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Re-thinking the Growth of London:

An interactive multi-stakeholder perspective derived in geodesign and negotiation

Carl Steinitz[1]

Abstract

The Cambridge-Milton Keynes-Oxford (CAMKOX) Corridor, is the fastest growing region in the United Kingdom. The UK National Infrastructure Commission proposes to add 780,000 housing units and 1,450,000 people to the existing CAMKOX population of around 3,300,000. The two-day workshop was organized among interested stakeholders by the Centre for Advanced Spatial Analysis of University College London. The participants were 20 professional planners and academics with CAMKOX experience. It applied the three scenarios of early-, late-, and non-adoption of systems policy and project innovations, and it reported the impacts at three time-steps, 2020 (existing), 2035, and 2050.

Geodesign changes geography by design, by intentional change. It tightly couples the creation of proposals for change with impact simulations informed by geographic contexts and by systems thinking (Steinitz 2012). Coming to a politically acceptable planning strategy inevitably is a negotiation among the people of the place, aided by geographic scientists and design professionals, and supported by information technologists. The digital tools to enable a collaboratively negotiated consensus are based on diagrams of policies and projects, and produce an outcome which indicates only that "*It can be…or might be… something like this".*

Key Words: land use change, stakeholder collaboration, geodesign, negotiation, 2050,

Biography

[1]Carl Steinitz is the Alexander and Victoria Wiley Professor of Landscape Architecture and Planning Emeritus at Harvard Graduate School of Design, and Honorary Professor at the Centre for Advanced Spatial Analysis, University College London. In 1965 he joined Harvard's Laboratory for Computer Graphics and Spatial Analysis. In 1984, he received the CELA Outstanding Educator Award for his "extraordinary contribution to environmental design education" and for his "pioneering exploration in the use of computer technology in landscape planning". Professor Steinitz is principal author of "***Alternative Futures for Changing Landscapes***" (2003), and author of "***A Framework for Geodesign***" (2012). He has lectured and taught workshops at more than 180 universities, and he is the co-founder of the International Geodesign Collaboration.

On planning for significant change

It is clear that for real and serious societal and environmental issues, intentional planning for change—planning by design-- is inevitably a collaborative endeavor, with participants from various design professions and geographic sciences, linked by technology for rapid communication and feedback, and reliant on transparent communication with the people of the place who are also direct participants. The people of the place are not just the clients; they are the designers as well. Quoting Herbert Simon in his 1978 Nobel Prize lecture, "Everyone designs who devises courses of action aimed at changing existing situations into preferred ones (Simon, 1996)." Coming to a politically acceptable planning strategy inevitably is a negotiation among the people of the place, aided by the design professionals and geographic scientists, and supported by information technologists

Geodesign changes geography by design, by tightly coupling the creation of proposals for change with impact simulations informed by geographic contexts and by systems thinking (Steinitz, 2012, Batty, 2013). Geodesign must be based in an organized process, in a framework (Rowe, 1987, 2017). It must be collaborative and it cannot be effective if conducted in separate bureaucratic "silos" (Pettit et al, 2019). It is most useful at the beginning stages of considering strategic change, when there is simultaneous need to consider all aspects of change: the "WHY?" questions, the "HOW?" questions and the "WHAT, WHERE and WHEN? questions (Steinitz, 1990, 2012, Hollstein, 2019). It is best-accomplished in a face-to face workshop setting, albeit possibly in these times among remote participants who are linked by technology Ballal and Steinitz, 2015). It can be supported with efficient digital tools (Ballal, 2015, 2020) which enable a collaboratively negotiated consensus based on diagrams of policies and projects, and if successful, produce an outcome which indicates that "*It can be…or might be… something like this".*

On geodesign

Geodesign is a method which tightly couples the creation and synthesis of diagrammatic policy and project proposals for change with impact simulations informed by geographic contexts and by systems thinking (rather than shape thinking). It is normally supported by digital technology, and it is organized by a systems-oriented framework for geodesign (Steinitz 2012 or another) which asks and answers six relevant questions that apply to any geodesign circumstance (figure 1): 1) How should the context be described? 2) How does the context operate? 3) Is the current context working well? 4) How might the context be altered? 5) What differences might the changes cause? And 6) How should the context be changed?

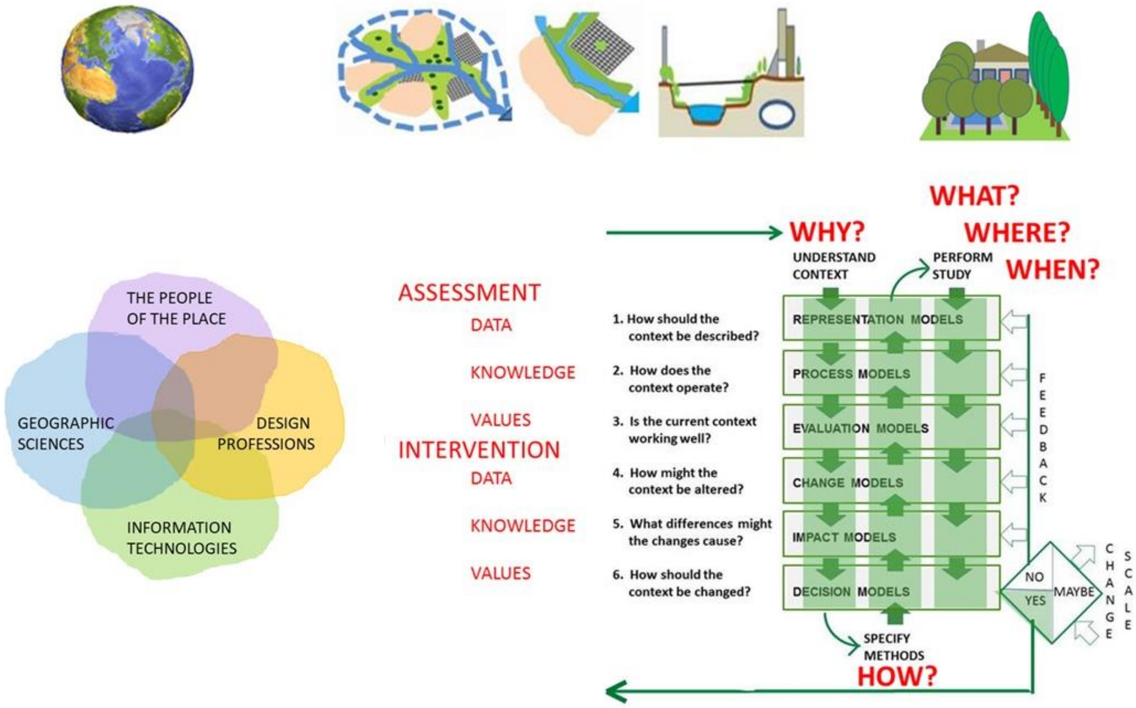


Figure 1: Six questions must be asked and be answered for any geodesign circumstance. (Steinitz, 1990, 2012)

