

EDGeS - Enabling Desktop Grids for e-Science

GRIDS@WORK, Sophia Antipolis, 2008-10-22

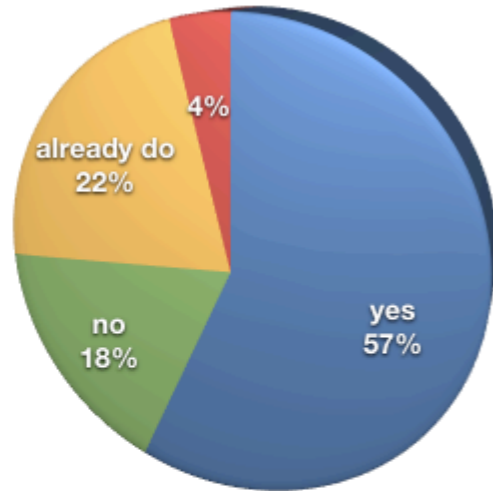
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With contributions from partners of the EDGeS project



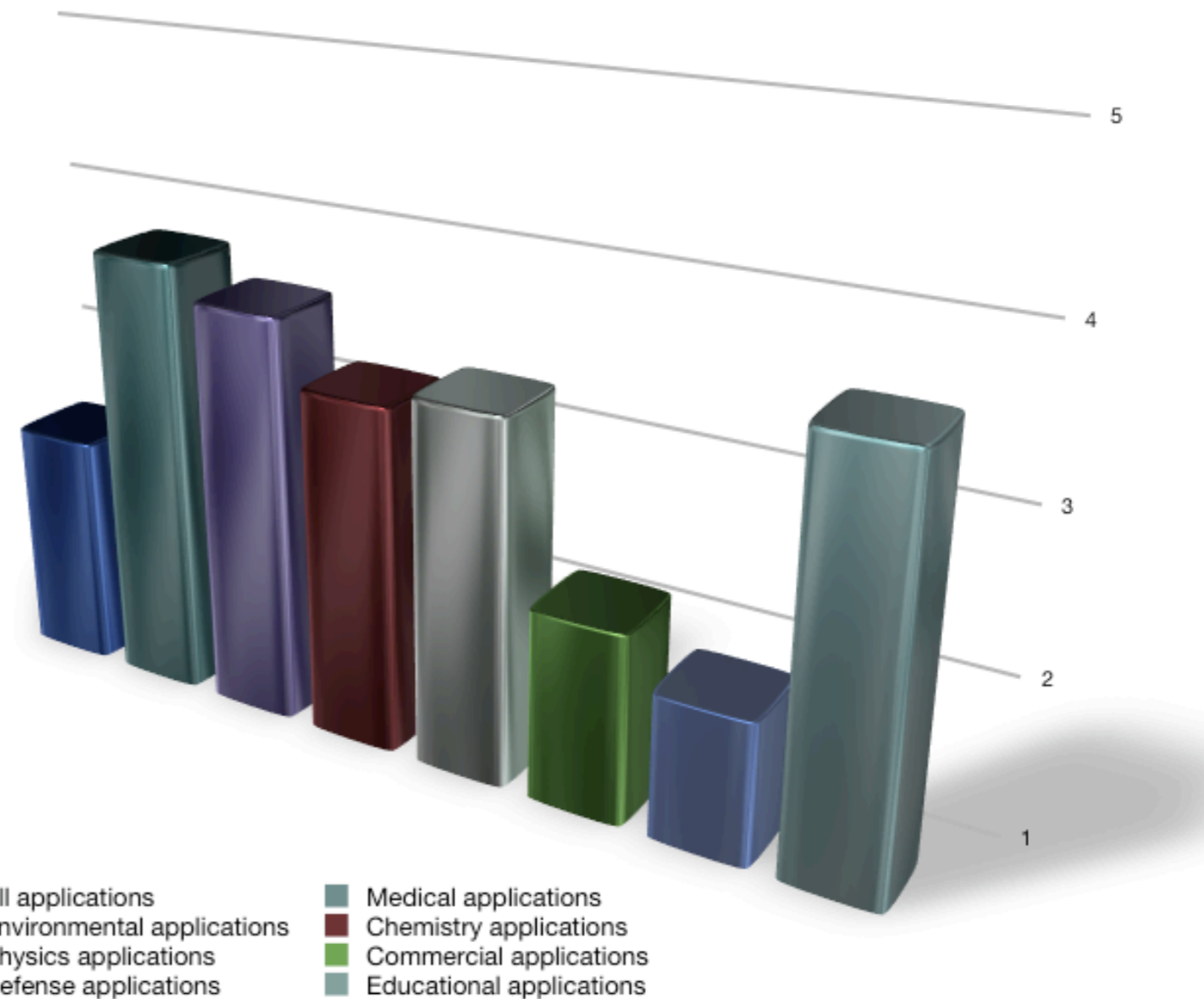
Survey amongst the General Public and SME's

