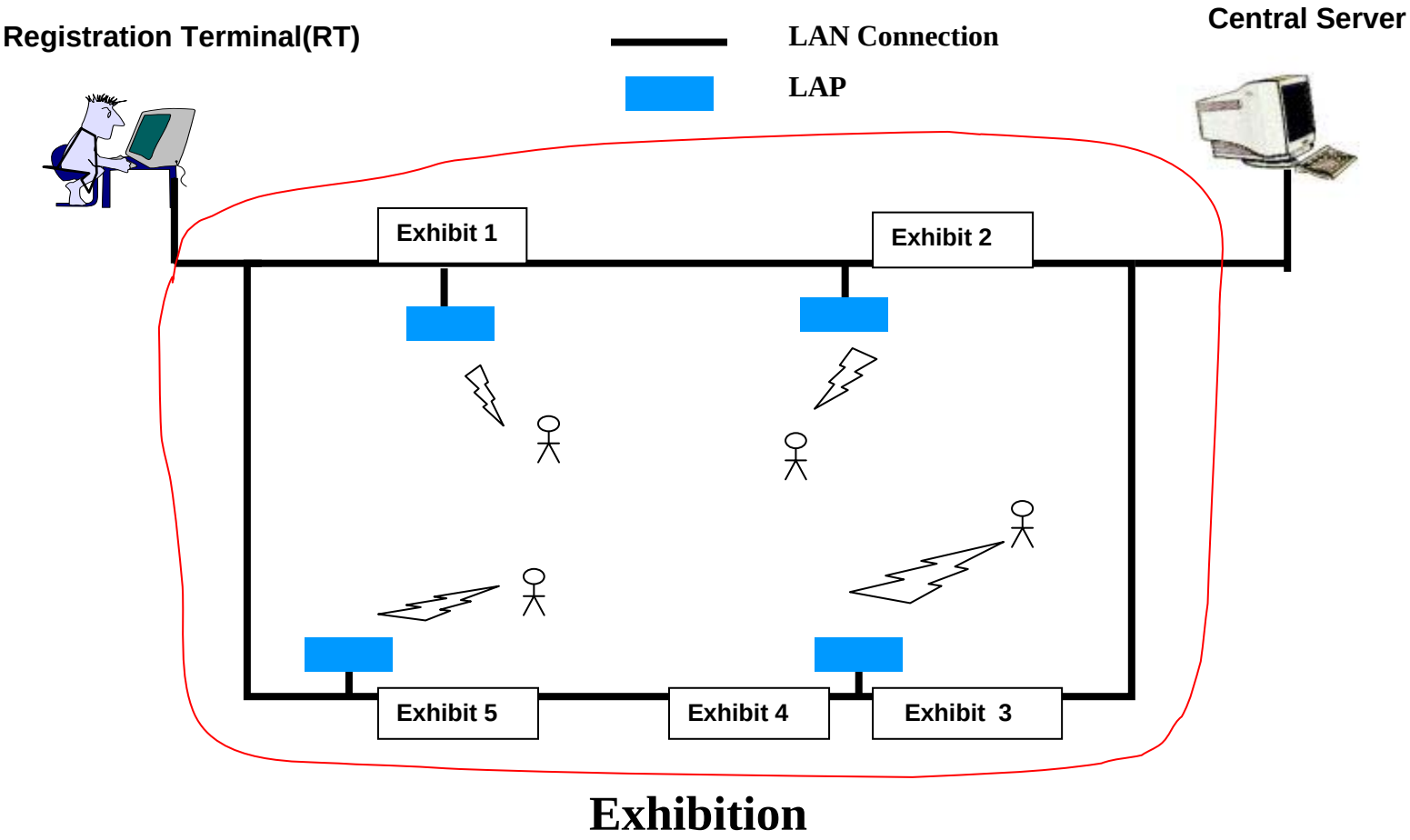
Example 2: Clarinox location determination