Geodesign is a design process that is normally organized for collaborative, negotiated decision-making (Steinitz 2014). It is especially applicable to large, complex and contentious circumstances related to planning for the future. Fisher (2016) describes geodesign as “a geo-spatial approach to grand challenges ... allowing communities of people with common interests to find each other as well as to generate alternate ways of addressing a challenge.". It enables different stakeholders to work together, and with scientists, design professionals and information technologists in a digitally supported process where the impacts of proposed designs are shown in real time. What makes geodesign interesting and innovative is that the process is geared towards negotiation among different stakeholders seeking to strike a compromise (figure 2). It attempts to shift the paradigm from a zero-sum game to a win-win situation.

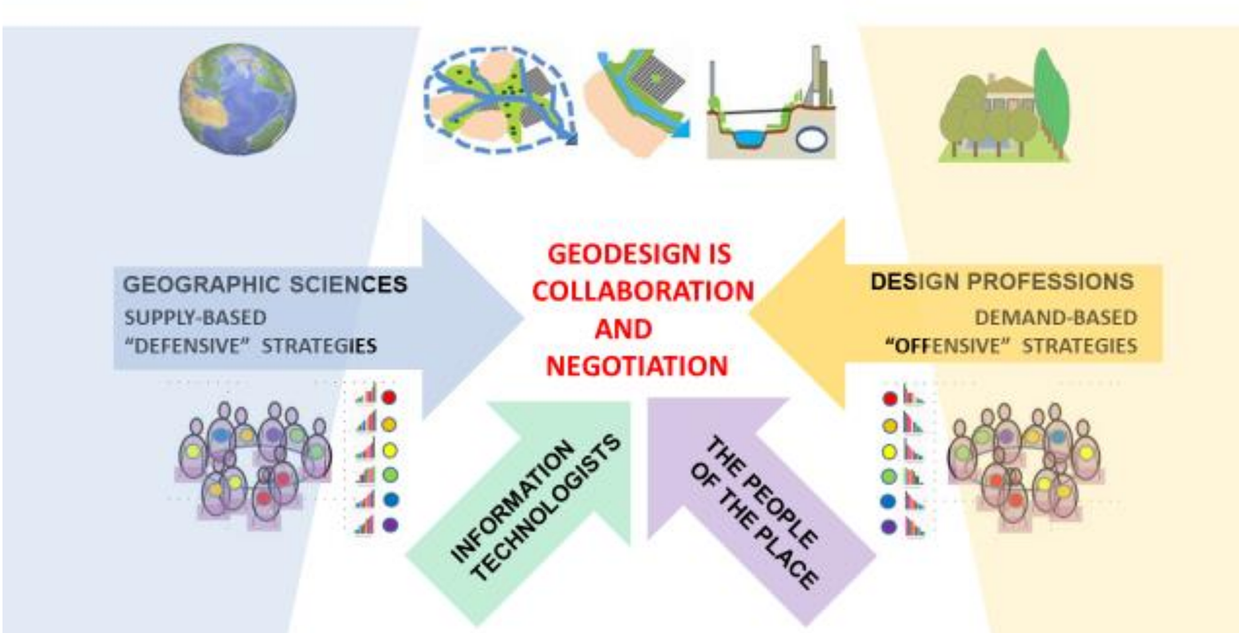


Figure 2: Geodesign is collaboration and negotiation

A geodesign workflow puts systems thinking into practice. Geodesign is normally a collaborative enterprise, so a geodesign study must be undertaken in a way that is understandable by all participants—especially by the people of the place. The basis for shared understanding includes the ability to conceive individual policies and projects and combine them into comprehensive designs. The process of combination is challenging. A design is a synthesis of decisions in space and time that brings about system-based change. Any individual change, no matter how seemingly localized, affects the system as a whole and can influence what is subsequently feasible and preferable. For example, the decision to align a road in one place or another (or yet another still) will affect the possible later location of housing or commercial developments. Because of and despite the complexity, rapid design iterations are critical in geodesign, so there must be the ability to rapidly assess potential impacts and costs of design proposals. Here, there are more challenges. Feedback relationships among individual design propositions require that representation, process, and evaluation models be updated to consider additional design changes. Given the amount of data and need for data updates, digital platforms for collaboration and communication usually form the basis of the geodesign workflow.

Geodesign has been developed in many ways and by many contributors (GOODCHILD, M.F., 2010, Fisher et al, 2020), It has most frequently been applied to the initial planning stages of problems which are politically contentious, and these inevitably require negotiation to achieve consensus. The two most common circumstances are when the people of the place disagree among themselves with what the problem is and what should happen, and when those who are responsible for providing guidance in the form of a designed proposal work in separate “silos” rather than in direct collaboration, and disagree about what should be proposed (figure 2).

On negotiation as a geodesign method:

Negotiation is the most important method for arriving at political consensus regarding future change. It is applicable across size and scale. When seen across a range of problem sizes and scales, collaborative negotiation in geodesign is especially applicable in this middle range (figure 3). At the global scale, the geographic sciences provide excellent guidance, and at the small project scale the design professions provide excellent service. The mandate for collaboration especially occurs in the middle range, where supply – based “defensive” strategies need to be balanced with demand – based “offensive” strategies, and where the people of the place, who are assumed not to agree with each other, have the major political role. Coming to a politically acceptable planning strategy inevitably is a collaboration among the people of the place, aided by geographic scientists and design professionals, and supported by information technologists. These people must have a basis for understanding, communication, collaboration and negotiation. This is not easy to achieve.

Frequently—but not necessarily—geodesign is delivered through a workshop setting. The geodesign process will make use of diagrams of proposed policies and projects to develop stakeholders’ proposed future plans. This technique of using diagrams and their assessments in standardized colors serves as a shared visual language that enables understanding and communication among workshop participants. It enables participants to select from the range of diagrams, and to edit or add new diagrams to create a final negotiated proposal for the study area. The result is not as data-rich as normally recognized in a GIS, nor as detailed as required by BIM. It is nonetheless extremely useful when confronting a large, complex and contentious problem.

