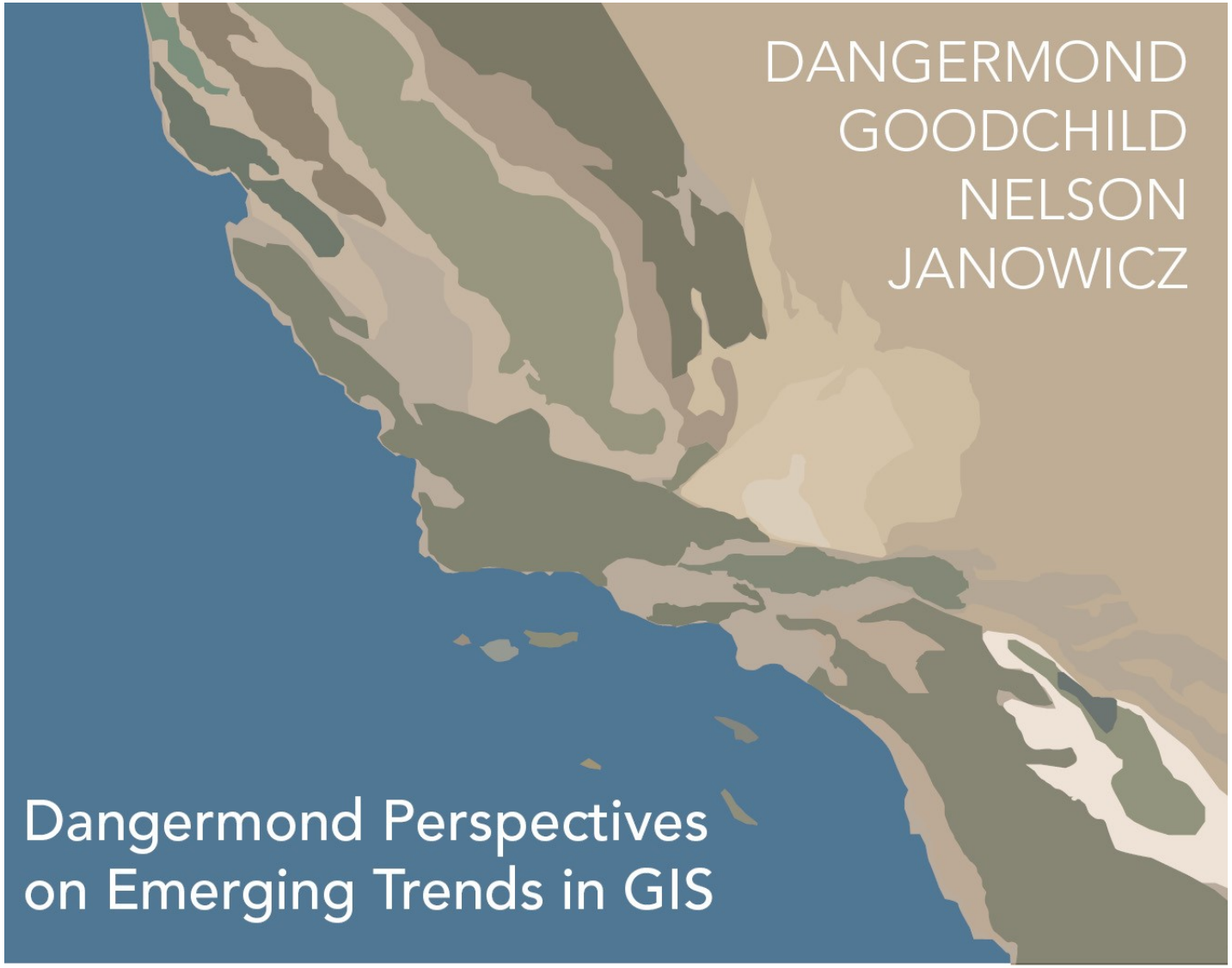

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Geography

Dangermond Perspectives on Emerging Trends in GIS Webinar (March 31, 2021)

YOUR questions answered!