Interest in donating computing time



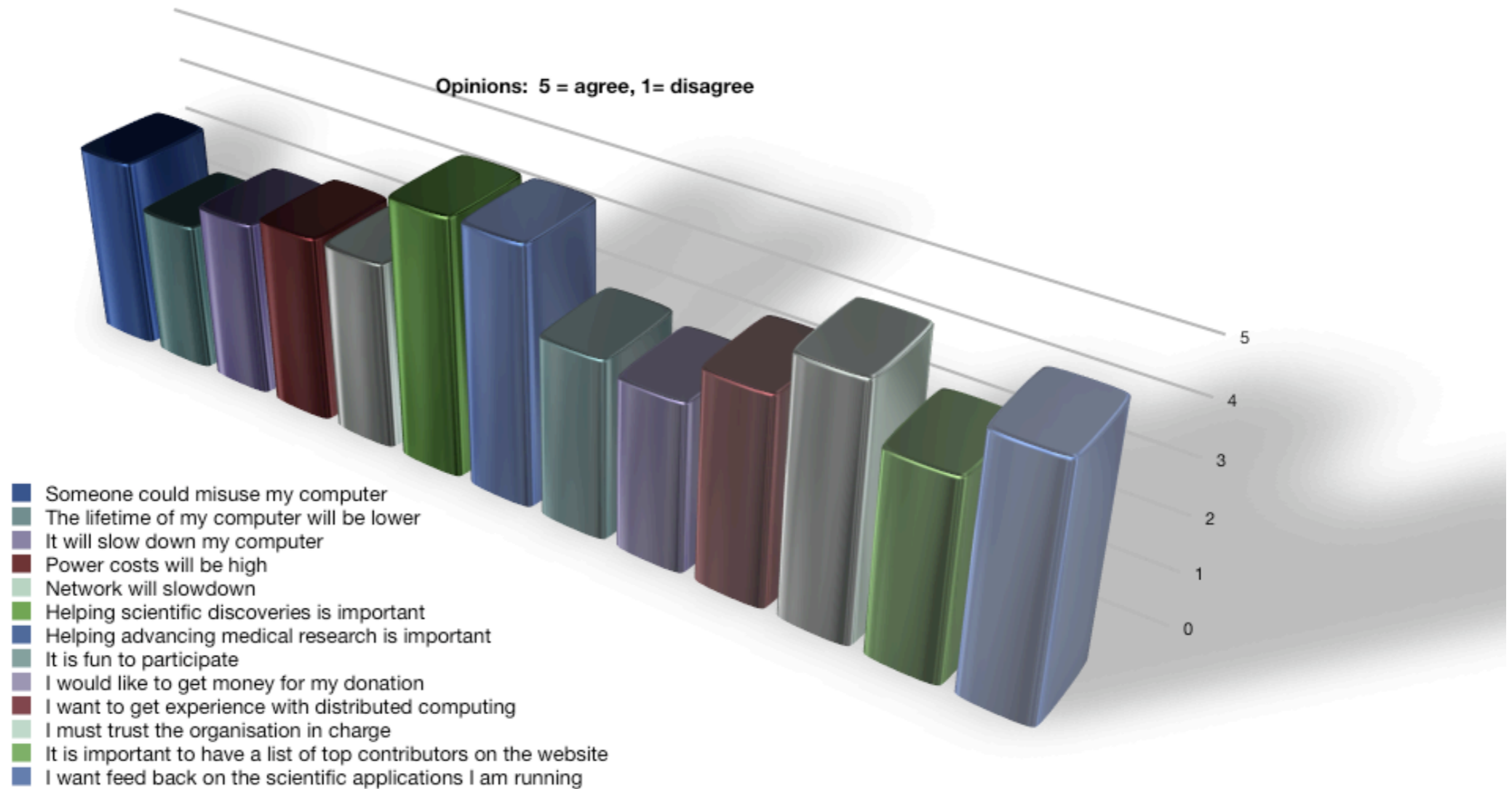
Are you interested donating computing time	yes	no	already do	do not know no answer
number	29	9	11	
percentage	59%	18%	22%	

Which applications would you want to run on a scale of 1 - 5 ?



Which applications would you want to run	All applications	Medical applications	Environmental applications	Chemistry applications	Physics applications	Commercial applications	Defense applications	Educational applications
Average	2,5	3,8	3,6	3,2	3,3	2,2	1,9	3,6
Standard deviation	0,9	1,1	1,1	1,2	1	1,1	1,1	1,2

Opinions about Grid computing



	Someone could misuse my computer	The lifetime of my computer will be lower	It will slow down my computer	Power costs will be high	Network will slowdown	Helping scientific discoveries is important	Helping advancing medical research is important	It is fun to participate	I would like to get money for my donation	I want to get experience with distributed computing	I must trust the organisation in charge	It is important to have a list of top contributors on the website	I want feed back on the scientific applications I am running
Average	3,6	2,8	3,3	3,5	3,5	4,8	4,8	3,3	3,1	3,8	4,6	3,6	4,5
Standard deviation	1,5	1,6	1,5	1,5	1,6	0,5	0,5	1,3	1,4	1,4	0,9	1,5	0,9



