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Visioning Studies: A Socio-technical Approach to Designing the Future



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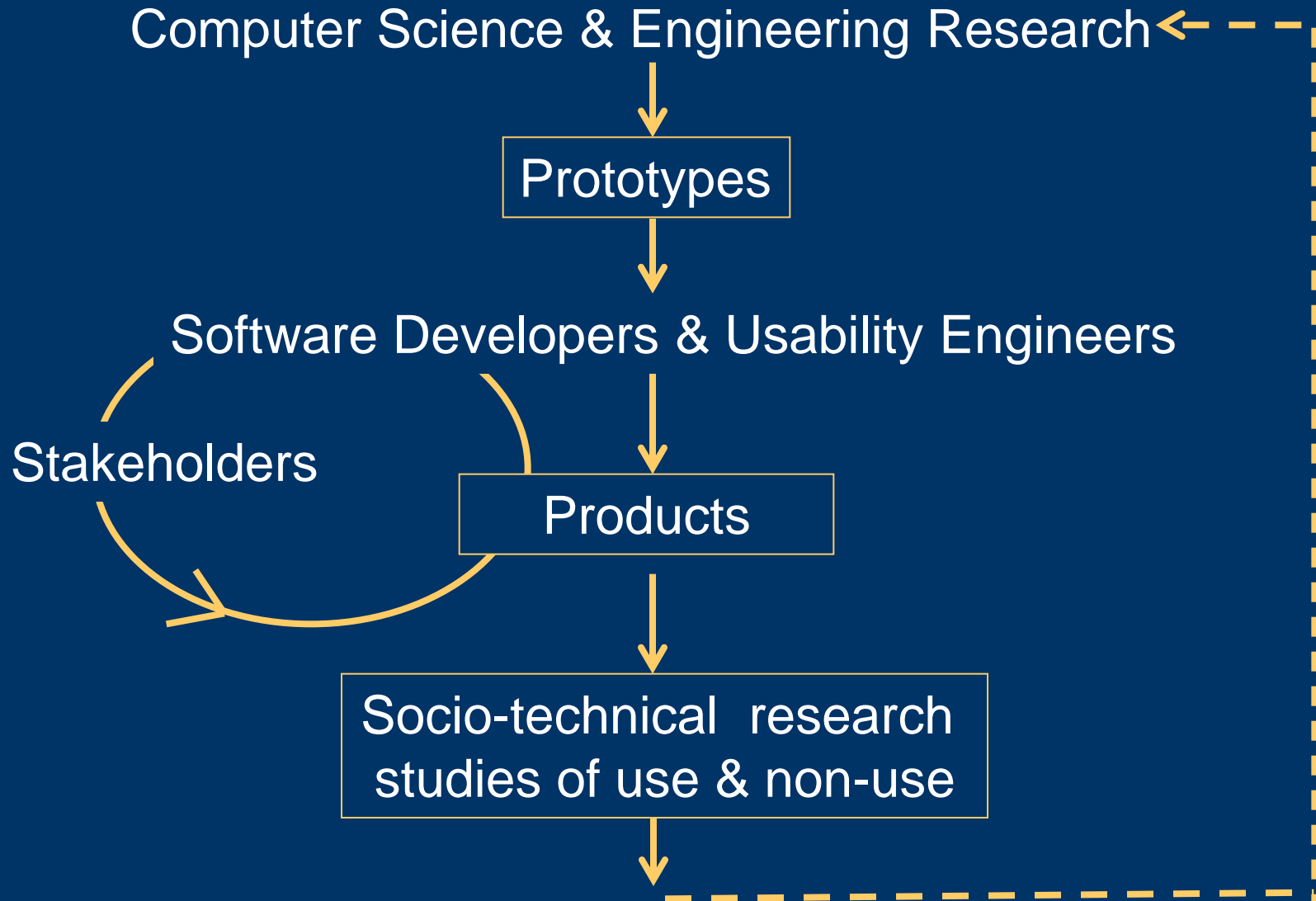
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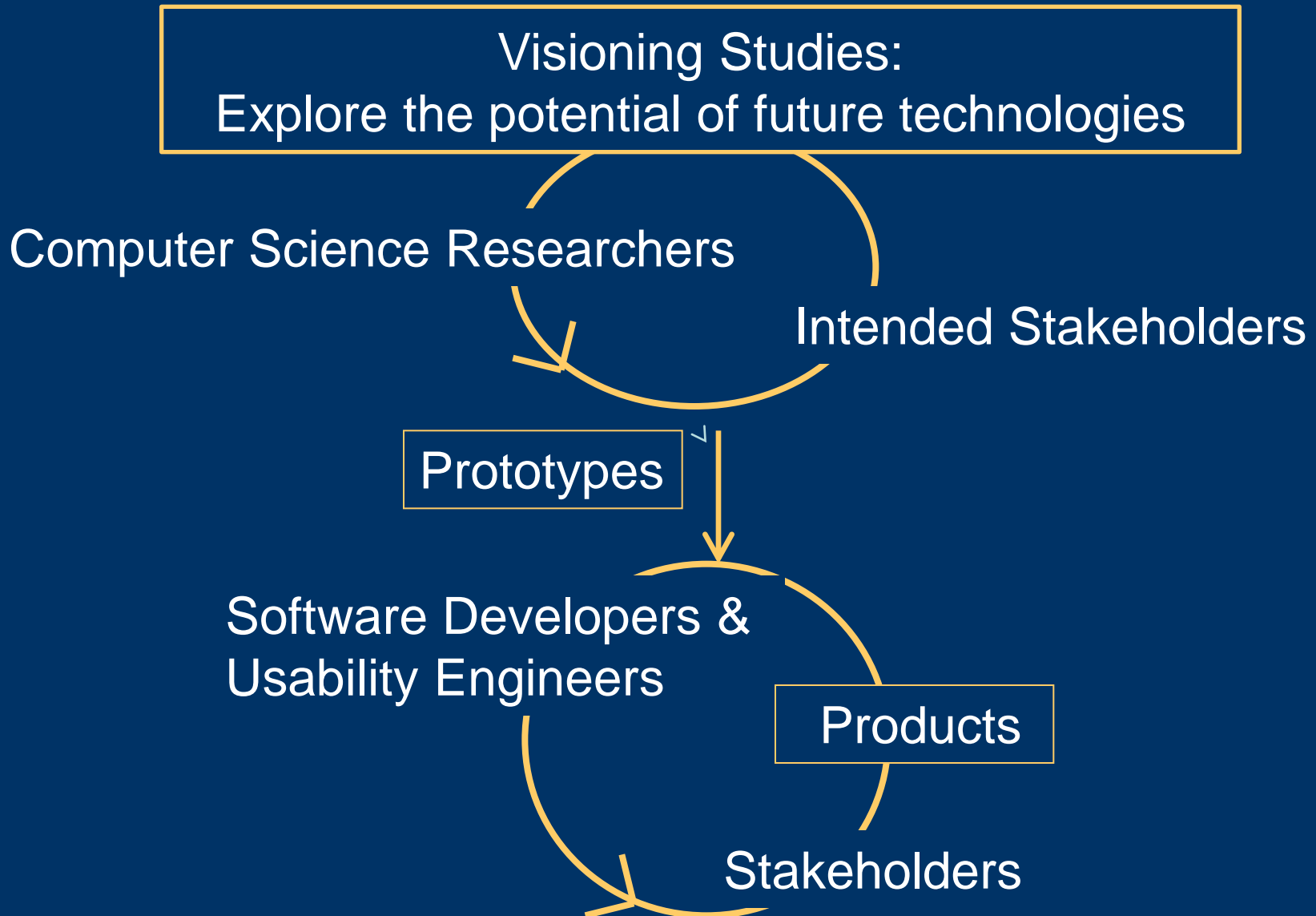
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Traditional Technology Research & Development Cycle



