Center for LifeLong Learning & Design

University of Colorado at Boulder

**Wisdom is not the product of schooling
but the lifelong attempt to acquire it.
- Albert Einstein**

Grand Challenges for QoL-based Design Strategies

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Basic Message

- **the problem:** the fundamental, ubiquitous, and global impact of digital technologies

- **the grand challenge**: explore and support

"quality of life"

as a fundamental design objective
  - by analyzing **design trade-offs** associated with it
  - by complementing and transcending the currently dominant design objectives of **efficiency and productivity**

Grand Challenges

- **a Grand Challenge =** a commitment to work together towards a common goal
  — valuable and achievable within a predicted timescale

- **purpose and impact of a Grand Challenge:** to change the discourse that drives research and practice

- **Hilbert's 1900 address to International Congress of Mathematicians**
  o http://aleph0.clarku.edu/~djoyce/hilbert/problems.html
  o topic: 23 major mathematical problems to be studied for the next century

- **getting a human on the moon** (1961; John F. Kennedy: declaring a national goal of "landing a man on the Moon" by the end of the decade)
  o going to the moon: a "complex" problem along one dimension;
  o sources for success: exceedingly cooperative environment, a single new organization, highly operational goal

- **High Performance Computing and Communications program (1991):**
  o objectives are not controversial: increase speed of computation, storage capacity, bandwidth, simple measurement of progress exist

Grand Challenges: Where Do They Come From?

- **Karl Popper** *"Scientific progress does not start with the collection of facts, it starts with problems."*
  - o fundamental problems (e.g.: digitalization, aging populations, energy sustainability, learning and education in the 21st century, creativity)

- **Marshall McLuhan:** *"I don't know who discovered water, but it probably wasn't a fish"*
  - o beyond group-think
  - o interaction with other disciplines
  - o think outside the box

An Example of Grand Challenges

Millennium Development Goals (MDGs)

<<agreed upon: Millennium Summit of the United Nations in 2000>>

grand challenge	1990	2015
access to clean drinking water in the world	77%	91%
number of hungry people	1,010 Mio	795 Mio
infant mortality (world)	12.7 Mio	5.9 Mio
life expectancy (world)	65.3 years	71 years
number of traffic deaths (Germany)	1991: 11,300	estimate: 3,450
employed people (Germany)	2005: 38.7 Mio	estimate: 43.4 Mio
students not finishing schools (Germany)	2001: 9.6%	estimate: 5.6%

Grand Challenge for the Digital Age:

Quality of Life

usable
    user-centered design

        → useful
            usable *versus* useful → usable *and* useful
            high functionality environments

            → engaging / experiences
                low threshold + high ceiling
                learning on demand
                flow + emotions