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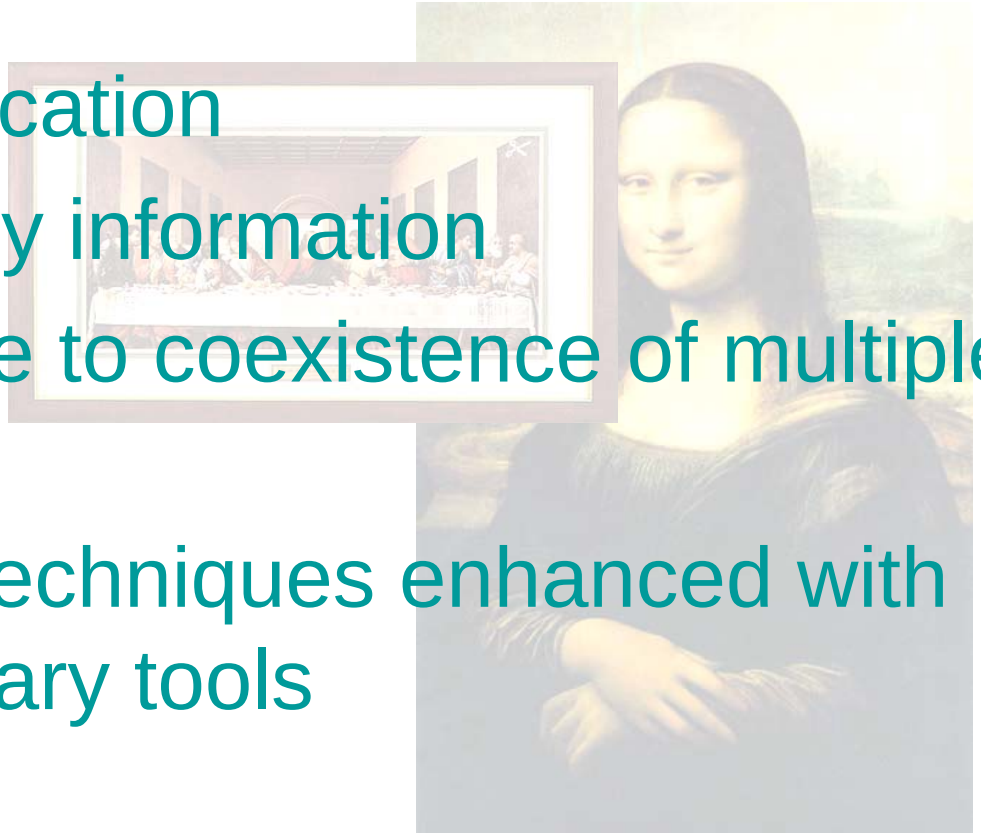
Example 2: Clarinox location determination



- Track visitor location
- Location history information
- Complexity due to coexistence of multiple devices
- Triangulation techniques enhanced with use of proprietary tools