Visioning Studies: A Different Approach



Visioning Studies Goals

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

- 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



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL



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[©] 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



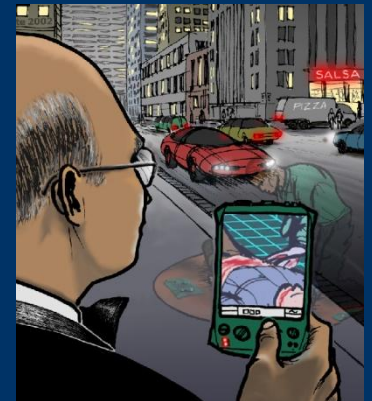
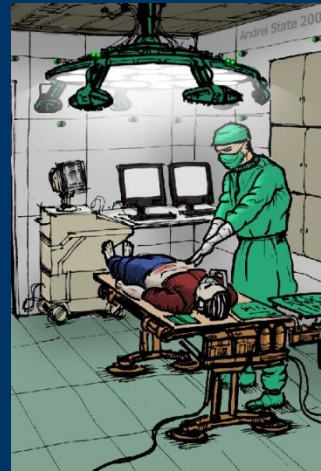
Investigating Domain Implications

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

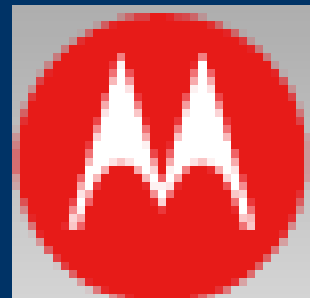
- Will make medical care visible in new ways across organizations, work roles & time
- Could inspire new modes of working & new treatments
- Has potential as a marketing tool
- Challenges current practices with respect to:
 - Performance review & reputation
 - Medical responsibility & division of labor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



