Sample Questions in SC Sciences
(Theory, AI, GIScience, Analytics, ...)

• What are components of spatial intelligence? Can computers have as much spatial intelligence as humans? How can computational agents reason about qualitative and quantitative spatio-temporal concepts and constraints?
• How may machine learning techniques be generalized to address spatio-temporal challenges of auto-correlation, non-stationarity, heterogeneity, multi-scale, etc.?
• How do we represent spatio-temporal concepts with incomplete/ uncertain information, with alternative data models, and possibly with multiple representations for the same data, in digital environments?
• What are scalable and numerically robust algorithms spatial statistical modeling?
• What are algorithm design paradigms for spatio-temporal problems which violate the dynamic programming assumptions of stationary ranking of candidates?
Sample Questions in SC Systems

(Sensors, Hardware, Networks, Software, Database, ...)

• What new SC opportunities arise from trends in sensors (e.g., LiDAR), sensor platforms (e.g., mobile phones) and sensor networks (e.g., traffic, weather)?

• For the best balance between performance and flexibility, what is the appropriate allocation of spatial data-types and operations across hardware, assembly language, OS kernel, run-time systems, network stack, database management systems, geographic information systems and application programs?

• How may one authenticate location of an Internet entity (e.g., client, server, packet) despite motion, location-spoofing, physical trojan-horses, etc?

Sample Questions in SC Services

(Services for Visualization, Social Media, Collaboration, LBS)

• What augmentations to human capabilities can be provided by SC? Consider different scales (e.g., individuals, small groups and large communities). If appropriate use tasks, e.g., assisted geo-search for missing person after a disaster or recent deforestation.

• How do we create, communicate and interact with (2D & 3D) spatio-temporal information for augmented reality? For scientific workflows, e.g., exploration of 3D volumes and their physical properties?

• How can an international SC system overcome geographic variance in language and cultural?

• Understand spatial human interaction in small (e.g., proximal interactions) and large (crowd-sourcing, flash-crowds). How geo-social groups form, how they are spatio-temporally organized, what are spatio-temporal signature of group behaviors of interest?

• How can we automate map creation similar to attempts in the database field to automate database administration tasks (e.g., index building, etc)?

• How do we fuse disparate spatial data sources to understand a geographic phenomena or detect an event, when it is not possible via study of a single data source?

• What SC challenges arise from the national scientific collaborations, e.g., EarthCube and IPCC? Emergency maps production, e.g., OSM?
Sample Cross-Cutting Questions

(Mobile Computing, Privacy, Data Quality, Uncertainty, Scale)

• What can be mined from geo-social media logs, e.g., check-ins, mobile device trajectories, etc.? How may one estimate evacuee population? Traffic speed and congestion? Urban patterns of life?

• If moving vehicles could talk to each other and humans, what would they talk about? What SC challenges emerge?

• How can one accurately determine location (and orientation) of mobile clients in GPS-denied spaces such as indoors or underground?

• What are sources of errors and uncertainties in spatial datasets and analysis? How may the errors and uncertainties be controlled or reduced? How to remedy data biases, under- or over-sampling?

• When does localization (e.g., GPS-tracking) lead to privacy violation? Is reducing spatio-temporal resolution sufficient to discourage stalking and other forms of geo-slavery?

• How can one characterize trade-off between privacy and utility of spatio-temporal data? How may societal needs (e.g., tracking infectious disease) be served?

• How should scale be addressed, how should data be organized (by layer, by feature type, etc.), and how should it be indexed for rapid search?

• How may one communicate spatio-temporal datasets with uncertainties in location, time and attributes in different modes, e.g., visual?