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Challenges

- Technical
- Ethical
- Human Interface

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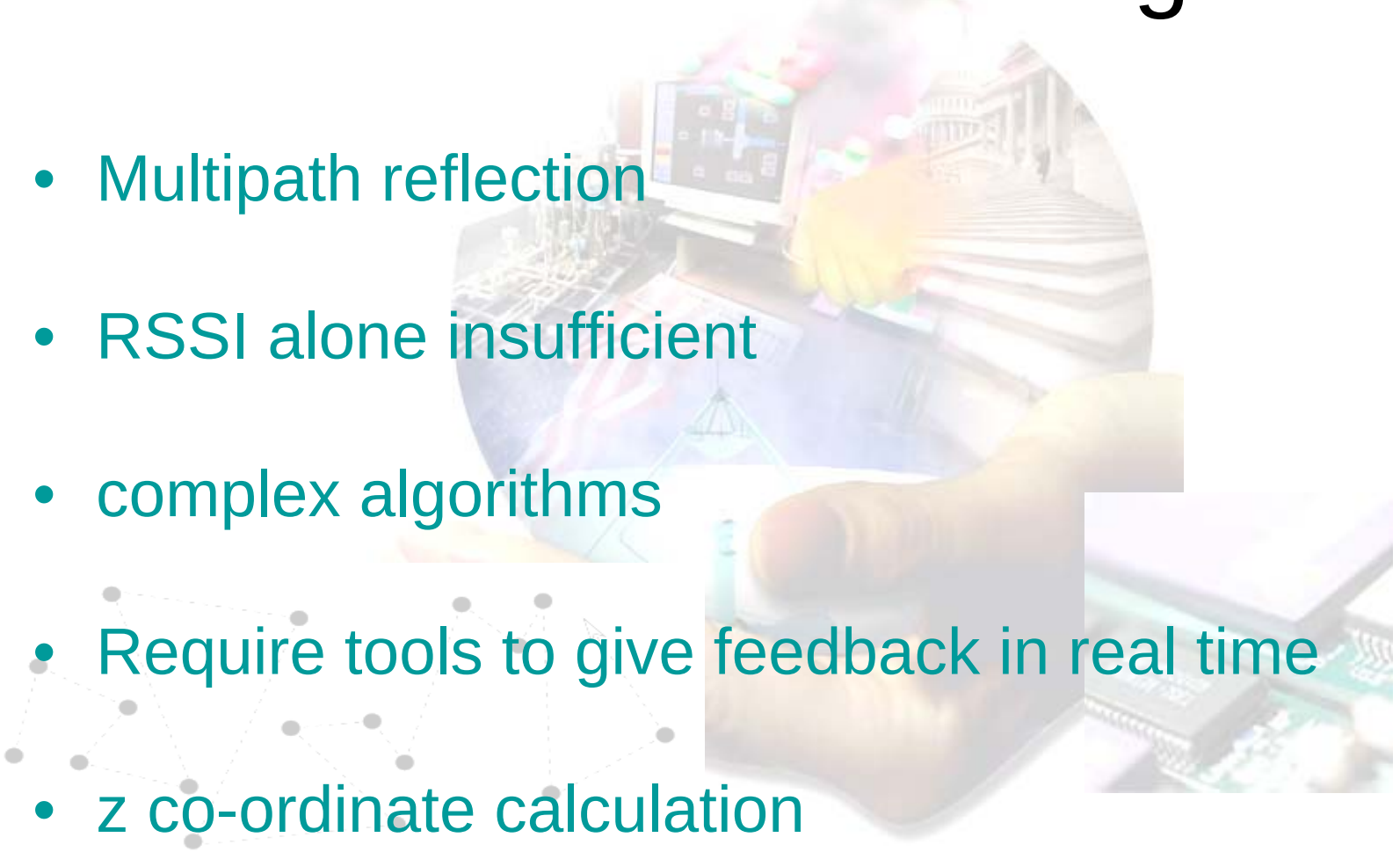
Technical challenges



- Multipath reflection
- RSSI alone insufficient
- complex algorithms
- Require tools to give feedback in real time
- z co-ordinate calculation

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Technical challenges

- ClarinoxBlue Explorer Analysis tool
- Bluetooth message/protocol tracer
- Protocol stack software
- Access point and tag unit hardware
- Application software