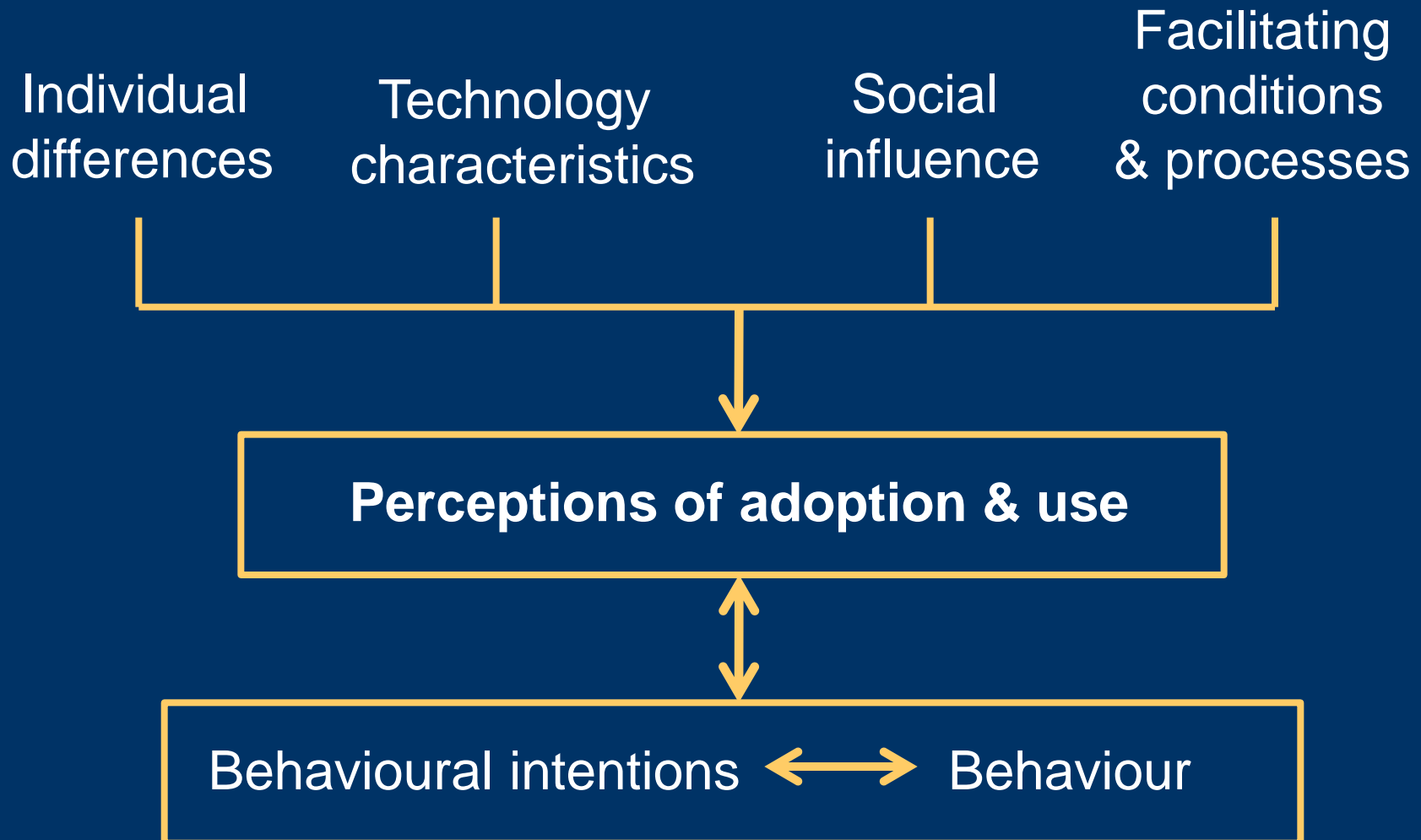
Future Mobile Technology in Police Work



- 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

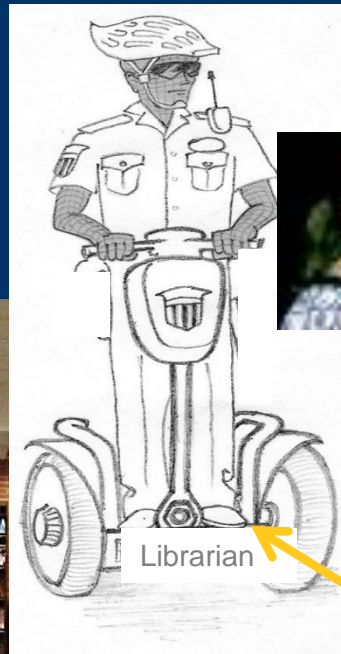
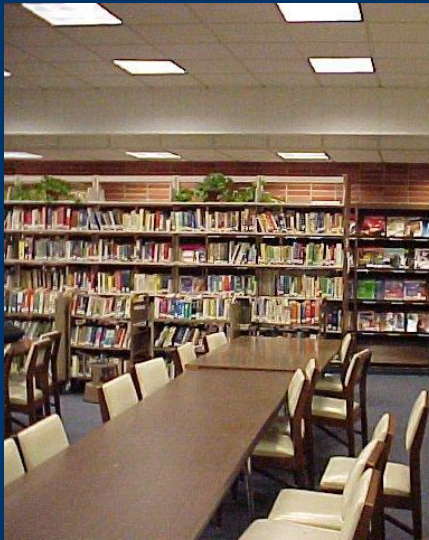


