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## **Visioning Studies**

Sonnenwald, Diane H.  
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# *Visioning Studies: A Socio-technical Approach to Designing the Future*

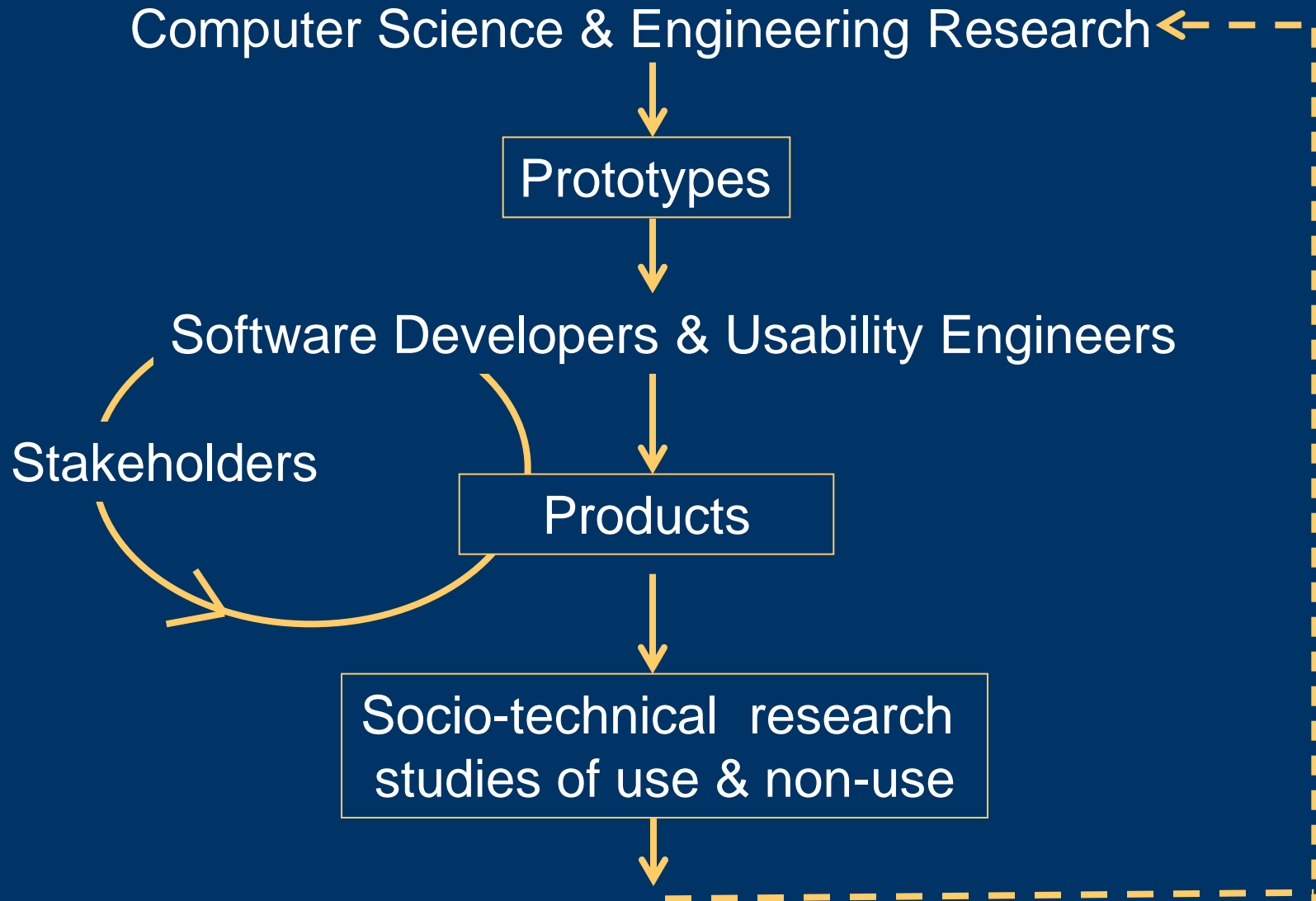


Diane H. Sonnenwald  
UCD

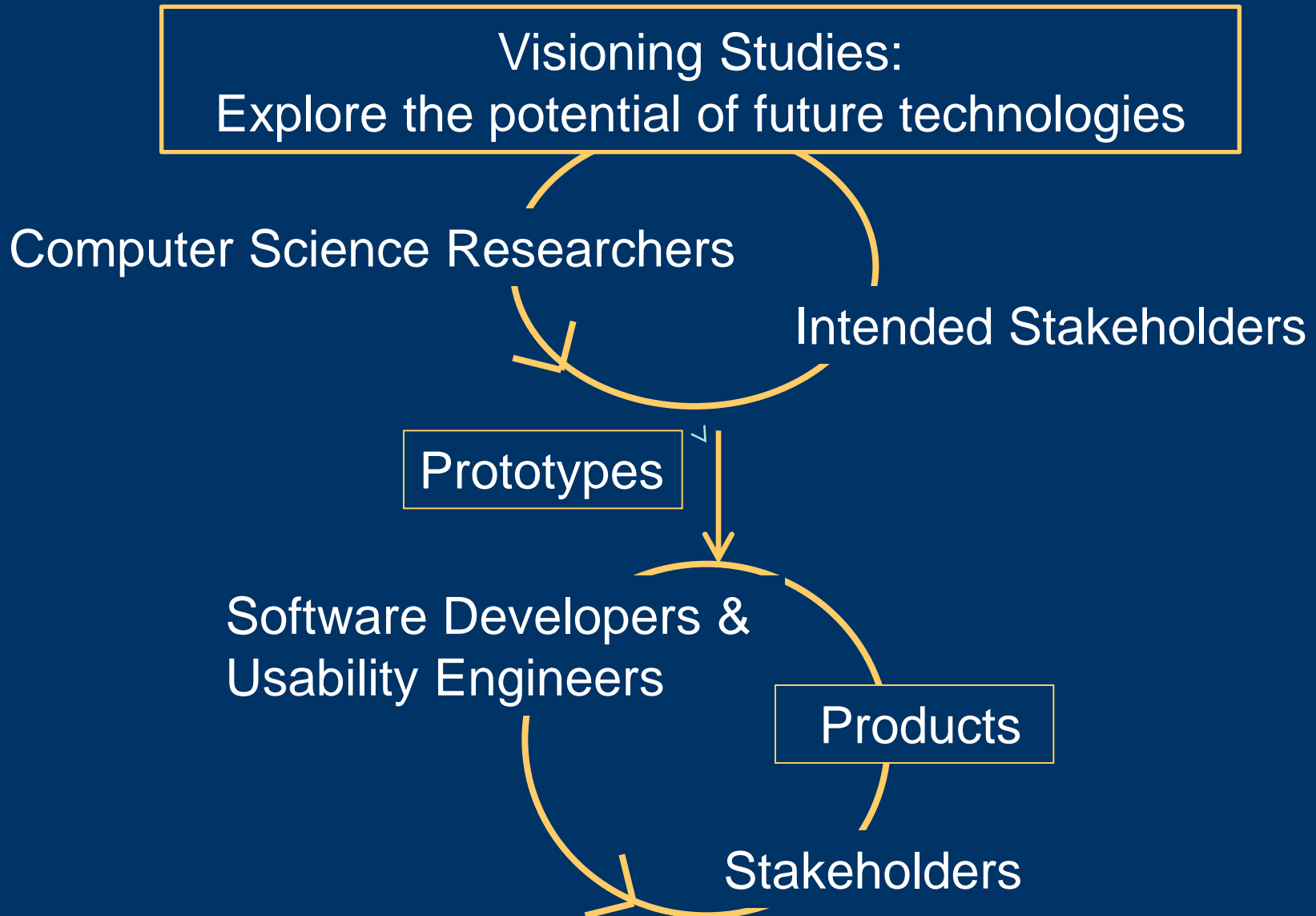


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# *Traditional Technology Research & Development Cycle*



# *Visioning Studies: A Different Approach*



# *Visioning Studies Goals*

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Focus on future technology that is costly to deploy  
e.g., in complex and/or critical domains



Validate proposed benefits

Identify unintended consequences

Identify unintended benefits

Provide insights regarding technology features

Identify deployment challenges & solutions



Reduction in unintended consequences, costs & time to market  
Increase in benefits, adoption & use

# *Visioning Studies: 2 Approaches*

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- Investigate task performance
  - Comparison of current, near term, long-term task situations
  - Simulation & use of proxies
  - Mixed methods
- Discover implications within the domain context
  - Video illustrating possibilities
  - Semi-structured interviews
  - Innovation adoption & use research framework
- Recent & ongoing visioning studies
  - 3D telepresence technology in emergency medical care
  - Future mobile technology adoption & use in policing