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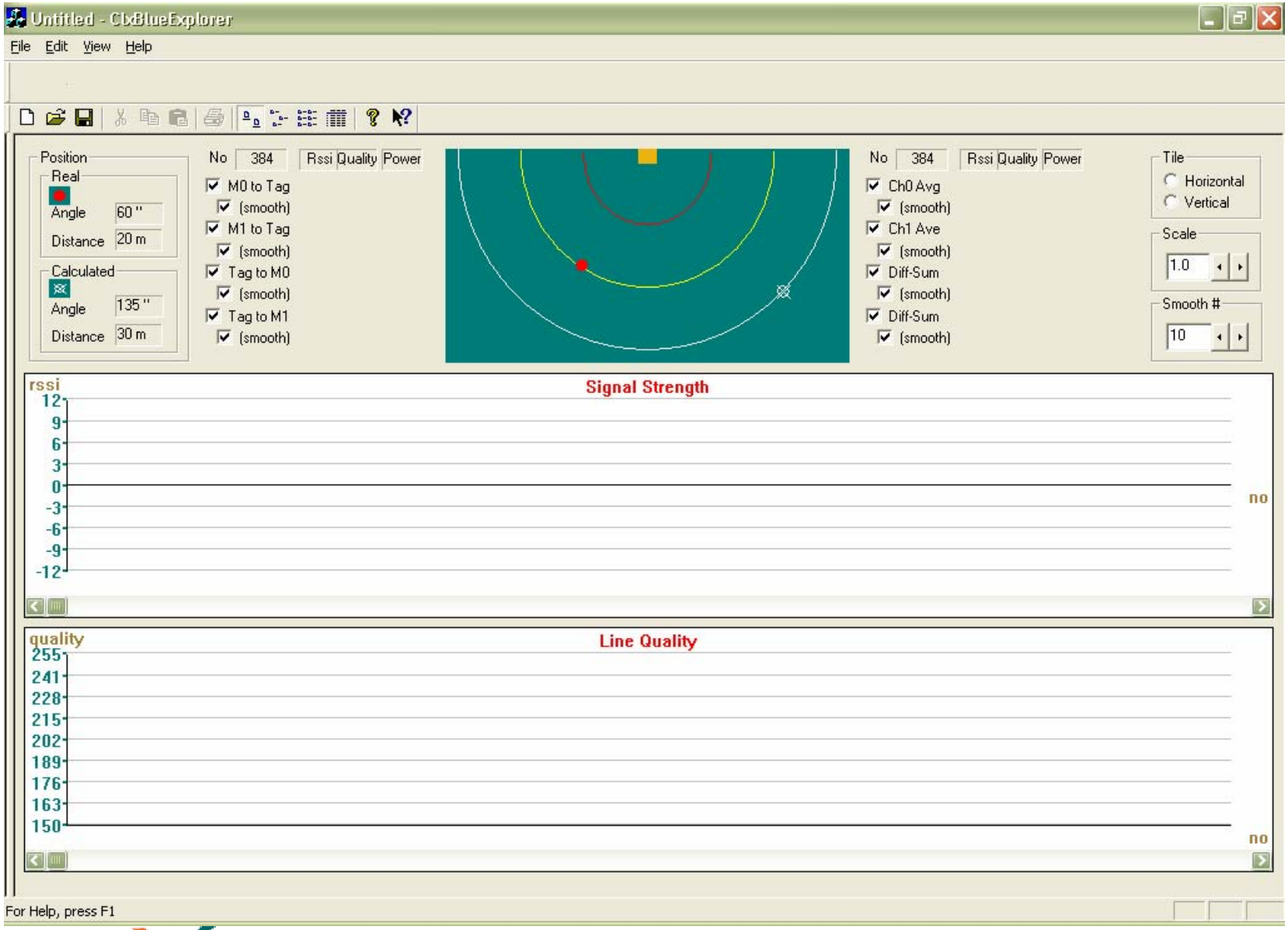