Possible New Ways of Working

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

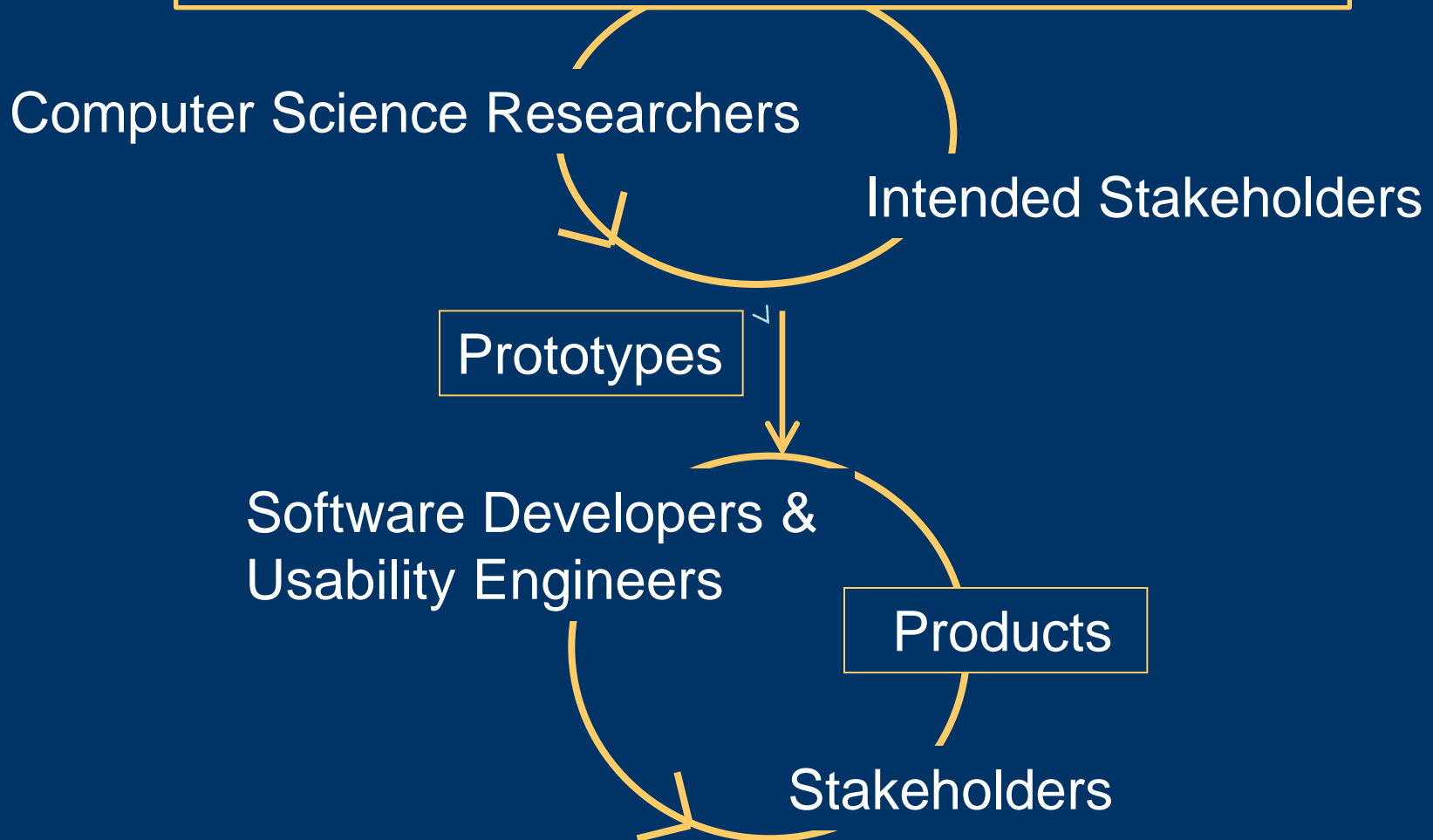
Intended Stakeholders

Prototypes

Software Developers &
Usability Engineers

Products

Stakeholders



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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