See the full webinar at https://www.geog.ucsb.edu/events/all/2021/webinar-dangermond-perspectives-emerging-trends-gis or https://www.youtube.com/watch?v=NGq3CiKbjh0

#	Question	Answer(s)	Answerer email
1	If it is possible to use the Strava data to identify and digitize bike lanes?	We use OSM for this. In mid and large sized North American cities, we found that the concordance of total length of OSM infrastructure relative to open data infrastructure ranged from < ±2% to ±30%. Ref: https://www.tandfonline.com/doi/full/10.1080/15568318.2018.1519746	trisalyn@ucsb.edu
2	I'd be interested to understand the panels view of the maturity of GIS tools for solving spatial-temporal challenges. The main challenge I see is that there are multiple temporal scale/periods, potentially occurring in the same dataset.	Far from mature at this point. I think the problem is the existence of some very distinct data types: remote sensing data cubes, trajectory data, longitudinal census data, etc. For each data type we may eventually have mature tools, but tools that span data types seem much less likely	good@geog.ucsb.edu
3	Are there links to more info on the bears & bikes?	My team has several papers on both topics. Check out www.SparLab.org for more information on projects and research papers.	trisalyn@ucsb.edu
4	What are your thoughts on the importance of empowering communities, particularly those in the margins to truly tell their own stories? Not just the stories we define by defining the data model or the challenge, but their narratives from their perspectives.	GIS is a powerful tool and we need to makes sure that that power is equitable distributed, with more power in the hands of black and brown people. GIS is a very powerful tool and making sure that GIS skills are broadly accessible is critical. Inclusive access to GIS education is an critical issue that higher education is grappling with. From my perspective one important approach is to make sure that we have multiple entry points to GIS education and need to expand our networks to help white departments become more culturally competent.	trisalyn@ucsb.edu
5	An episode of Silicon Valley (HBO) once discussed the concept of data shortages, blackouts, and rationing. Do you ever see a scenario someday where there is so much GIS	I think we've already reached that point - we are losing the battle to preserve data in the long term, and even in the short term we may be able to store data but finding it can be very difficult. I think the answer is	good@geog.ucsb.edu

	data available that we don't have the infrastructure to store or distribute all of it?	to develop methods of compression, e.g. point clouds into structured 3D data	
6	What are some examples of how you see these technology trends in GIS specifically benefitting first and emergency responders?	Challenging ethical issues for first responders: medical privacy versus responder access to medical records for example. I think Esri will need to respond regarding the most recent tools	good@geog.ucsb.edu
7	given the complexity of the GIS Infrastructure pattern - what should we focus on teaching new students fundamental, 'future proof' aspects of GIS as opposed to training on any one set of tools within this ecosystem, for example does learning RDBMS still matter?	Difficult to achieve a good balance between training in today's practices and education in the principles that will still be true in ten years. Also there's a need to balance the skills needed in the job market versus the expertise needed in a research career. I've always believed education and research skills were most important for students at a research university.	good@geog.ucsb.edu
8	I am missing indoor stuff. Maybe one could comment on that issue?	Positioning is still largely experimental with many different competing technologies. BIM and CityGML are both well developed but lacking a well-defined set of use cases.	good@geog.ucsb.edu
9	I noticed that many governmental organizations are doing the 3D modeling of the urban landscape both above the ground and underground. And they are collecting data and assigning attributes they collected such as assigning the owner's personal information to a specific apartment in a apartment building in the 3D model. Do you think this technology will influence city management and urban planning in both positive and negative ways?	Yes definitely. There are some very positive use cases, such as alerts to buried infrastructure, but also some that raise ethical issues, such as surveillance. I'm very interested in the aging-in-place idea, and how we can make it easier for people to age in complex 3D structures	good@geog.ucsb.edu
10	Question to Michael and Jack, where we will be in terms of advancements in GIS after 15/20 years from now?	Setting aside the question of what we will be calling it (geospatial infrastructure perhaps), I think we will have a much better interoperability between indoor and outdoor, also much finer resolution for data and more accurate positioning, and as a result better route guidance for active mobility	good@geog.ucsb.edu
11	Would love to hear insights from each speaker about how we can use GIS to create a safer	Several attendees have asked about safety and GIS. In bicycling research education, enforcement, and design area all aspects of safety that get discussed. I personally, favor an emphasis on safety by design and I think	trisalyn@ucsb.edu