# *3D Telepresence Technology in Emergency Medical Care*

- Co-Principal Investigators
  - Bruce Cairns, James E. Manning  
Medical School, University of North Carolina
  - Greg Welch, Henry Fuchs  
Computer Science, University of North Carolina
- PhD student: Hanna Maurin Söderholm
- Funding: U.S. National Library of Medicine



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United States  
**National Library of Medicine**  
National Institutes of Health

# *Emergency Medical Care*





# *Vision for 3D Telepresence Technology*

Large  
medical  
center



Remote  
accident



Need to evaluate the potential of the technology  
in this context before large investments are made

# *Investigating Task Performance*

- Lab based study
  - Post-test, between subjects design
- Simulated, high fidelity emergency medical task situation
  - METI<sup>©</sup> human patient simulator
  - Diagnose a difficult airway & perform a cricothyrotomy
- Conditions
  - (1) Paramedic working alone
  - (2) Paramedic collaborating with a physician via state-of-the-art 2D video-conference
  - (3) Paramedic collaborating with a physician via a 3D proxy



# Task Performance Results Summary

- 3D telepresence impact on health care outcomes
  - Fewer harmful interventions occurred, but overall medical task completion not significantly better
  - Strong positive effect on future task performance
  - Elimination of negative impact from a lack of previous work experience
  - Significant negative impact on future task performance when collaborating via 2D video-conferencing
- Technical design examples
  - Necessity to dynamically change remote views
  - Strong need for virtual remote pointer
  - Usefulness of showing remote physician to paramedic



# *Investigating Domain Implications*

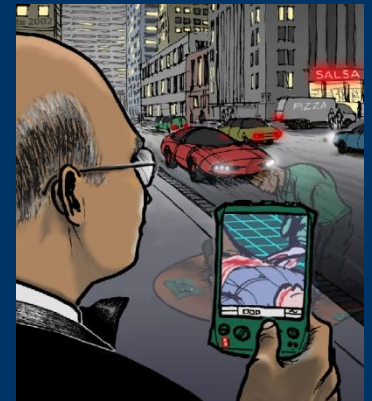
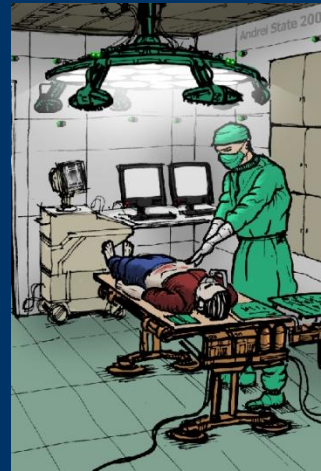
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What might facilitate and/or impede the adoption & use of 3D telepresence in the U.S. health care system?

- Video illustrating vision for 3D telepresence
- Open ended interview questions
- Study participants:
  - Paramedics
  - Emergency room nurses, interns, physicians at large & small medical centers
  - Medical center & emergency services administrators
  - IT personnel
  - Government medical agency personnel

# Examples of Domain Implications

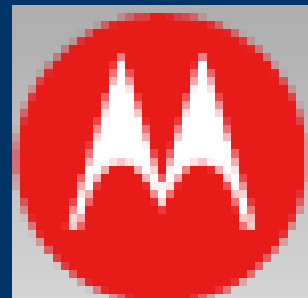
- Will make medical care visible in new ways across organizations, work roles & time
- Could inspire new modes of working & new treatments
- Has potential as a marketing tool
- Challenges current practices with respect to:
  - Performance review & reputation
  - Medical responsibility & division of labor
  - Electronic medical records
  - Billing



# *Visioning Study*

## Future Mobile Technology in Police Work

- Collaborators
  - Padraig Conway, UCD
  - Eddie Cussens, Police consultant
- Postdoc
  - Andrea Johnson
- Funding
  - Motorola Foundation