AlmereGrid - World's first CityGrid

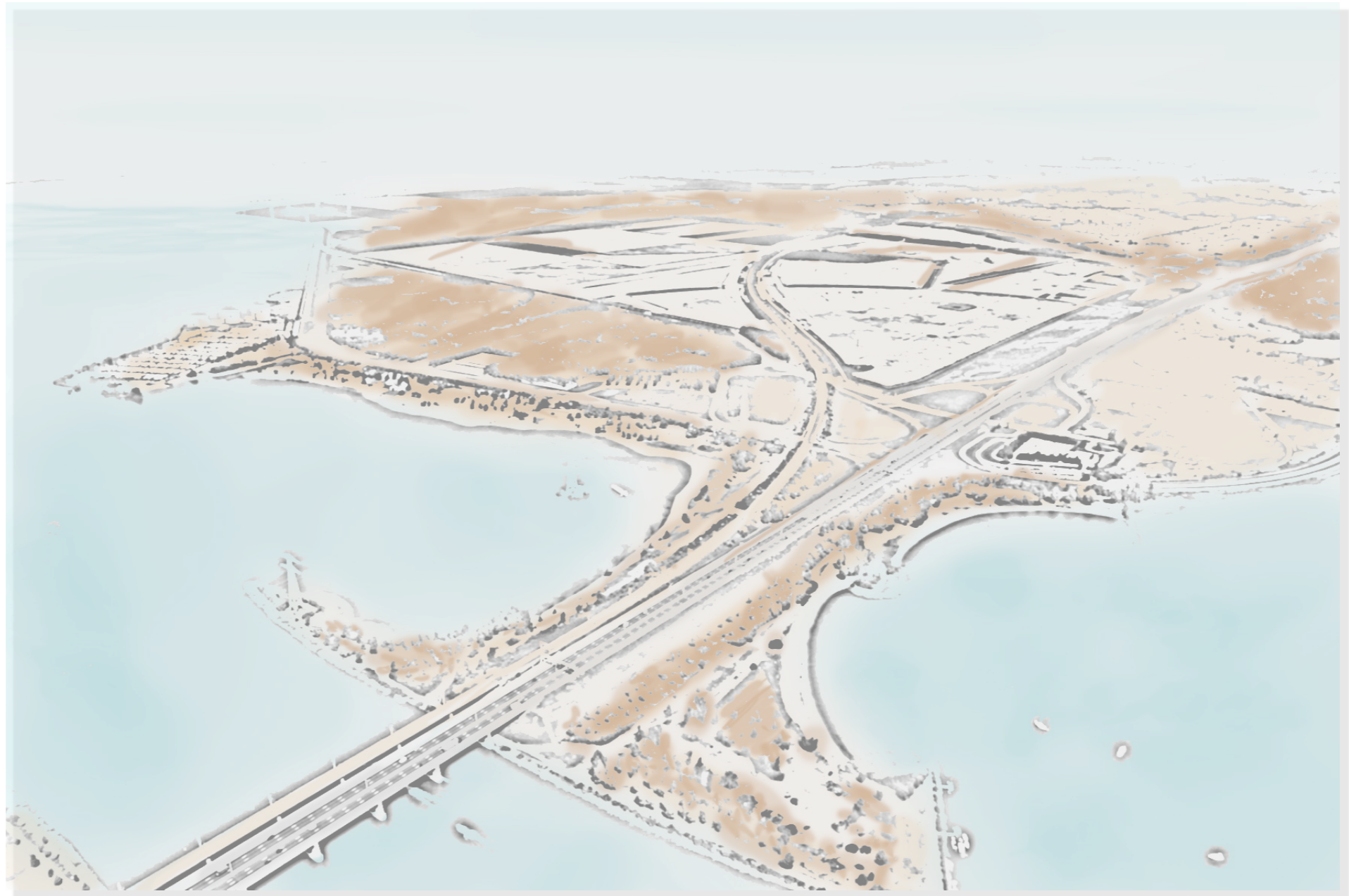
- ✚ Almere is a new town in the Netherlands
- ✚ Good cradle for the world's first CityGrid
- ✚ Desktop Grid used for scientific applications:
sharing CPU power
- ✚ Back-Up Grid experiment to share hard disk
space (as part of EU BEinGRID project)
- ✚ Build-on-Grid and Virtual Reality based
environment to allow people to build their own
house in virtual space with all the right data
and checking permits before it is built in reality.
(Feasibility study for municipality finished.)