The CAMKOX corridor workshop: re-thinking growth in the London region

The Cambridge-Milton Keynes-Oxford Corridor, hereafter the CAMKOX Corridor, spans 30 local councils comprising the growth corridor from Oxford through Milton Keynes and Northampton to

Cambridge. It is the fastest growing region in the UK.   It forms the northern fringe of the greater London city region to which it is profitably tied, just north of the Green Belt. History, knowledge, technology, agriculture and nature combine in a rich tapestry that has long contributed to the commonwealth of the United Kingdom. In a globalizing world where distances of all kinds are slashed, the CAMKOX Corridor is more than a key part of the greater London region. It is a gateway north to the Midlands and the “Northern Powerhouse” (figure 3, the blue-outlined area). The United Kingdom’s National Infrastructure Commission proposes to add 780,000 housing units in the CAMKOX Corridor and 1,450,000 people to the existing population of around 3,300,000.

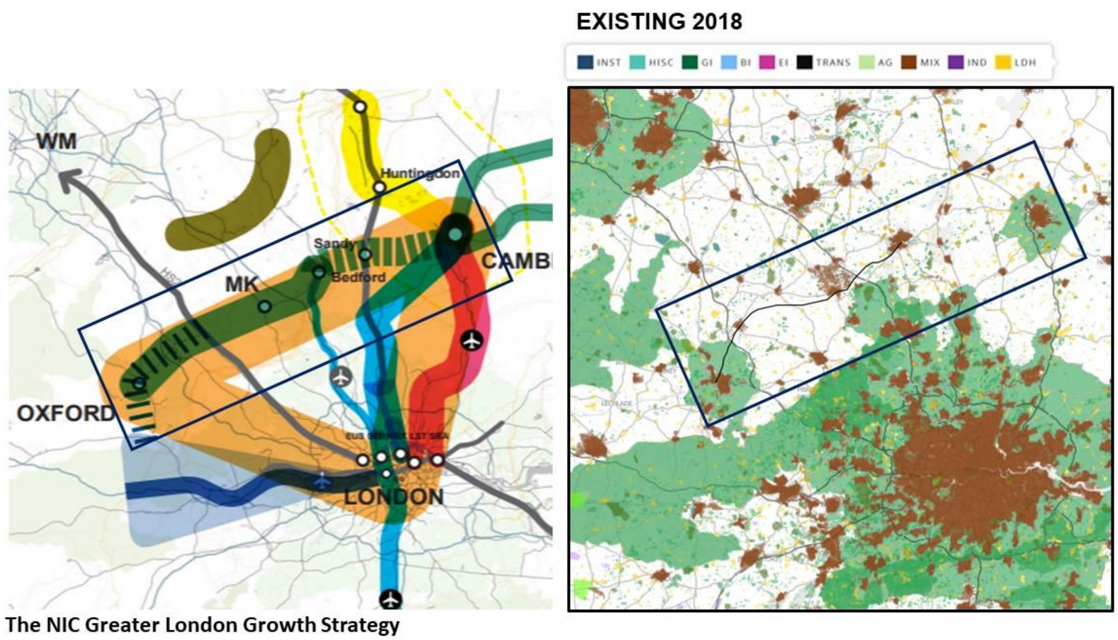


Figure 2 The CAMKOX study area

Figures 3: Cambridge, Milton Keynes and Oxford

Traversing the corridor from south to north is the proposed high-speed rail line HS2, as well as the planned east-west and east-west rail line linking Oxford to Cambridge through Milton Keynes. These transport links, taken together, are intended to enhance connectivity, mobility and productivity across the region. Other impacts of growth also need to be addressed, such as last mile connectivity and multi-modal transport, social inequities, land consumption of agriculture and forests, greater flood risk, pollution, and loss of ecological function and integrity of this historical region including its villages and towns (figure 4). These impacts need to be addressed by an assessment of growth scenarios and their impacts, in advance of major infrastructure projects.

Figures 4: CAMKOX corridor scenes

There are important complications:

The high speed train HS2 does not connect with the CAMKOX Corridor’s train, and it is not planned and will not be built to do this.

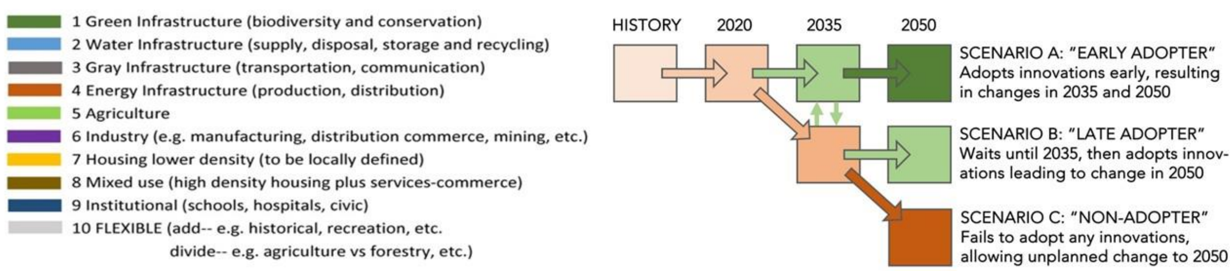
The right-of-way of the prior train linking Cambridge with Bedford (and on the Oxford) was sold when the train closed in the 1980s.

There is considerably more travel demand from CAM, MK and OX to London, and into CAM, MK and OX from their immediate sub-region, than from OX to MK to CAM.

The London policy to maintain its greenbelt is under pressure from many proposed developments, and the availability and price of London housing is a major political issue.

There is organized opposition to the proposed development of the region.

The CAMKOX workshop was organized by The Centre for Advanced Spatial Analysis of the Bartlett School, University College London, and it was conducted by Carl Steinitz and Hrishi Ballal in a two day workshop in November 2018 using Geodesignhub technology. The participants were 20 professional planners and academics with knowledge of and experience in the issues embedded in the workshop. The workshop was structured by the conventions of the International Geodesign Collaboration (IGC 2018, Orland and Steinitz, 2019). It adopted the nine IGC systems and one optional resource systems as the basis for design, e.g., green infrastructure, transportation, energy infrastructure etc. (figure 5a), it applied the three scenarios of early-, late-, and non-adopters of systems policy and project innovations, and it reported the impacts at three time-steps, 2020 (existing), 2035, and 2050 (figure 5b). All aspects of the IGC and all project submissions are available via http://www.geodesigncollab.org for viewing, machine translation and download.



Figures 5: (a) IGC resource systems. (b) Geodesign scenarios and time lines.