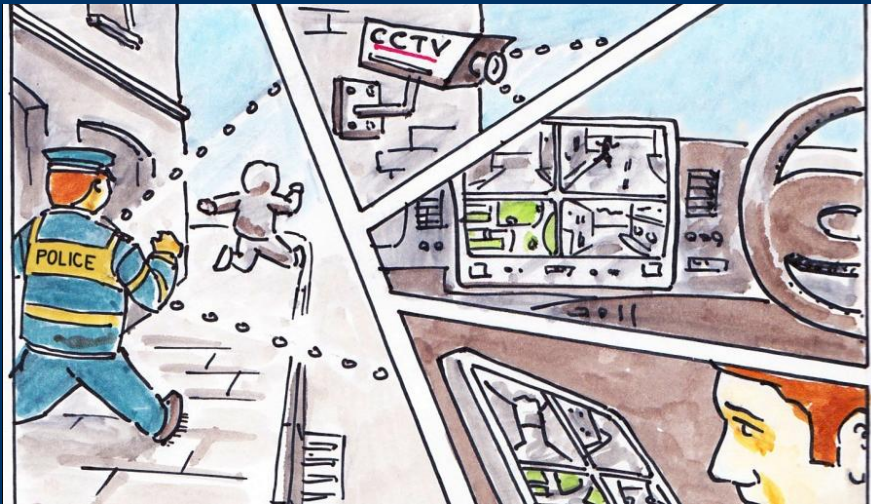
# *Future Mobile Technology in Police Work*

## Motivation

- Delays in technology adoption
  - Different perceptions of best practice, risks & benefits
  - E.g., 3 years for adoption of fingerprint id technology in Ireland
- Cost of deployment
  - Development staff months = deployment staff months
- Rapid mobile technology adoption by criminals & public
- Dynamic work context impacting lives
- EU emergency services spectrum discussion