	place to live? (i.e. monitor, identify and prevent hate attack, shooting incidents)	this extends more generally to all our planning efforts. 3D renderings of cities that have incredible detail are an amazing fabric for mapping of personal narratives of safety and can help us identify and redesign unsafe spaces. Geodesign is another tool that is well suited to designing safe spaces.	
12	What's the most advanced future GIS application that each panel member sees us moving toward? Neural networks, Fully-autonomous T(transportation)aaS, or other?	I think we are making it possible to study much larger and more complex systems than in the past - the entire Earth's surface, for example, or the entire population of individuals in a major city. To do this we need massive computing and storage, but also models that go beyond the local. The reward lies in finding teleconnections and telecoupling, already well developed in atmospheric science but with exciting possibilities in international migration, pandemics, etc.	good@geog.ucsb.edu
13	Dr. Goodchild mentioned teaching practices when discussing the trend of ethics. Thinking about all of the technology trends discussed today (and ethics), do you think educators will need to make significant changes to their GIS curricula (compared to how they've taught GIS courses in the past)? Thank you!	Yes, too often I think ethics have been discussed last rather than first, and have focused narrowly on privacy rather than broadly on all issues, including staffing	good@geog.ucsb.edu
14	Could the panelists comment on their thoughts on the present state of the intersection of GIS and blockchain technology, and it's future? Thank you	I've not yet seen compelling examples of the use of blockchain in geospatial infrastructure. But the environmental impacts of its extreme energy usage are severe, and could be the subject of some interesting geospatial analyses	good@geog.ucsb.edu
15	Curious to hear what the presenters think about the future of qualitative GIS, particularly given the context of the recent social and technological developments they've discussed. Is the future of our data only "big" or do you see the need for it to be "thick" (borrowing from Geertz) as well?	Interesting question. I think in many ways the potential is already realized, in the ability to manage, analyze, and display qualitative geospatial data. Ethnographic approaches are also well advanced. The growing interest in place rather than space is also significant, as part of the effort to humanize GIS.	good@geog.ucsb.edu
16	I'm yet to find an "empathy" setting in any GIS or database. Students learn the mechanics of GIS and how to make basic maps with it. Later,	I'd echo that in the case of ethics. But I think the solution lies in the user's mind rather than in the technology, although the technology could do a better job of alerting us to opportunities and pitfalls	good@geog.ucsb.edu

	they (hopefully) learn to make maps that reflect empathy, not just algorithm-derived visualizations. How do we foster empathy in our day to day work? Do we wait to be asked to employ it?		
17	Do you anticipate increasing contributions from predictive models, e.g., climate downscaling, and the interoperability of models?	Yes absolutely. But they raise significant ethical issues; all too often predictions are presented without any estimates of uncertainty, and without much about the provenance of the predictions. These readily segue into legal liabilities.	good@geog.ucsb.edu
18	How about Gladys Mae West (born in 1930) - a mathematician who contributed to the math modeling of the shape of the Earth, and her work on the development of the satellite geodesy models that were eventually incorporated into the GPS - being called "The Mother of GIS"?	Interesting comment, thanks for drawing attention to her and her work. I suspect there were other women who contributed to geodesy over the years, and geodesy is an important part of geospatial infrastructure. Perhaps the "mother of GPS"?	good@geog.ucsb.edu
19	Safe spaces relates to creating spaces where folks from marginalized groups, people of color, LGBTQIA+ folks etc. So the question is about how to leverage GIS to understand issues marginalized groups face and to support the mobilization of organized activities to address inequity.	GIS can be used to map the presence of marginalized populations, from census data, social media, and VGI, and on a 24/7 basis rather than home locations. Then it can be used to map incidents and feelings expressed in social media. It can also be used to map features that tend to predict urban dysfunction - litter, graffiti, need for maintenance.	good@geog.ucsb.edu
20	Given the Trends by Jack and Michael, what industry job professions and academic fields of study do you think have the most opportunity for students to consider.	I think job opportunities in the geospatial field will continue to grow - but issues of ethics will become more important, so programs of study should definitely feature them.	good@geog.ucsb.edu
21	Geography crosses over so many different academic disciplines. Are there any academic disciplines that have not yet integrated the use of geographic tools and concepts but would benefit from using geography and GIS?	Personally, I am still surprised by disciplines that are not using GIS tools more deeply. In some of the social sciences, for instance, GIS tools are deeply used by only a handful of researchers and spatial perspectives are still considered quite novel. There is a role for GIS training and education that looks more like how we offer statistics in universities. We need GIS classes that are nuanced to the interest and data sets used in different	trisalyn@ucsb.edu