For science and beyond

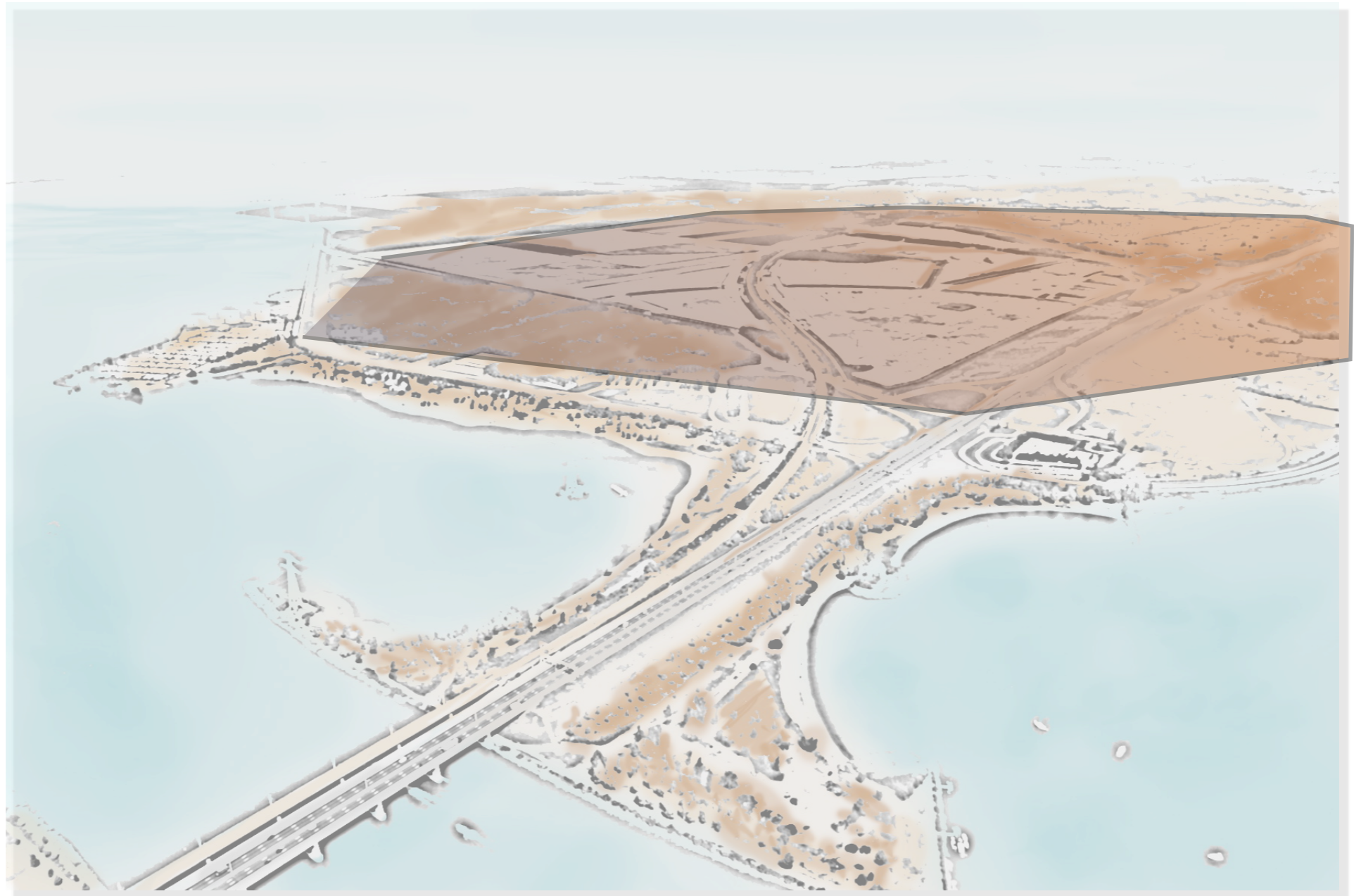


For science and beyond



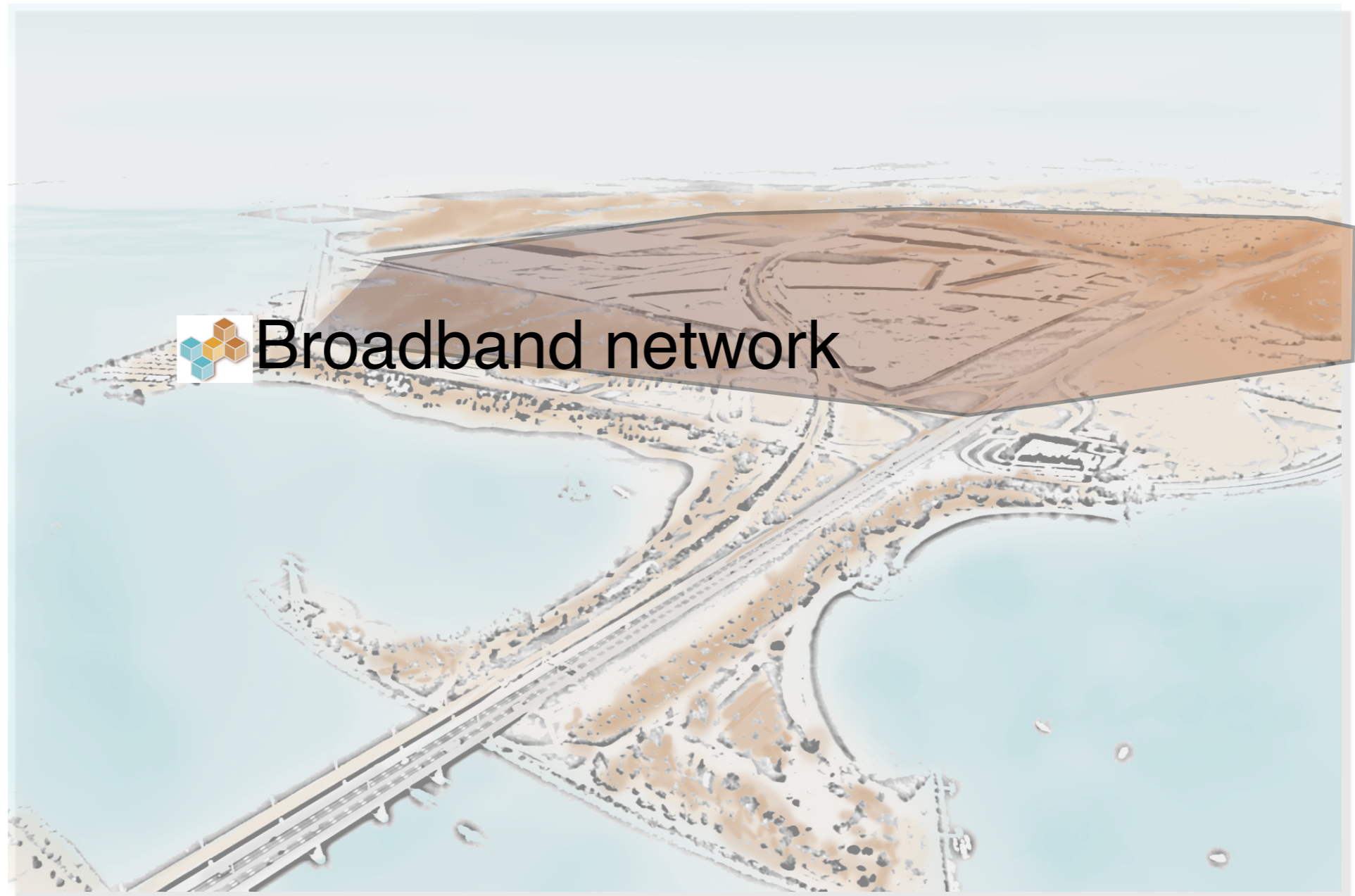