# *Future Mobile Technology in Police Work*

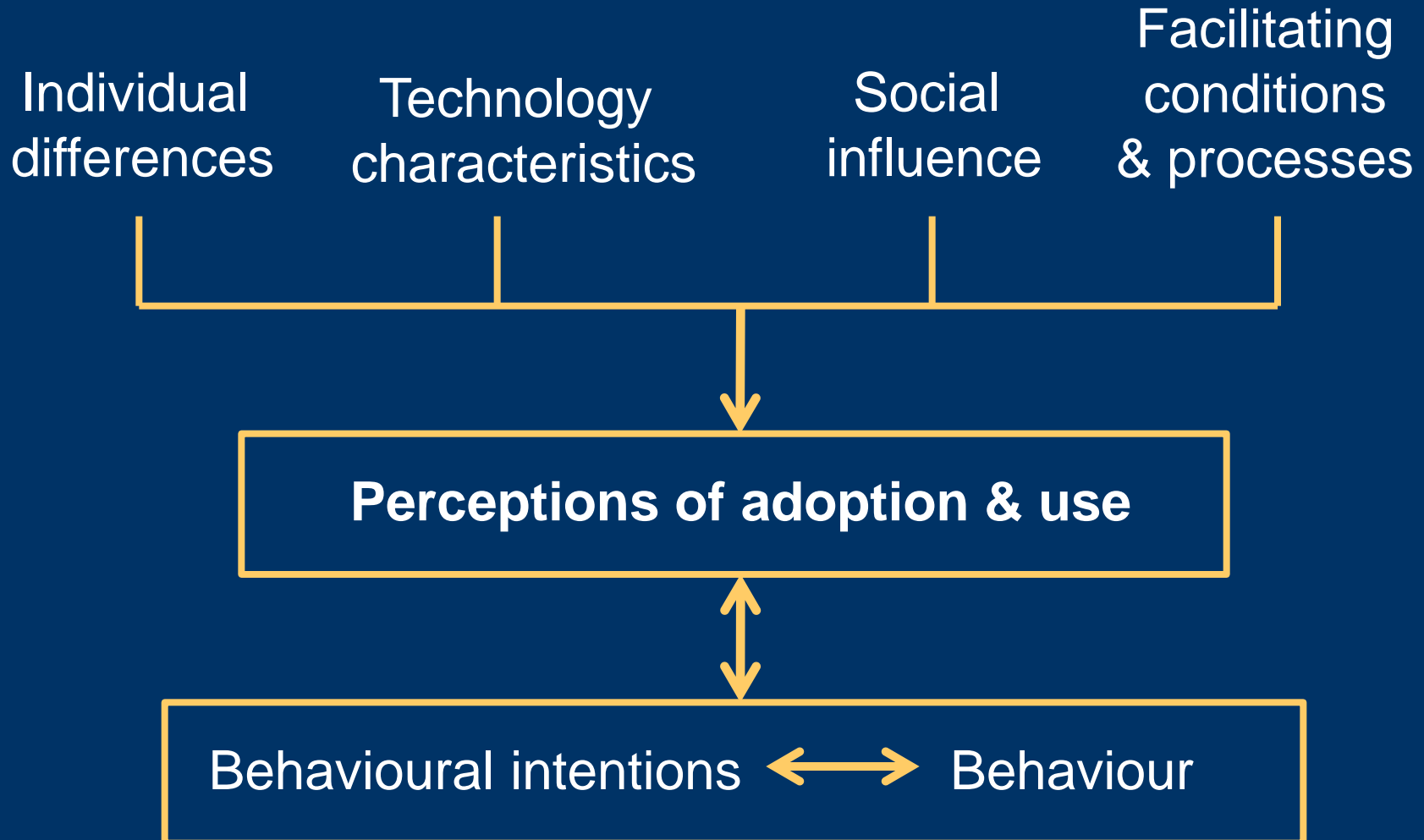


- Smart situation awareness
- Seamless access to distributed information
- Proactive dissemination of aggregated information
- Smart capture of information
- Real time analysis & synthesis of information



# *Factors influencing Adoption & Use*

## Theoretical Framework

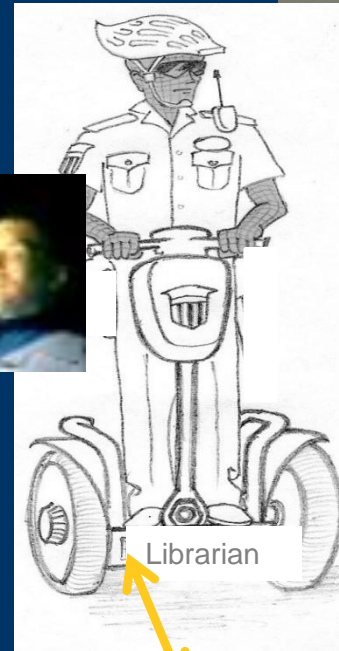
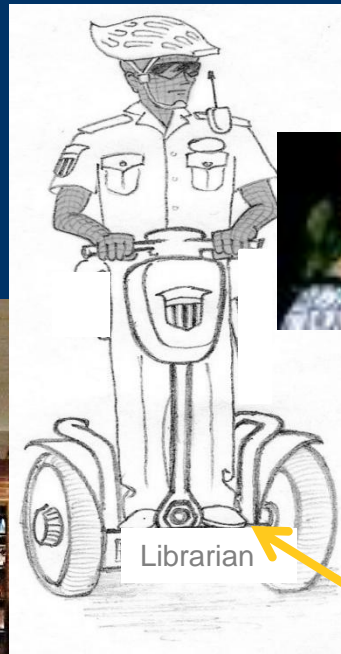
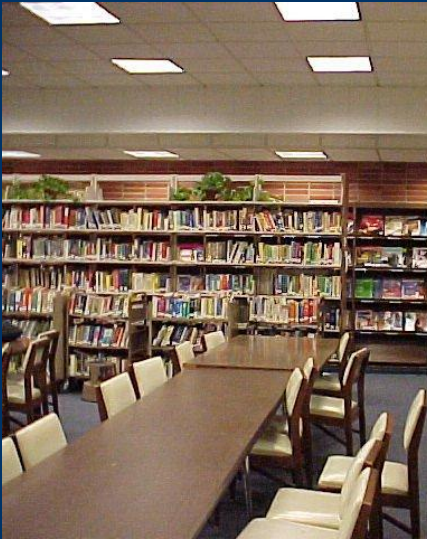


# Possible New Ways of Working

## Physical Virtual Avatars

Physical manifestations of remote professionals

Rural library in small town A



Rural library in small town B



Librarian at a central location

Welch, G., et al.