Geodesignhub is a cloud-based, free and open access, open platform software built by Hrishi Ballal (figure 6). It is designed to link with other tools and models via an application programming interface (API), rather than to contain its own complex data, models and visualization tools. It is used to manage geodesign for large, complex, politically contentious projects and studies in their early conceptual and strategic phases when the process is at its most dynamic. It is designed to support collaboration and negotiation. Geodesignhub aims to be as simple as possible: easy to learn, set up, use and (most importantly) easy to understand.

The tool allows participants to easily change their proposed plans as they work through several reiterations of their designs in response to evaluations related to the characteristics of the study area. Further changes resulting from collaboration and negotiation with other participants can be made quickly, and evaluated on the spot. It includes tools to support comparison among designs and negotiation towards agreement. These aspects of Geodesignhub were the focus of the CAMKOX case study.

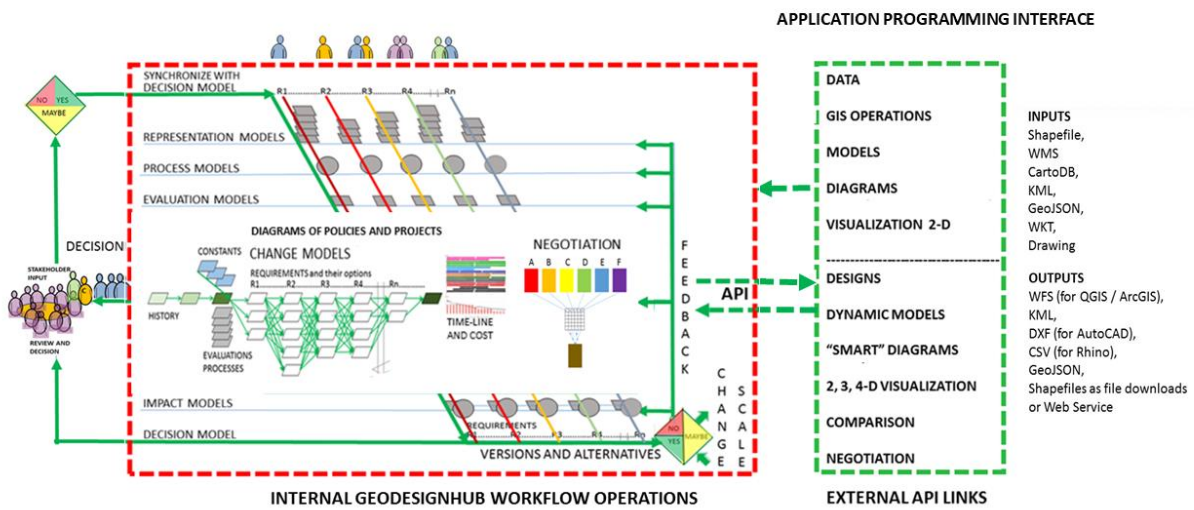


Figure 6: Geodesignhub - a digital workflow for geodesign

The pre-workshop organization had four main tasks. Designing the workshop's content, workflow and timing was accomplished in two meetings among key CASA participants. The ten IGC systems and the growth assumptions of the National Infrastructure Commission to add 780,000 housing units and 1,450,000 people to the existing population of around 3,300, 000 in the CAMKOX Corridor were accepted as the basis of the workshop requirements (table 1).

Table 1: Systems requirements for the CAMKOC corridor.

Water Infrastructure Reduce flood hydrograph Retain water	Industry and Commerce Double existing IND-COM	If 2:1 each 17,200 ha RES 4,000 ha MIX
Agriculture Convert ½ AGR to greenhouse AGR? Conserve prime soils	Residential Lower density 26,000 ha at 30 Units/ha. if all RES Likely all in "green"	If 1:1 each 13,000 ha RES 6,000 ha MIX
Green Infrastructure Protect Greenbelts as possible Expand Greenbelts as possible? Expand urban GI	Mixed Residential with Commerce 12,000 ha at 65 Units + /ha. if all MIX Part likely in prior urban	If 1:2 each 8,600 ha RES 8,000 ha MIX
Energy Increase efficient use Increase local production	Institutional Improve existing INST cores Add an institutional core to each new urbanized area	If 1:3 each 6,500 ha RES 9,000 ha MIX
Transport Infrastructure	Historic Tourism	

The most relevant and influential innovations by 2035 and 2050were selected from the IGC list by the workshop organizers (Table 2). There was no opportunity to ask either the workshop participants or other people from the study region.

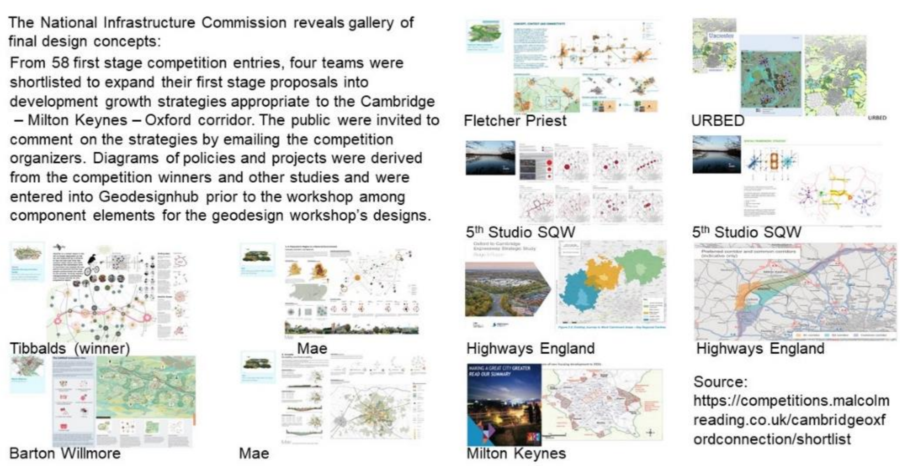
Table 2: System innovations by 2035 and 2050