For science and beyond





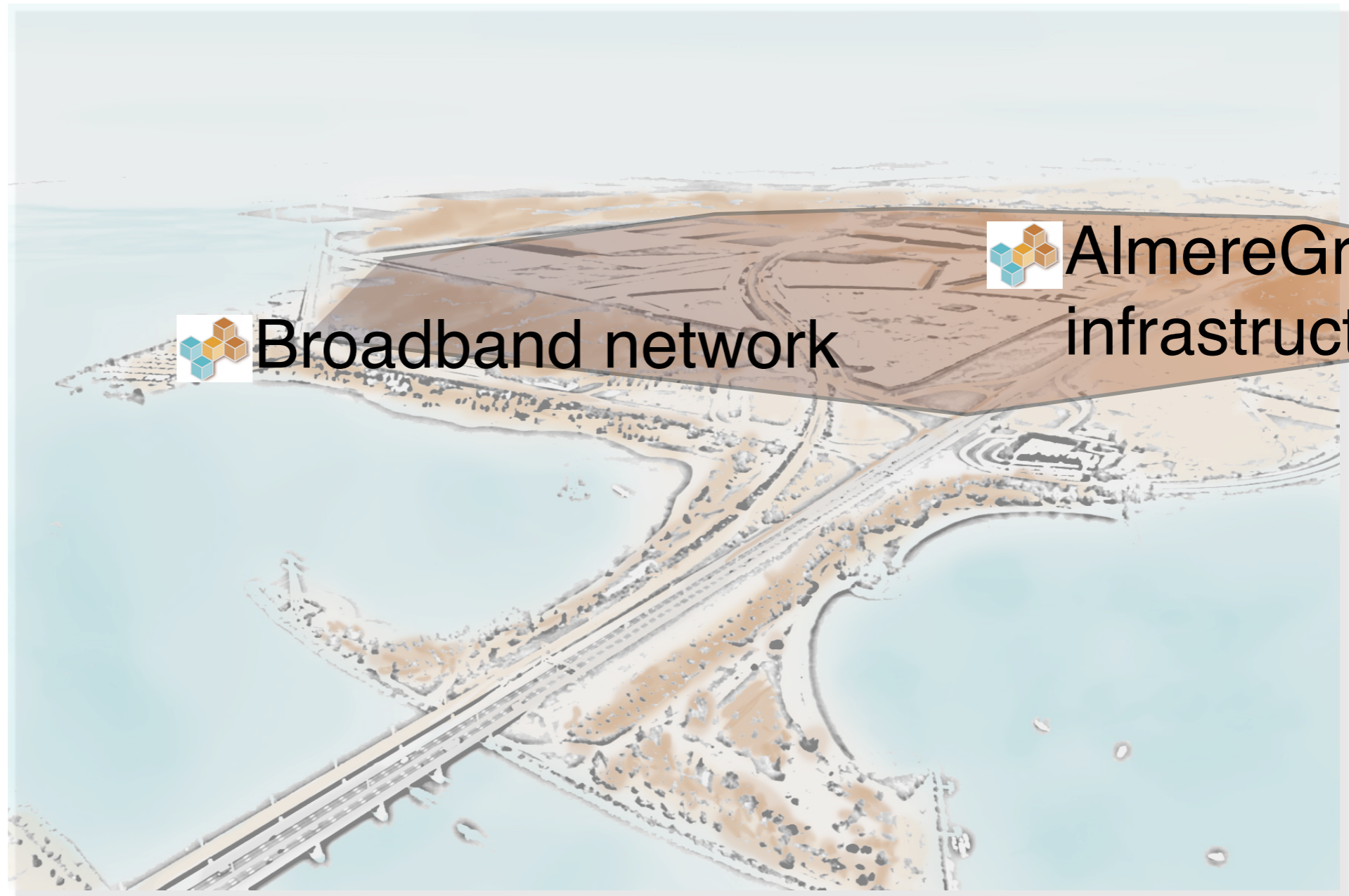
For science and beyond



Broadband network