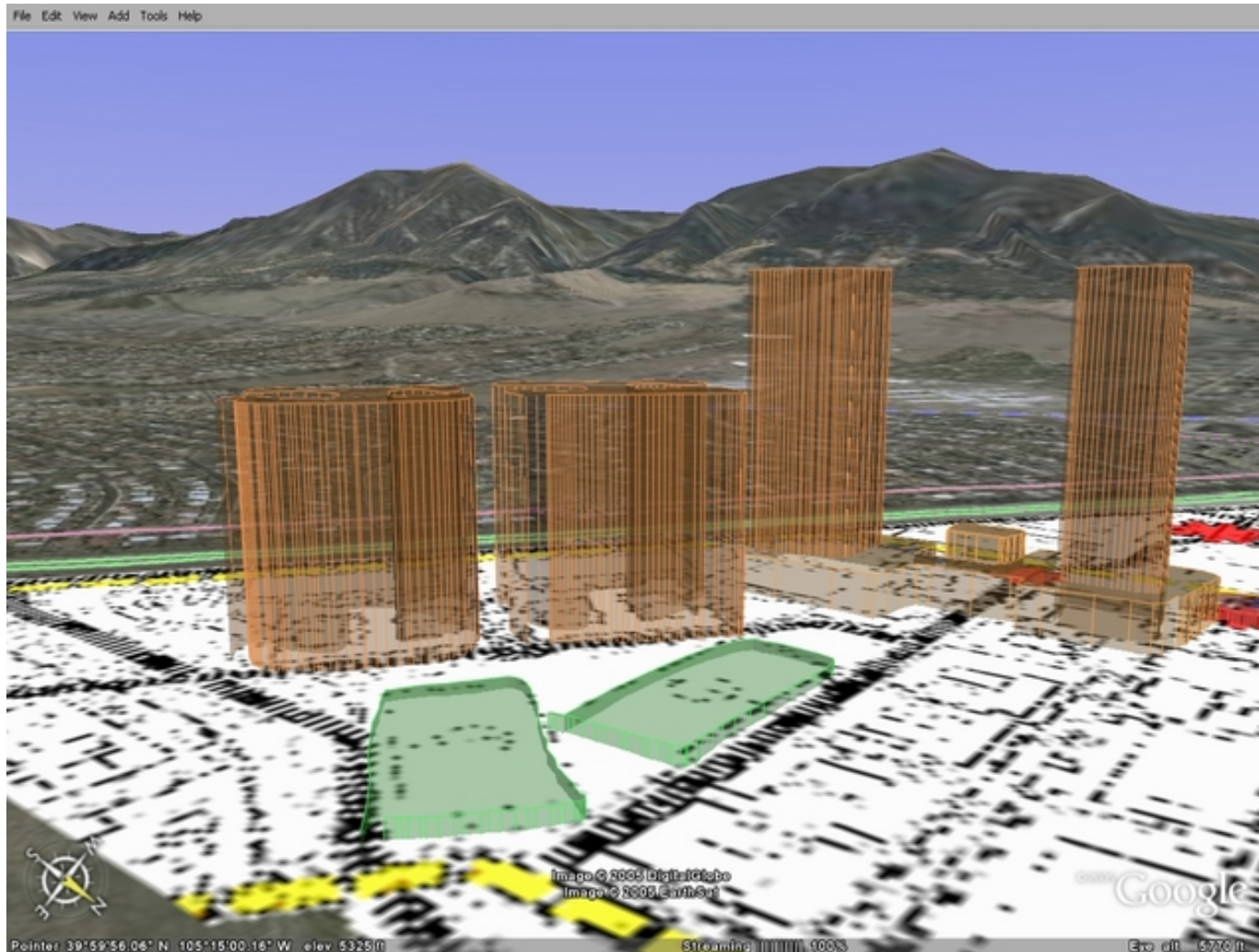   **→ quality of life**
                    design trade-offs
                    human-centered design

The Envisionment and Discovery Collaboratory (EDC)

Boulder City Council and University of Colorado Regents

The Visual Impacts of High Buildings shown in Google Earth

Design Methodologies for Empowering all Stakeholders

- **professionally-dominated design:** works best for people with the same interests and background knowledge

- **user-centered design:** analyze the needs of the users and understand the conceptual worlds of the users

- **participatory design:** involve users more deeply in the process as co-designers to envision the contexts of use

- **meta-design:** create design opportunities for users at use time (sharing control, making all voices heard, making owners of problems independent of high-tech scribes)

Quality of Life (QoL)

- **QoL — what is it?**
  - definition: focused on the well-being of individuals and societies
  - a precise, generally accepted definition does not exist: Does it mean being happier in life? Having more leisure time? Having good health? Having a high standard of living?

- **QoL has a wide range of contexts, including:**
  - health
  - financial resources, work and employment
  - quality of environment, personal safety
  - emotional wellbeing, engaging in personal meaningful activities
  - social relationships
  - **information and communication**