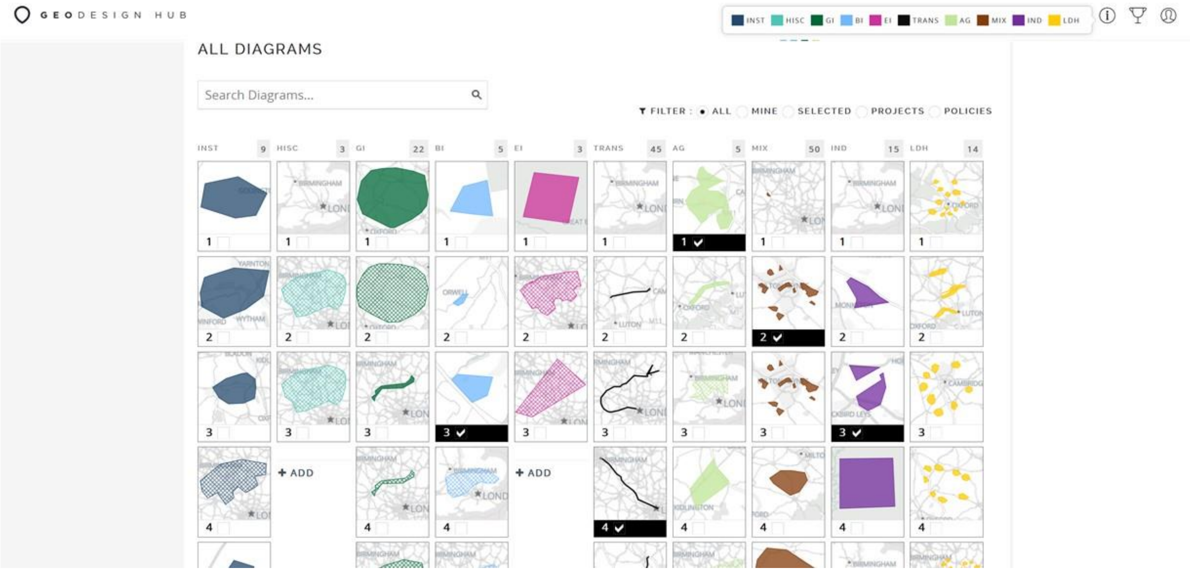
IGC research teams had identified about 200 innovations which might be expected by 2035 and 2050. These were assessed and the following were those selected for the set of workshop assumptions (Table 2)

Table 2: Selected innovations by 2050, a basis for the adoption scenarios.

WAT 2 Water retention
AGR 4 Carbon farming
AGR 18 Controlled-Environment Agriculture (CEA)
GRN 1 Resilient landscape infrastructure
EN 1 Renewable energy sources
TRA 8 Self-driving cars will disrupt the train industry
IND/COM 2 Industrial robots
IND/COM 5 Rapid prototyping and product individualization
IND/COM 14 Internet based commercial distribution
MIX 10 Sustainable urban infrastructure
HIST 1 Increased protection of historic places and landscapes

Initial diagrams of policies and projects for each of the ten systems were drawn from finalist presentations in the CAMKOX Corridor ideas competition managed for the UK Infrastructure Commission. These were added to and also edited during the workshop (figures 7).





Figures 7: Initial diagrams from The National Infrastructure Commission competition (Malcolm Reading Co.)

In the first day of the workshop, and after an introduction and learning the basic operations of Geodesignhub, the participants in the workshop were organized into five teams based upon the IGC scenarios of early, late and non-adoption of innovations, combined with a policy to protect or alter the current greenbelts of London, Cambridge and Oxford (Table 3).

Table 3: the workshop geodesign teams and their assumptions

A: EARLY-ADOPTER	B: LATE-ADOPTER	C: NON-ADOPTER
e.g. Water management Soil conservation Greenhouse agriculture Automated small cars Expressway with special lanes for car-trains Local commuting improvements Robotic manufacturing Robotic commercial delivery Higher density (MIX) housing	e.g. NON-ADOPTER in 2020 – 2035, and observe and compare what EARLY-ADOPTERS do well by 2035, and then ADOPT/ADAPT to 2050	e.g. Lower density garden cities, towns and villages Mostly decentralized LD RES Some MIX HD housing Retain agriculture as possible Rail train connections ? Local commuting improvements Local transit ? Expressway ?
Protect greenbelts / Not	Protect greenbelts / Not	Protect greenbelts OR Not ?
EARLY YG / EARLY NG	LATE YG / LATE NG	NON (YG or NG?)

Each team selected, edited or added policy and project diagrams to generate its Version 1 proposals for 2030 and 2050. These were assessed for their impacts and costs and revised at least once, for Version 2 and again assessed (figures 8, 9).

Figures 8: Making the designs

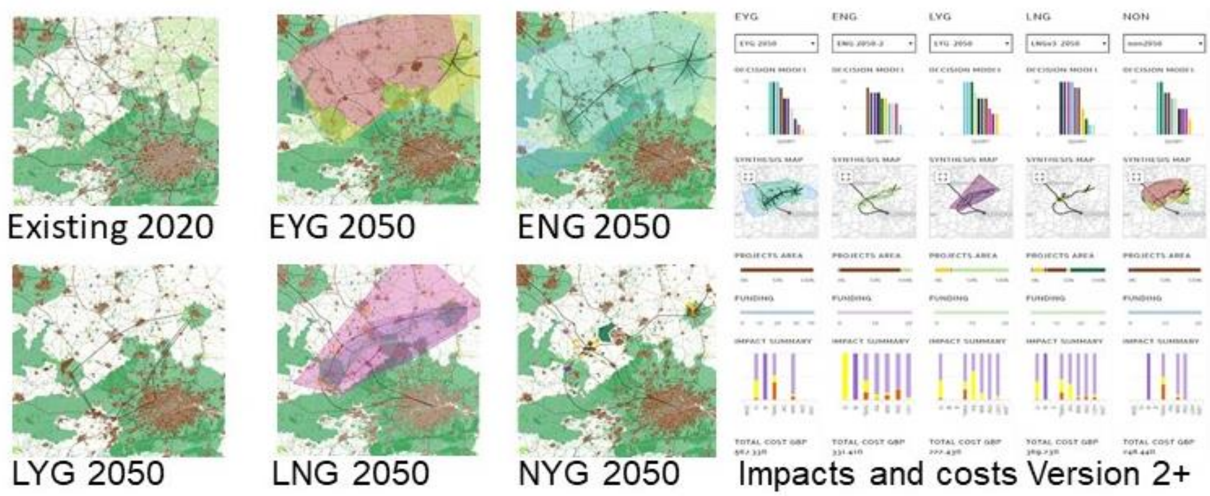


Figure 9: The Version 2 designs at the end of the first day

On the second day, the teams began informal negotiation as they all knew that one objective of the workshop was to generate a negotiated solution for the region. This initial negotiated set of alternatives was Version 3, and it was again assessed. The workshop then used a sociogram to determine the mutual proclivities for formal negotiation. These were based either on the similarity of designs or their potential symbioses. Two rounds of negotiation were conducted using Geodesignhub tools and this produced the final negotiation designs for 2035 and 2050 (figures 10, 11).