For science and beyond



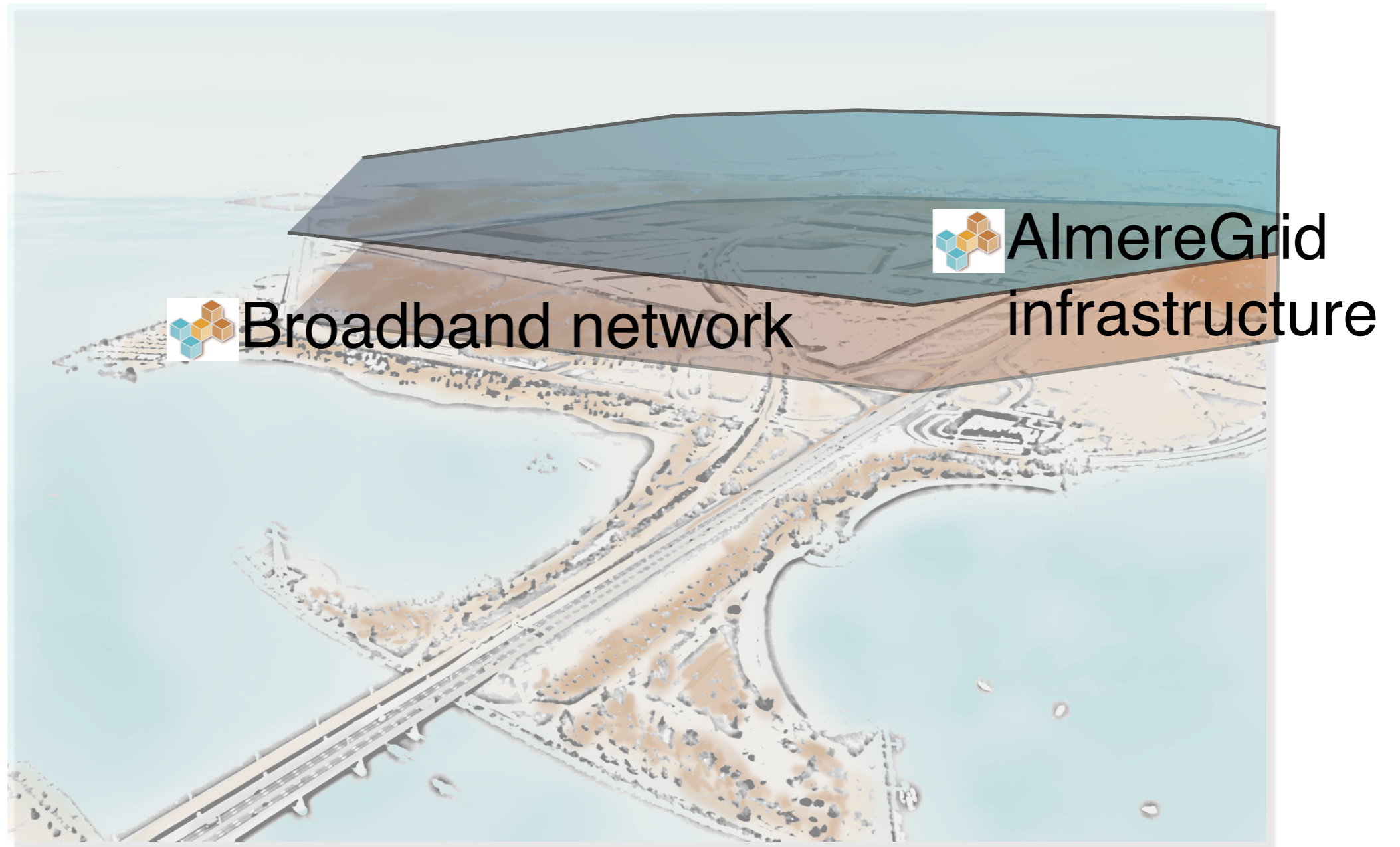
Broadband network



AlmereGrid
infrastructure