Preliminary Questionnaire about QoL in the Digital Age

For you personally
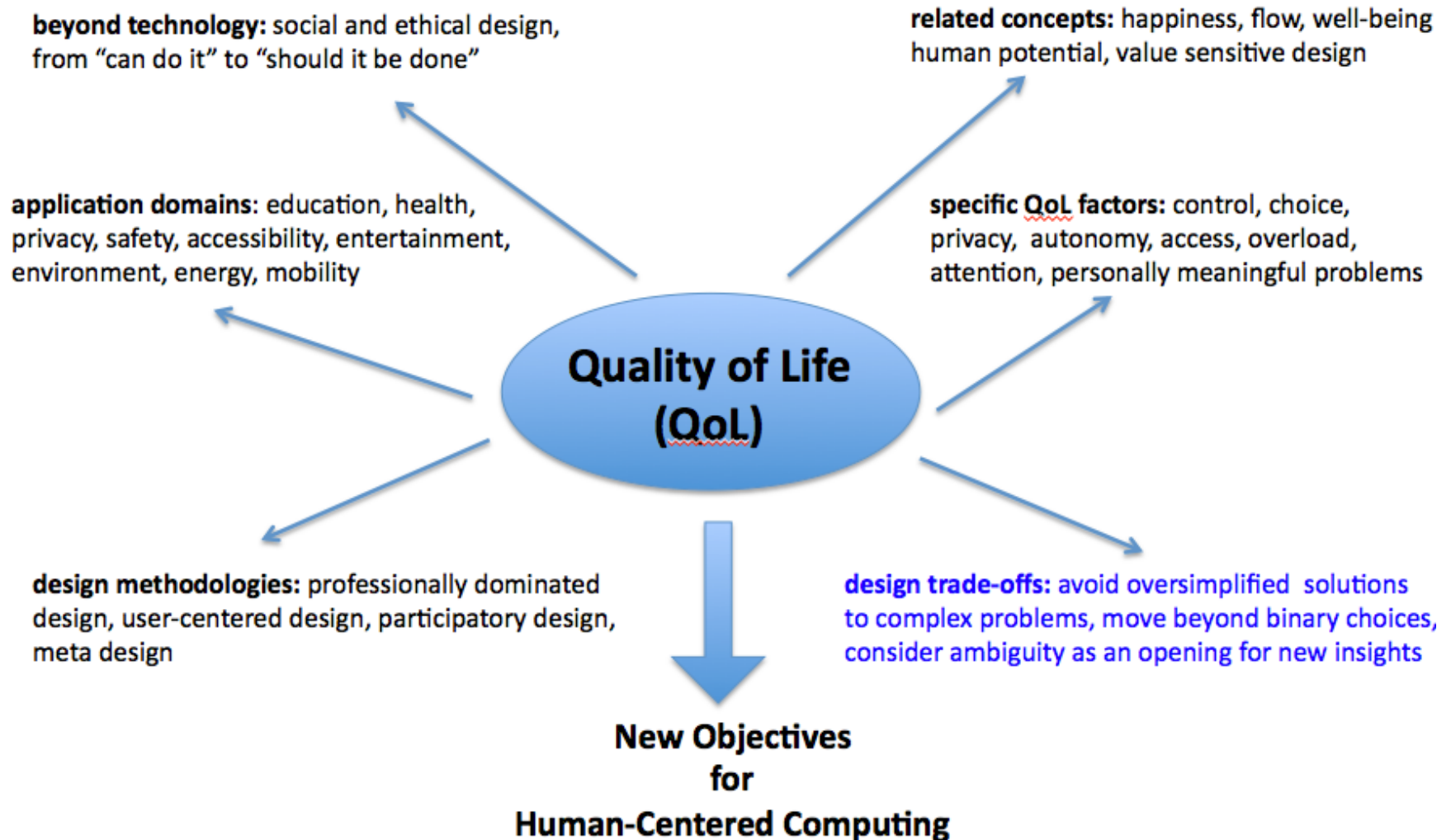
- what does QoL mean?