# *Visioning Studies Approach*

Visioning Studies:  
Explore the potential of future technologies

Computer Science Researchers

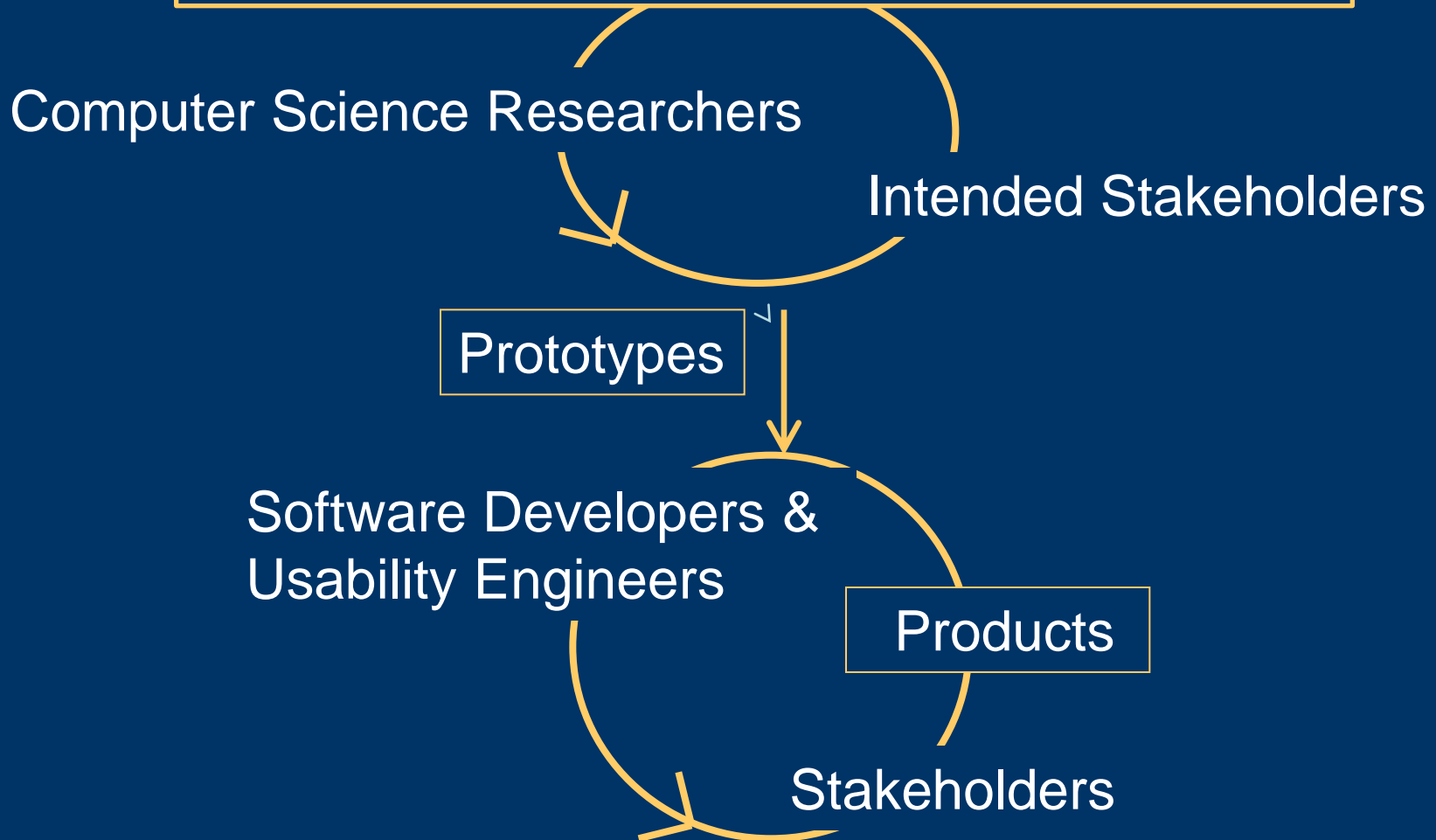
Intended Stakeholders

Prototypes

Software Developers &  
Usability Engineers

Products

Stakeholders



# Acknowledgments

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*The first visioning study was supported by the National Library of Medicine, contract N01-LM-3-3514, 3D Telepresence for Medical Consultation: Extending Medical Expertise throughout, Between and Beyond Hospitals.*

*The second visioning study is supported by the Motorola Foundation.*

Extra slide follows

# *Emergency Medical Care*

- Trauma – serious physical injury
  - Responsible for more productive years lost than heart disease, cancer & stroke combined worldwide (Meyer, 1998; Coates & Goode, 2001)
  - Paramedics, not physicians, provide emergency health care to trauma victims at accident scenes
  - Complex, dynamic health care situations
  - Today paramedics receive advice from physicians via cell phone or radio
- State-of-the-art 2D video-conferencing use in telemedicine
  - Difficulty in obtaining the desired camera views
  - Lack of depth perception
  - Mun, 2000; Tachakra, 2001; Hauber et al., 2006