		fields. GIS folks are used to thinking about spatial data across a range of fields, but I am not convinced the reverse is true. One thing that I think might help is having core curriculum that is paired with domain specific labs.	
22	Big Data and IOT can lead to extensive data on human activities over space, but can also lead to a police state. How do we take advantage of this growing ubiquity of data, but safeguard privacy. AI disaggregation of collected spatial data as in the practice in the census?	We need to stress the importance of being familiar with an app's terms and conditions, and thinking carefully about how to respond. We can map cameras and blind spots and become familiar with their locations. We can provide support to organizations that are lobbying for legislation.	good@geog.ucsb.edu
23	What are the most important competencies for today's GIS students to acquire so they can engage with these emerging technologies and trends in our field?	I think it's important to take courses that emphasis the critical assessment of geospatial technologies and their impacts	good@geog.ucsb.edu
24	Out of pure curiosity, has GIS been used for mapping of space objects? i.e. asteroid fields, planets, etc	Yes, see the project to map space objects at George Mason University in the spatio-temporal center, also the work of Phil Stooke at the University of Western Ontario on mapping non-spherical bodies	good@geog.ucsb.edu
25	GI has and will continue to contribute to wealth concentration, including but not limited to job elimination (go Amazon!). This is a huge ethical issue, in my opinion. Any thoughts?	We need studies of how that happens, especially in the GI context, and specific ideas on how to disrupt the process. And we need to be more sensitive to the job-deleting impacts of new tools and ideas.	good@geog.ucsb.edu
26	How can we democratize data so that all communities can have access? Data gatekeeping can be disadvantageous to communities that have traditionally been oppressed.	Crowdsourcing projects, like OSM, are great examples of data access moving in the right direction. As well, the growing trend of cities to provide open data is encouraging. GIS tools that make data sharing easier are helping. But, I think we still have a ways to go in supporting the most underserved groups with the skills and access to technology needed to benefit from growing availability of data. Just because data are available does not mean it is accessible to everyone.	trisalyn@ucsb.edu
27	I think "safety" means something different for everyone - sometimes I am concerned that influencing people's behavior based on their very detailed preferences actually acts to	I think this point is true of many technologies that are currently popular. From our social media to our main stream news, we are "served" information that reinforces our world view. I think you bring up a point that is unique to spatial technology, in that reinforcing of preferences can happen in place. People might less aware that this their world view is	

	polarize us more - isolating us from potentially "unsafe" experiences and preventing us from interacting meaningfully	reinforced by curated messages received as they move throughout their city or day.	
28	With increasing geographic surveillance (i.e., Google tracking our location to have up-to-date traffic maps, frequency of routes being traveled, etc.) do you see this data becoming more available to the public, as it is the public who provides it, or will it continue to be proprietary to those large organizations who gather the data?	I think it will continue to be proprietary. But as Trisalyn's presentation showed there are good technologies for keeping track of your own spatial behavior. I regret that I have so little data on my own travel - I once created a database of all flights from 2001 to 2010, but I wish I had a complete fine-resolution data set of a lifetime. In other words we won't stop the Googles of the world from doing it, but we can do it ourselves in parallel. How about 3D representations of everywhere we've ever lived?	good@geog.ucsb.edu
29	What level of anonymization should we accept to study public health or individual health, using GIS data which may be captured at very high spatial and temporal resolutions? How we can balance specificity and accuracy with ethics?	Unfortunately it's far too easy to de-anonymize geospatial trajectory records as long as they include some kind of device ID. There's good work on various ways of protecting individual privacy, by aggregating or fuzzing locations, but they depend on knowing the relevant use case.	good@geog.ucsb.edu
30	What's your advice for someone starting their career in GIS	I think it is really important to have good skills. Combining in and ability to understand and application and apply your skills in coding and statistics can be a very powerful way to approach a career in GIS.	trisalyn@ucsb.edu
31	Is geographic information systems a stand-alone science or a technical tool?	An old debate, in my view long since settled by the introduction of GIScience	good@geog.ucsb.edu
32	Would like to hear from both speakers on level of community engagement GIS should drive for understanding and serving the needs of community?	Absolutely, we should maximize community engagement and make use of the tools we have to achieve that	good@geog.ucsb.edu
33	How can we use GIS to capture the spatio-tempro trend of the geographic data, or the 'velocity' in the big data era?	By developing real-time GIS that processes streaming data and provides immediate analyses	good@geog.ucsb.edu
34	I like the onion peeling analogy and wonder if the structure of GIS data needs a fundamental change?	Interesting question. We seem to have reached a point where there are two technologies - one for maps and one for globes - but the set of techniques in the global technology need more development.	good@geog.ucsb.edu