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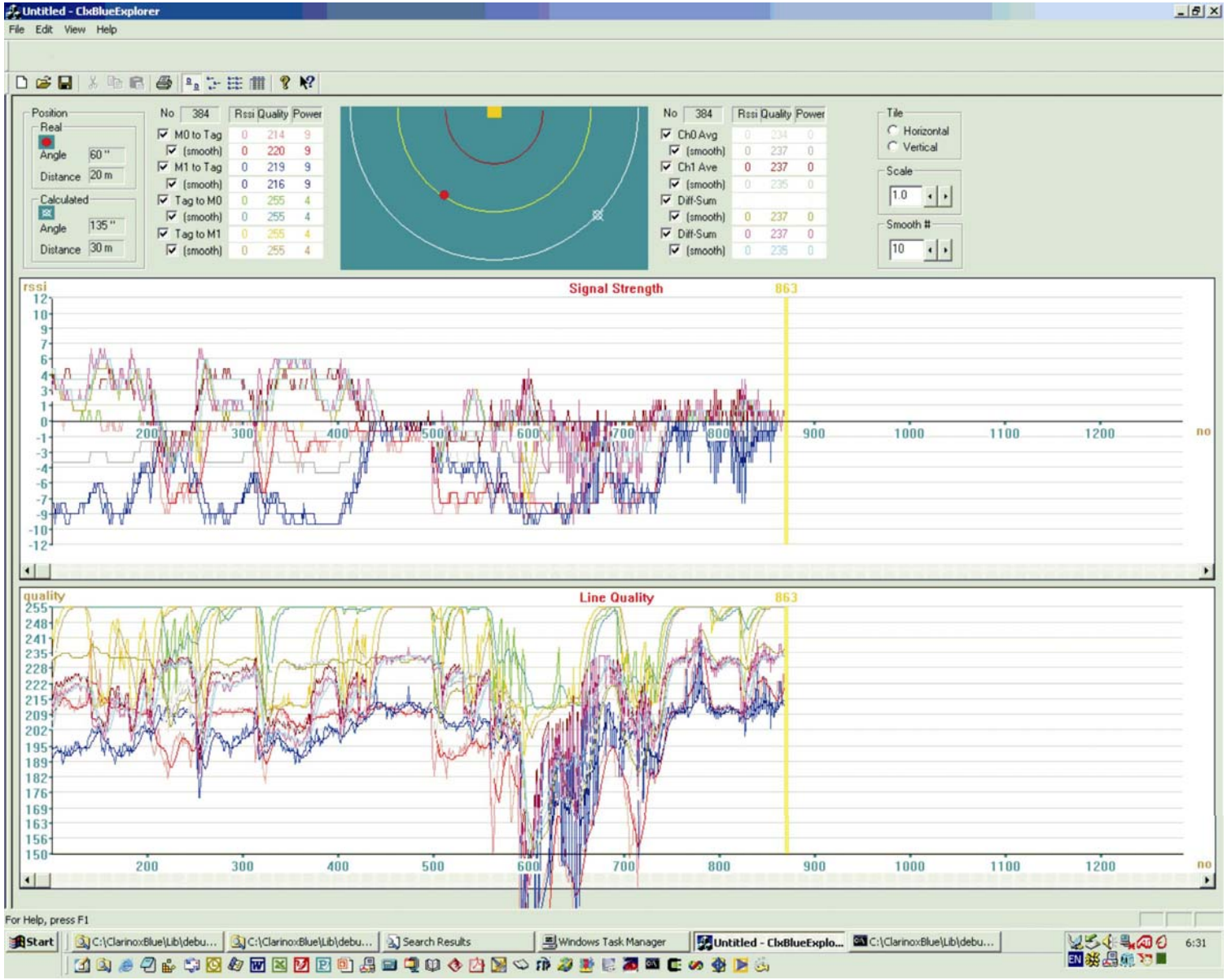

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Human Interaction challenges

- Prejudices
- Experiences
- Perception
- Expectations

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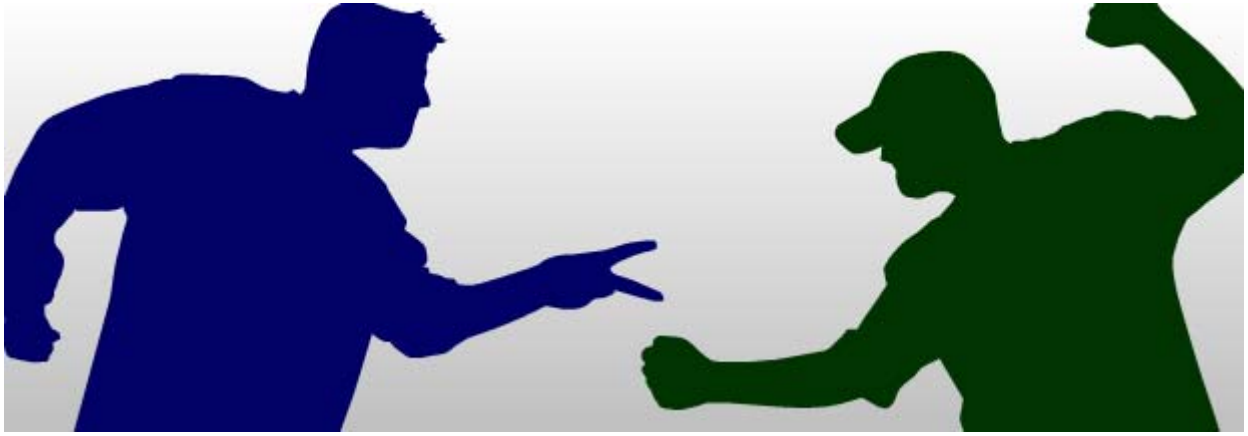
Prejudices



Volunteers asked to second guess an opponent playing scissors-paper-rock
Told the opponent either “computer” or “human”
[actually both random, and presented via computer]