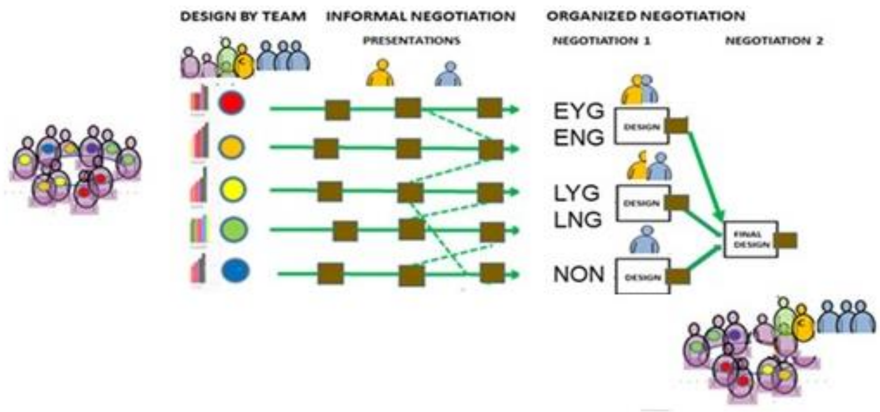


Figure 10: Collaborative negotiation as a geodesign method in the CAMKOX workshop

Figure 11: Negotiation

NOTE: The designs below were re-represented by Carl Steinitz after the two-day CASA workshop. These include the policies and projects from the final negotiated designs for 2035 and 2050. They omit policy diagrams for graphic clarity and add inadvertently omitted projects.

The Early Adopter teams (figure 12) first protected the region's major assets and developed urban patterns that were denser than the past development of the area. They introduced conservation policies for prime soils, water, agriculture and the historic-cultural landscape. They retained the London greenbelt but not all of those of Cambridge and Oxford, while also promoting a new national park and large regional expansion of linked conserved landscapes. An important decision was to designate large areas of non-prime soils for conversion to industrial scale, controlled-environment agriculture, based on climate change and the need for multiple and more diverse food crops.

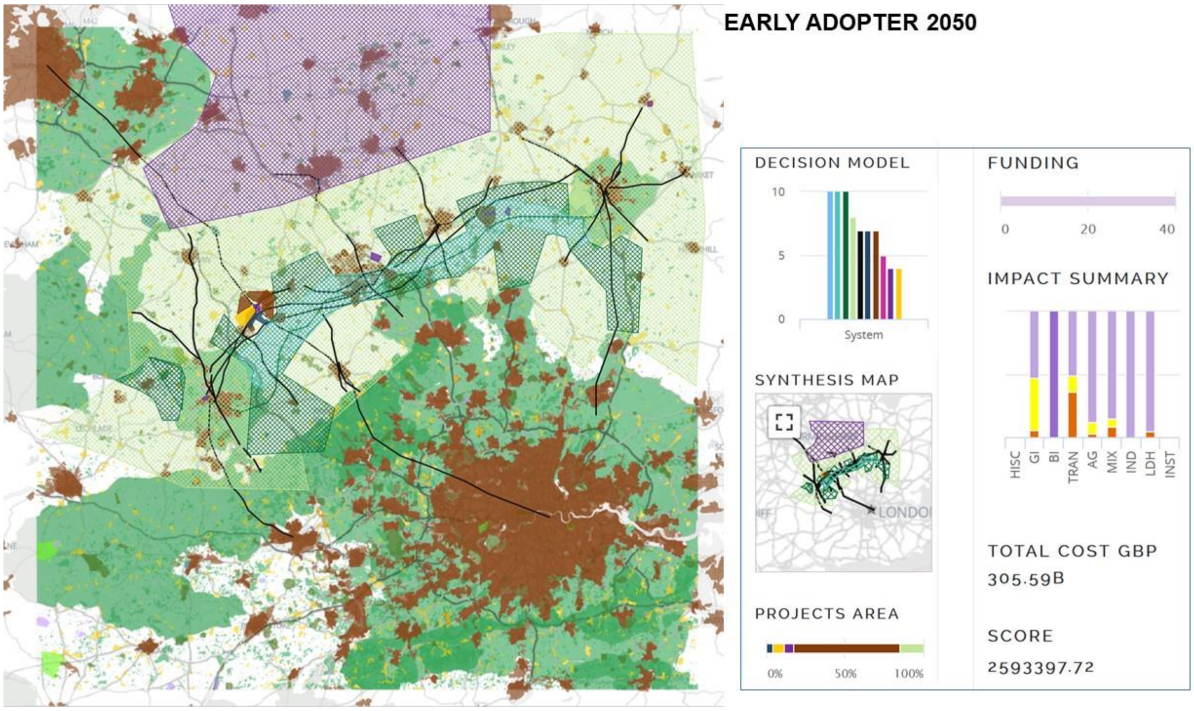


Figure 12: Early Adopter 2050

Urban development was focused on mixed higher density residential and services, and concentrated along the CAMKOC corridor. This also retained the highly dispersed pattern of villages and towns. One urban development area which is preplanned by 2035 is at the intersection with HS2 and is based on a proposed multimodal transfer point at this location. The most controversial aspect of their decision making was to not rebuild the train link between Cambridge and Bedford, and to rely on the future development of multimodal transport on roads designed and redesigned for car-based trains. This was in large part a reflection of the existing highly distributed network of smaller communities and lower overall regional densities. Train links would continue to be improved between the major towns and London and northern cities.