35	Prof. Nelson, excellent intervention characterizing GIS as a catalyst/crane to expand and elevate inclusive capacity building rather than just a tool/hammer.	GIS is a field that is uniquely placed at the intersection of the tech industry and the discipline of geography. We are poised to lead in finding solutions to climate change and social justice. But, we need all hands-on deck and that means also being leaders in inclusion and learning from diverse voices.	trisalyn@ucsb.edu
36	GIS is being used a lot in many critical applications, which is awesome. Still a common person seems to know little about it. I believe if GIS becomes more popular, it will be used more and it will raise the level of innovation. What can be done to popularize the GIS?	Unfortunately, people are very familiar with some aspects of GIS - wayfinding and mapping apps for example - but don't recognize what they're seeing as GIS. We are making progress, I find less and less need to explain GIS to people, but there's endless confusion, e.g. between GIS and GPS.	good@geog.ucsb.edu
37	What's the value of conducting more detailed analysis just because we can? How do we make sure what we are doing is relevant for a broader, diverse population?	Good question! and one with many lengthy and context-dependent answers.	good@geog.ucsb.edu
38	Our City os working in a smaller poorer area that has been hit by multiple storms and flooded many times. When we try and make changes to make things better we get push back due to the history of the area which we know will be hit again. How can we use GIS to empower the citizens to work together to make the area better - what data would you show and tools to give them a voice.	Perhaps by using GIS to tell the historic story, and by engaging the community through techniques of geodesign	good@geog.ucsb.edu
39	Pertaining the abundance of data and rise in professional/amateur users. Do you foresee data validation becoming an issue especially when Africa and South America start to become bigger significant contributors to GIS data?	Yes definitely. The problem of uncertainty is very complex and while we make progress by validating and by improving spatial resolution we will never reach a point of absolute certainty	good@geog.ucsb.edu
40	What model or tools are most effective in analysing aircraft noise? Any new technology or method in GIS to do so? Thank you.	Sensors are getting cheaper so they can be deployed more densely, but it will always be difficult to turn point measurements into maps - we have excellent methods of spatial interpolation but sound is affected by context in so many ways	good@geog.ucsb.edu

41	How is social media abundant data handled from GIS perspective?	A very broad question! Unfortunately, only a small fraction of social media users include their locations, and access to these data is more and more restricted by the social media operators. But there is good work on estimating the effects of these restrictions	good@geog.ucsb.edu
42	If gis is a science then it can be considered a branch of geography	A complex issue. Some geographers are very critical of GIS, and many disciplines have a legitimate claim to GIS in their own work	good@geog.ucsb.edu
43	If story maps are transforming into a social media. How then can these stories be archived, analyzed for different view points)...	The archive of story maps is growing fast, but making it more and more difficult to search the archive, and no archive can last for ever	good@geog.ucsb.edu
44	Do you feel that cartography can help us have a better sense of place, in the sense of being more connected to our surroundings? I live in suburbia and much of it does not seem to have individual character and so seems interchangeable with similar places.	The evidence seems to point both ways - on the one hand maps improve our knowledge of places, but on the other hand relying on maps can reduce the knowledge we carry in our heads	good@geog.ucsb.edu
45	Thank you for interesting presentations. Why we did not see any name of social networks in GIS trends? Is it hided in big data term?	Yes, we assume Big Data includes social media	good@geog.ucsb.edu
46	There are more and more people in AI field discussing the Ethics/bias issues in AI, such as the responsible machine learning trend. We see similar trends in GIS as the question we are asked in this webinar. Geographic bias usually come with social bias. From a GIS/GeoAI perspective, what would be our unique contribution to address this ethics/bias issues from a model perspective?	One distinction between geographers and developers of AI is in access to ground truth - geographers who know the world can always question data, but advocates of data science tend often to take data at face value	good@geog.ucsb.edu
47	I am interested to hear more of the panelists' thoughts on balancing bias and power in mapping - specifically what are common sense things to consider when creating a map to take	I think the answer lies in the map's metadata - description of how it was made, where the data came from, how it can be interpreted and used. Without such information maps are always open to misuse	good@geog.ucsb.edu