- how do the following tools impact **your "quality of life":**
    - E-Mail
    - Smart Phone
    - Facebook
    - Twitter
    - Wikipedia
    - Navigation Systems in Cars
    - Do-It-Yourself-Opportunities (checking in at airports, checking out your own groceries, ………)
    - self-driving cars and self-parking cars
    - …………………………………

Personal Meanings of QoL — Brief Summary of Answers

- be able to choose and decide things

- be able to be in touch with friends and smart people

- be in a community/society where people care for each other

- be in an environment where people enjoy learning and sharing

- be able to have a flexible work and leisure schedule

- to be involved in collaborative efforts creating artifacts and conducting activities that transcend what individual can do

- be able to work with people who are talented and passionate

- afford to be lazy once in a while

- be healthy and happy

Components of a Framework for QoL

beyond technology: social and ethical design, from "can do it" to "should it be done"

related concepts: happiness, flow, well-being human potential, value sensitive design

application domains: education, health, privacy, safety, accessibility, entertainment, environment, energy, mobility

specific QoL factors: control, choice, privacy, autonomy, access, overload, attention, personally meaningful problems

Quality of Life (QoL)

design methodologies: professionally dominated design, user-centered design, participatory design, meta design

design trade-offs: avoid oversimplified solutions to complex problems, move beyond binary choices, consider ambiguity as an opening for new insights

New Objectives for Human-Centered Computing

Design Trade-Offs ("Faustian Bargains")

- design is **choice**: it is an argumentative process with **no correct solutions** or **right answers –> design trade-offs are universal**

- design requires **identification and awareness** of trade-offs, analyzing the respective **strength and weaknesses**, and searching for **desirable mixes**

- **examples of trade-offs:**
  - informate (empowering humans)   ←→   automate (replacing humans)
  - Intelligence Augmentation (IA)   ←→   Artificial Intelligence (AI)
  - less information and choice   ←→   more information and choice
  - advanced driver assistance systems   ←→   self-driving cars
  - personalization, context awareness   ←→   privacy, filter bubbles
  - cultures of participation   ←→   consumer cultures

Is More More or Is Less More?

- more slides in a presentation

- more Facebook friends / Twitter followers

- more publications (to get tenure as a faculty member) — higher H-Index

- more "new version" messages from Adobe / Microsoft / …..

- more apps on Smart Phones (1.5 Mio for Apple and Android)

- more "invitations / requests" to provide feedback for making a reservation, staying at a hotel, having a repair service, …………………..

- ……………………………………

A Modern Tombstone

IN LOVING MEMORY OF

@kurtmarkoneill

1999-2064

672 Twitter Followers
1,673 Clubcard Points
60,590,000 Calories Consumed
92% Positive eBay Feedback
184 Tinder Matches
76,928 km Jogged

REST IN PEACE

Cultures of Participation

consumer cultures

focus: produce finished goods to be consumed passively

$$\Downarrow$$

cultures of participation

focus: provide all people with the means to participate actively in
personally meaningful problems

- **rationale:** *"The experience of having participated in a problem makes a difference to those who are affected by the solution. People are more likely to like a solution if they have been involved in its generation; even though it might not make sense otherwise"* (Rittel)

- **examples:** Wikipedia, Open Source Communities, Web 2.0, Scratch, 3D-Warehouse (SketchUp models), ……

Design Trade-Off for Cultures of Participation

- **claims:**
  - there is nothing wrong about being a consumer (watching a tennis match, listening to a concert, ...)
  - the same person wants to be a consumer in some situations and in others a designer → consumer / designer is not an attribute of a person, but of a context
    consumer / designer ≠ f{person} → f{context}

- **design trade-off:**
  - someone wants to be a designer but is forced to be a consumer → *personally meaningful activities*
  - someone wants to be a consumer but is forced to be a designer → *personally irrelevant activities*

Personalization / Context Awareness versus
Privacy / Filter Bubbles

- **the positive:** being shown new books, movies, hotels, flights, …. close to our taste and plans → avoid information overload with context-awareness

- **the negative:** loss of privacy and filter bubbles
  - no more privacy: Google and Facebook know more about us than we do about ourselves
  - **filter bubbles:** users get less exposure to conflicting viewpoints and are isolated intellectually in their own informational bubble (suffering from "group-think")

The Grand Challenge

the future is not out there to be discovered

—

it has to be **invented and designed**

- **question:** invented and designed → by whom?
    - by them?
    - by us?
    - *"The best way to predict the future is to create it."* — Alan Kay

- **question:** pursuing which objectives? → the research objectives of the symposium:
    - **quality of life**
    - **design trade-offs**

- **Winston Churchill:** *"This is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning."*