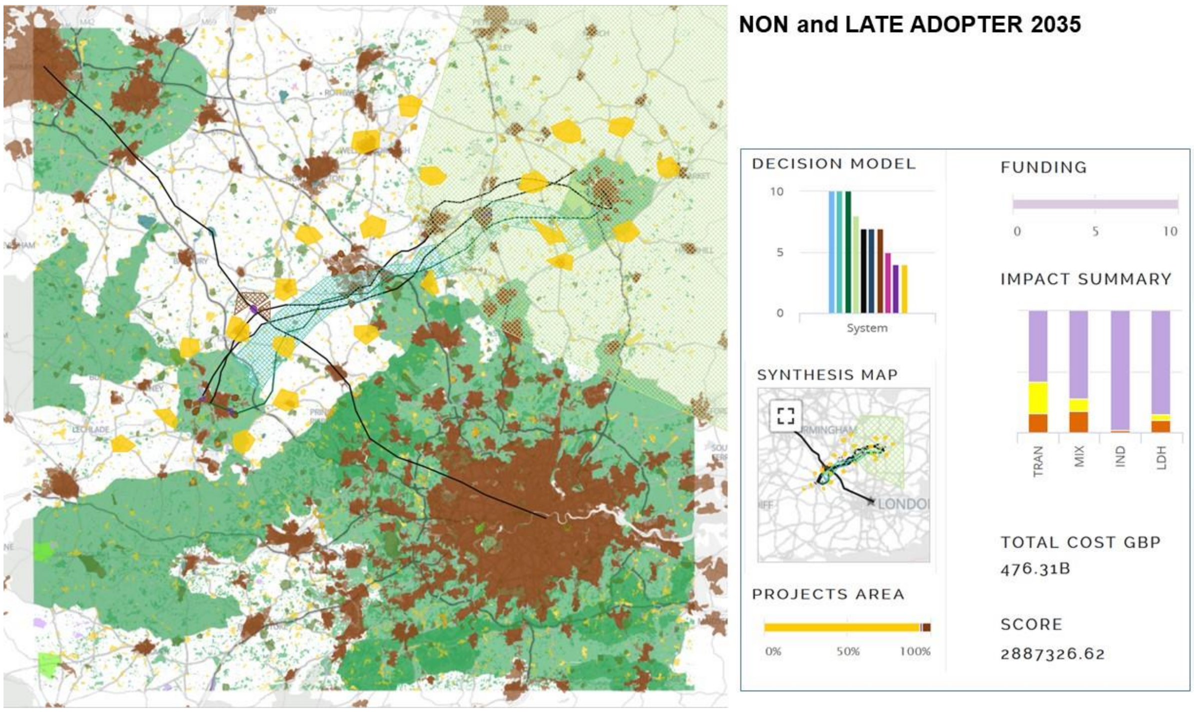


Figure 13: Late Adopter 2050

While recognizing growth pressures, the Late Adopter teams (figure 13) reflected the conservative planning attitudes that characterize the region. They adopted the proposed expressway and train plans of the National Infrastructure Commission, relocating and remaking the Cambridge to Bedford train link by 2035. They also continued the preferred lower density development patterns, and distributed growth among many of the smaller towns in the region. This also reflected the NIC's preferred competition winners' proposals (see below). The exception is in Milton Keynes, where there is a plan for higher density mixed development by 2026. Their conservation was focused on retaining agriculture and its associated landscapes and villages.

After 2035, they adopted innovative policies and projects and promoted mixed higher density development, in part to support the prior infrastructure investments. This also involved proposing a link between the new infrastructure and HS2. Conservation was focused on special protection for the most travelled tourism zone.

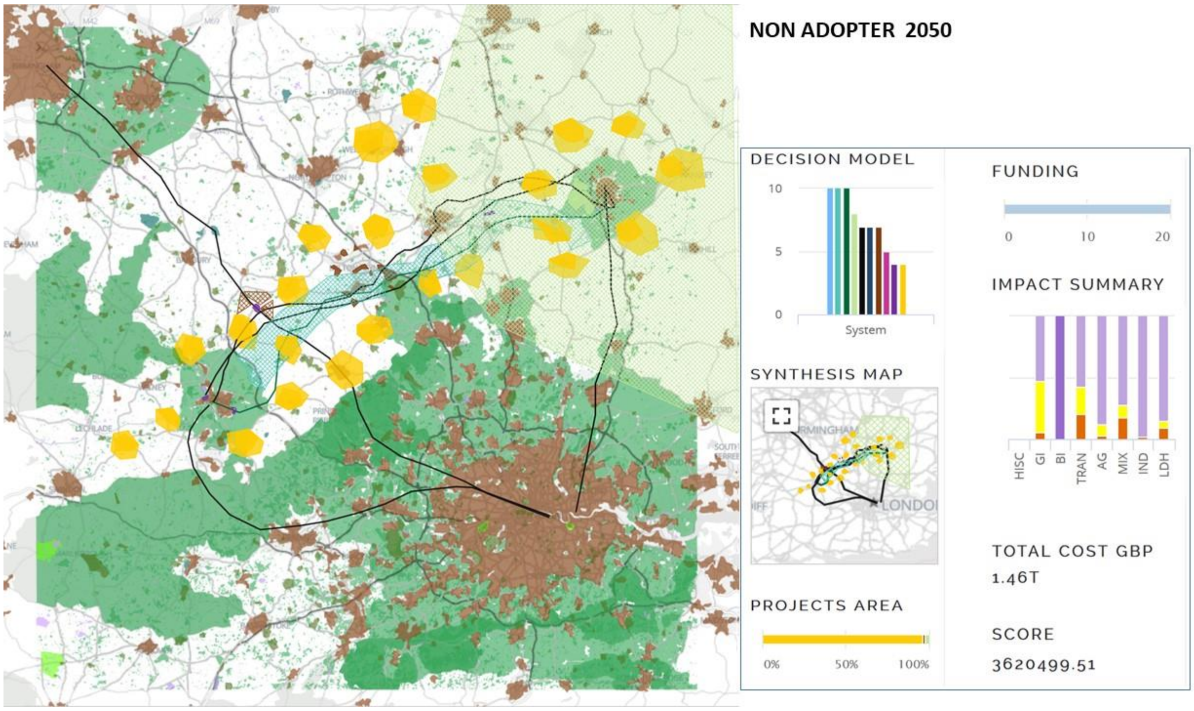


Figure 14: Non Adopter 2050

The Non-Adopter teams (figure 14) accepted the proposed expressway and train plans of the National Infrastructure Commission, relocating and remaking the Cambridge to Bedford train link by 2035. They continued the preferred lower density development patterns, and distributed growth among many of the smaller towns in the region. This reflected the NIC's preferred competition winners' proposals (see below). The exception is in Milton Keynes' plan for higher density mixed development by 2026. Their conservation was focused on retaining agriculture and its associated landscapes and villages. These overarching policies and projects were continued to 2050, enlarging the distributed, town-based lower density development pattern throughout the CAMKOX Corridor.

In the final negotiation process, it became clear that the workshop participants favored policies and projects related to higher rather than lower densities for the CAMKOX corridor, and this despite the market favoring lower densities (figure 15). Priority was given to protection of the existing high-quality landscape and the historical assets of the corridor. The participants placed great emphasis on growing the existing settlements along the major corridor spine but they did this with an emphasis on automated private vehicles in a new highway designed for efficient linking into “trains”, rather than an emphasis on rebuilding the train network that formerly existed. The major reason for this was the existing and highly distributed location of industries and institutions throughout the region and the need for the existing transit system to have additional links to these many locations.