	into consideration justice, equity, diversity, and inclusion both for the users of the map and their perspectives and the content of the map.		
48	StoryMaps sounds like a great tool to help democratize and decolonize spatial data and story telling. Please talk about ways to mobilize to get it into the hands of communities of color.	Unfortunately, that is bound to be a slow process, but education can play a major role if we can get teachers and professors to use story maps in their classes.	good@geog.ucsb.edu
49	For the K12 educators in the audience, What is the most important aspect of GIS for teachers to address with students?	While I am not a k-12 educator, I think the key thing is to get students excited about maps and related technology. I have seen tremendous things happen when students realize that the techniques of GIS can help them answer the questions they are most passionate about. In higher education we get very few majors right out of high school. Most geographers stumble into geography and are delighted to find a fit. Anything we can do in K-12 to help students connect with geography earlier would be great, though perhaps it is the geographer's prerogative to wander a little.	trisalyn@ucsb.edu
50	How can users utilize ArcGIS Storymaps to tell stories that haven't been told before when people can gatekeep vital information when sharing on these kinds of platforms?	Something to bear in mind when designing story maps - how important it is to include information about the sources of the data, efforts to validate the data, details of legends.	good@geog.ucsb.edu
51	What are your thoughts on controlling bias in story maps and GIS analysis? Is the software vendor responsible for controlling bias or potentially identifying bias in GIS analysis?	No, not the software vendor, but certainly the person or team who designed and created the story map	good@geog.ucsb.edu
52	To follow up on the question of safety, What type of security or surveillance is placed for the information that would identify a particular ethnic group. For example as shown in the presentation, a spoken language can be identified by location if this information is associated with a particular ethnic group , this information may be used as a way to target a population with hate crimes?	It's a matter of balance - between the legitimate need to collect and publish information on the one hand, and the dangers of misuse of that information on the other.	good@geog.ucsb.edu

53	I am sure with AR, etc storytelling and Story Maps will take off - perhaps the robotic/AI influence will color the technology in an uncomfortable way. How do we engage and educate those not technology-aware - in a sense prep/educate society for what is to come.	By exposing teachers to these tools - that is, by teaching the teachers	good@geog.ucsb.edu
54	There are so many great new opportunities for GIS, which have been created by so many. What do you see as the obstacles for GIS to be overcome? One such area some of us are working on is overcoming obstacles to using confidential geospatial data, and to create enable researchers and others to access, share, analyze, build-on, research and projects which	Yes, we need better tools to protect confidential data while not impeding research. I think uncertainty is another huge obstacle, because all geospatial data are uncertain to some degree and it follows that all results from GIS are also uncertain. But it has proven immensely difficult to adapt the tools.	good@geog.ucsb.edu
55	Given the vast development in geospatial science/technology, what are your views on how and what should we teach our students at graduate and undergraduate levels that can sustain over their career ??	The principles of GIScience and the habits of critical spatial thinking!	good@geog.ucsb.edu
56	Can you share/recommend someone who is an excellent spatial data story teller, so we can get inspired and learn from?	Esri ran a contest for the best story map - take a look at the winner and the other contenders at https://www.esri.com/en-us/arcgis/products/arcgis-storymaps/contest/gallery/archive	good@geog.ucsb.edu