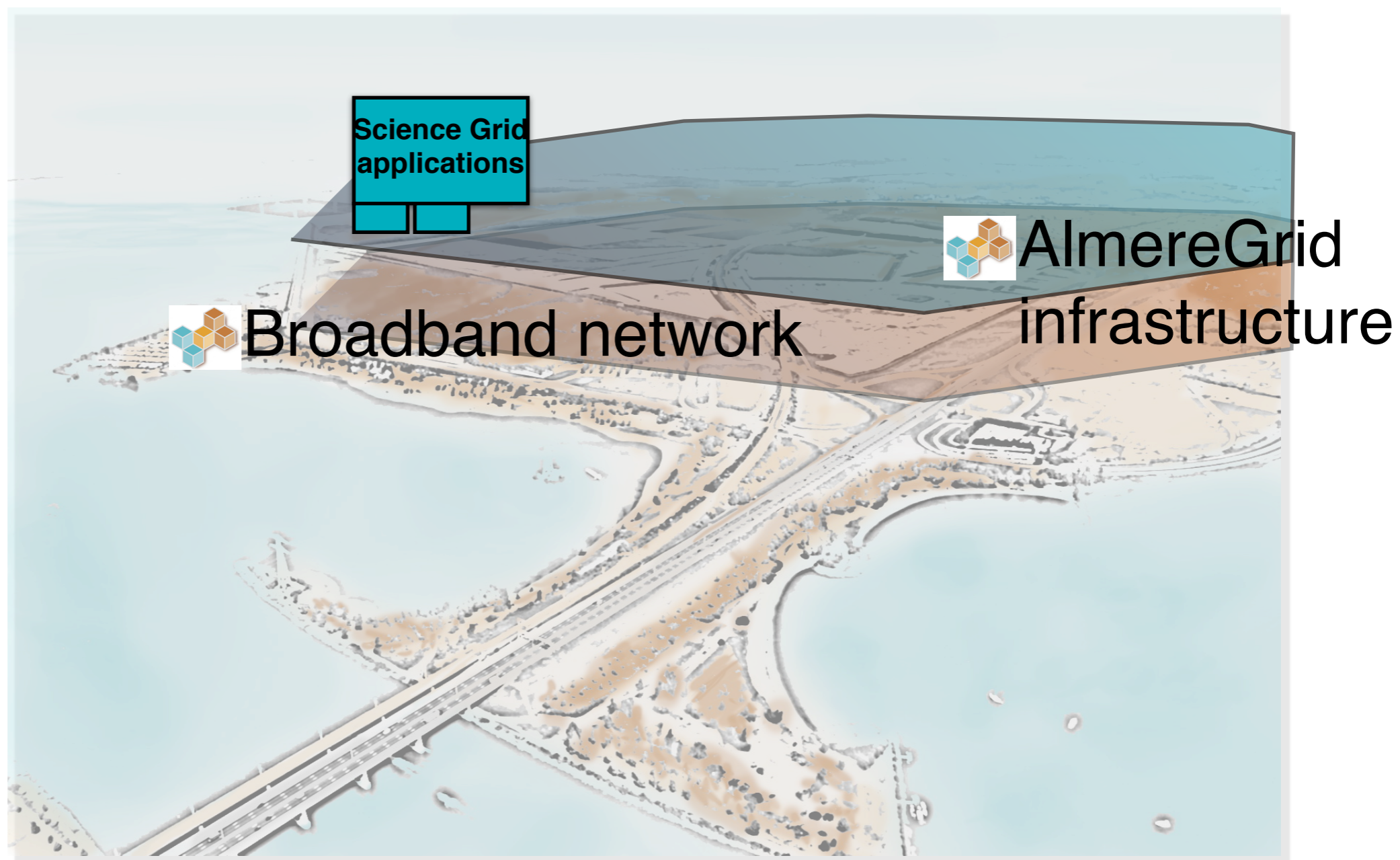


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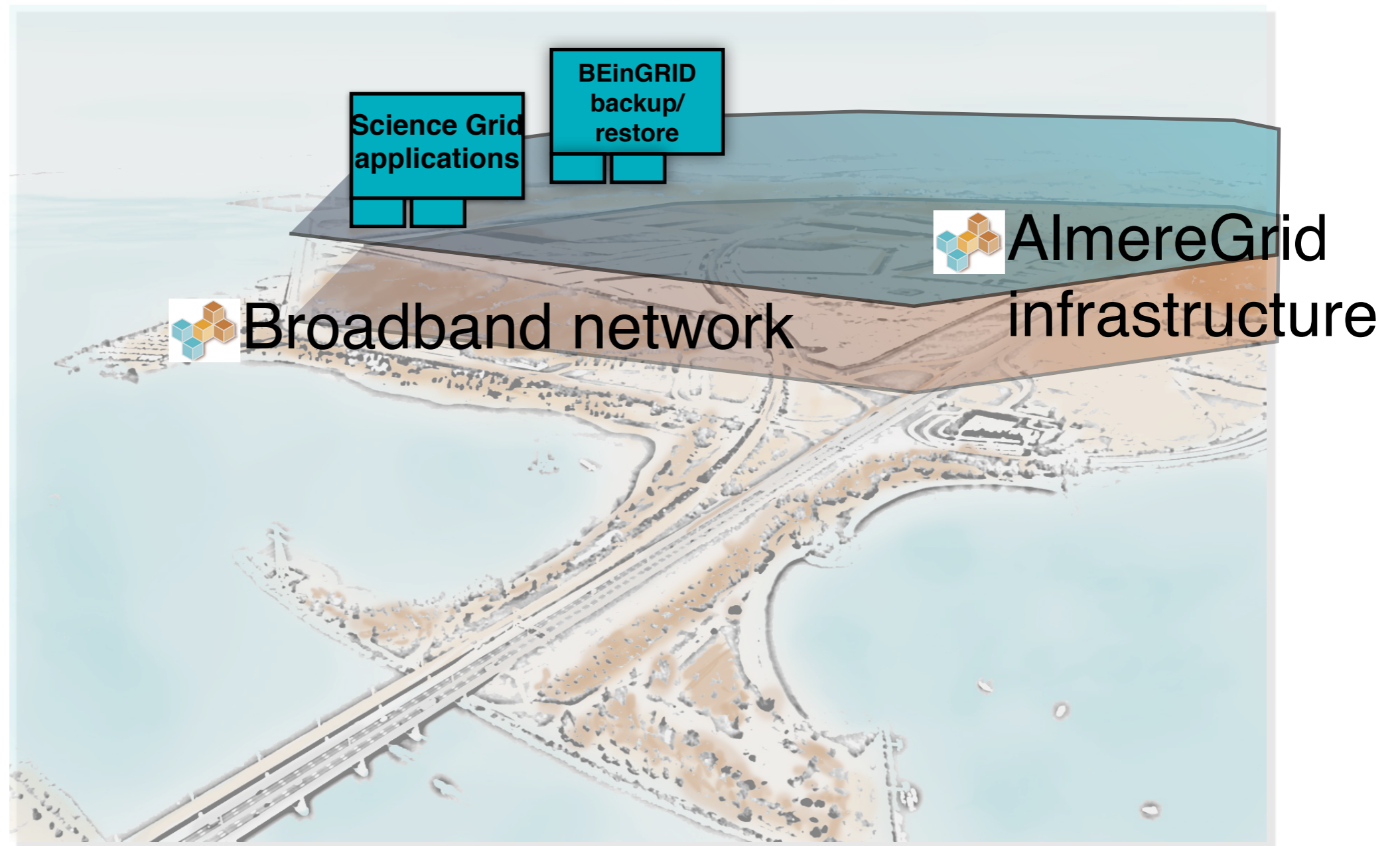