Figure 15: The result of the final negotiation for planning for 2050

There was also a further post-workshop speculation based on what might occur if London made appropriately-selected areas of its greenbelt available for such development after 2035 or 2050 (figure 16). The Non Adopter’s CAMKOX design would still satisfy current urban and environmental preferences but there would likely be severe financial pressure on its train infrastructure as well as major negatively-perceived change to its landscape character. In contrast, the Early and Late adopter designs would likely be expandable in their innovative

infrastructure and urban aspects while retaining the high quality environmental character of the CAMKOX region.

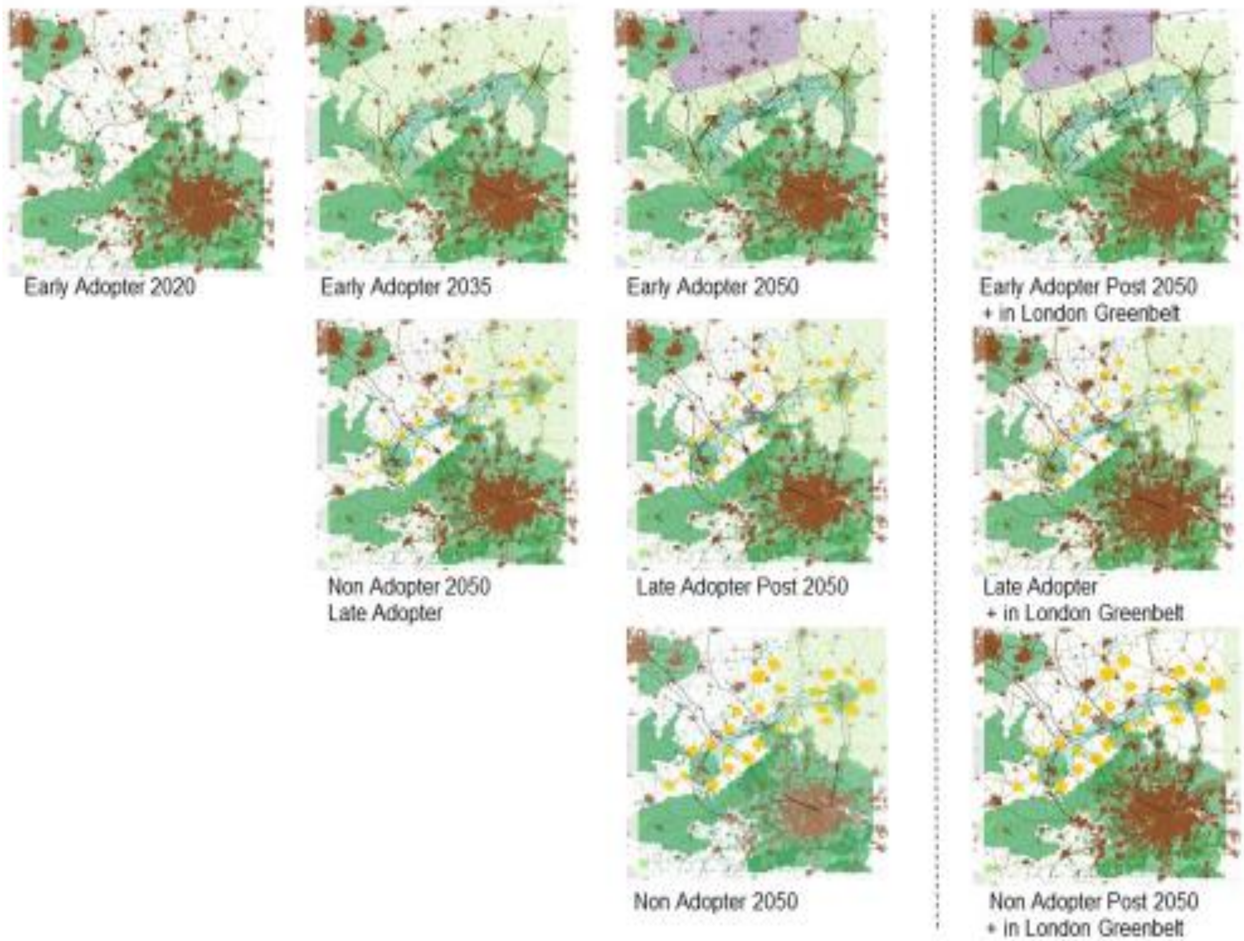


Figure 16: The three scenario-based designs for 2035 and 2050, and a post-2050 speculation

The purpose of this two day exercise was to think through strategic alternatives for a complex set of intra- and inter-system relationships among policies and projects, in a future-oriented spatial-temporal manner, and to do this with considerable openness, flexibility and efficiency (figure 16). All the participants agreed that this geodesign-based exercise was worthwhile, and one which might be a model for how to begin to think strategically about difficult and contentious issues which require a negotiated solution among and with local as well as regional stakeholders, all being an integral part of the planning process.

Afterword

Successful collaborative negotiation among different stakeholders seeking to strike a compromise shifts the paradigm from a zero-sum game to a win-win situation. It requires a different mindset from the participants than the normal practice of defending bureaucratic policies and projects or private profit interests “to the death”. It also requires knowledgeable but neutral leadership. It operates under different social rules (figure 17).

Some social rules for collaboration:

If you don’t understand, ask a question.
If you say you’ll do it, do it.
If you can’t do it, ask for help.
If asked for help, give it.
No idea is a bad idea, but not all ideas are equally good.
All ideas are public property.
An idea becomes a good one when adopted by others.
Nothing is worth more than five minutes of discussion.
When in doubt, vote.
A good design is a finished design.
It’s “our” design. I did this part.

Carl Steinitz

Figure 17: Some social rules for collaboration

The CAMKOX Corridor workshop was not an official governmental study. It could have been. It was an example in which knowledgeable experts who are also stakeholders agreed to use the best available data and to try to develop a consensus on an extremely large, complex and contentious planning problem. Given the long term perspective, they were clearly many unknowns around which strategic “best guesses” based on current data and projections and which prospective innovations needed to be synthesized, comparatively assessed and collaboratively negotiated. The workshop was perceived to be highly successful because it was conducted as a “live” collaboration rather than being conducted sequentially in many separate bureaucratic silos. The participants brought their experience and expertise, and a central reason for its success was the simple and rare occurrence of collaboration toward a prospective solution, and the significant pleasure of working on it collectively.

Acknowledgements

I thank the workshop participants who shall remain anonymous, and the firms whose diagrams we used as the initial basis for geodesign.

Photographs by Tess Canfield

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