(Gallagher 2002)

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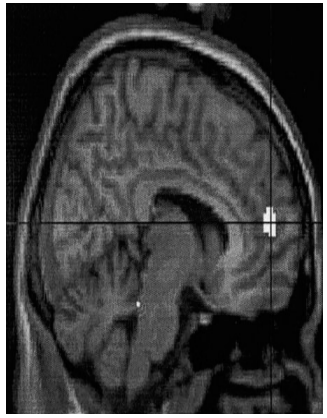
Prejudices



Anterior paracingulate cortex activated

Player believes opponent is computer

Player believes opponent is human

Brain PET scans during play

Imaging the Intentional Stance in a Competitive Game – Gallaher, 2002

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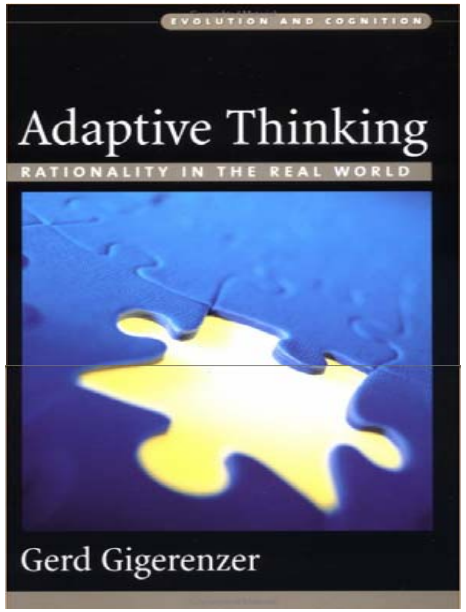
Experiences



"People restructure their environment to allow faster, more accurate, decisions to be made"

Gigerenzer et al

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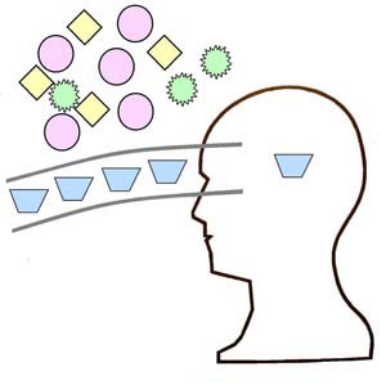
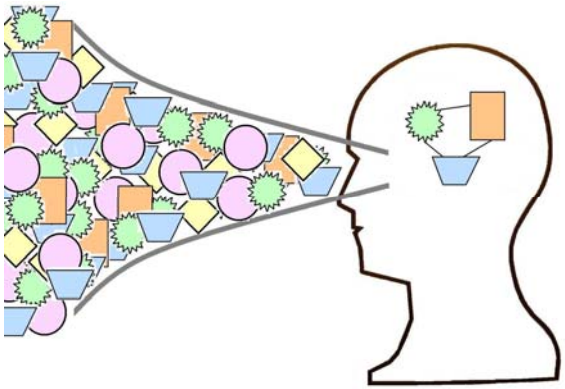
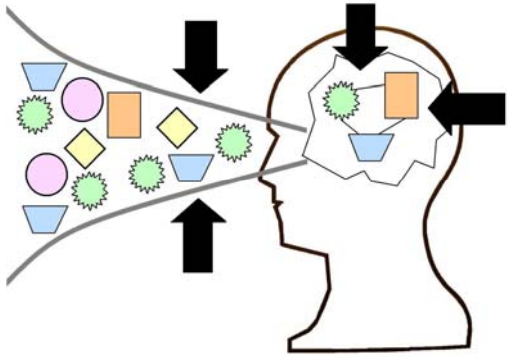
Perception



Attentional tunnelling



Data overload



Stress

(Endsley, M. R; Bolte, B; Jones, D "Designing for Situation Awareness. An Approach to User-Centered Design)"

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Expectations

- Transparent
- Interactive
- Adaptive
- Available

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Ethical challenges

- Privacy
- Consent
- Rights of individual vs employer / society at large

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Conclusion

"TCS believes there is a significant market emerging for applications developed around this [Clarinox] technology"

Shiva Iyer, Market Development Head,
Communication and Embedded Technologies,
TATA CONSULTANCY SERVICES (India)

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