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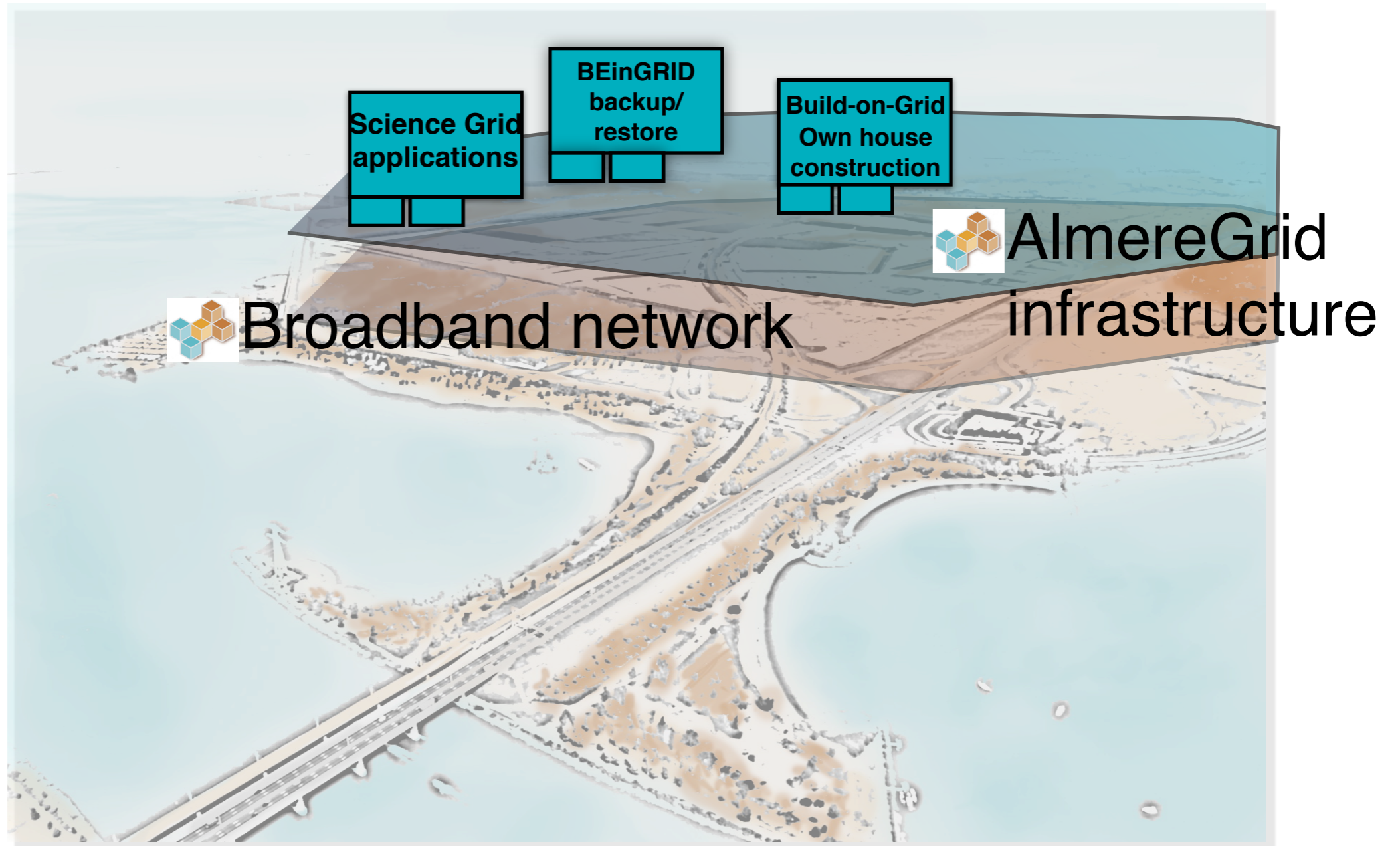


For science and beyond



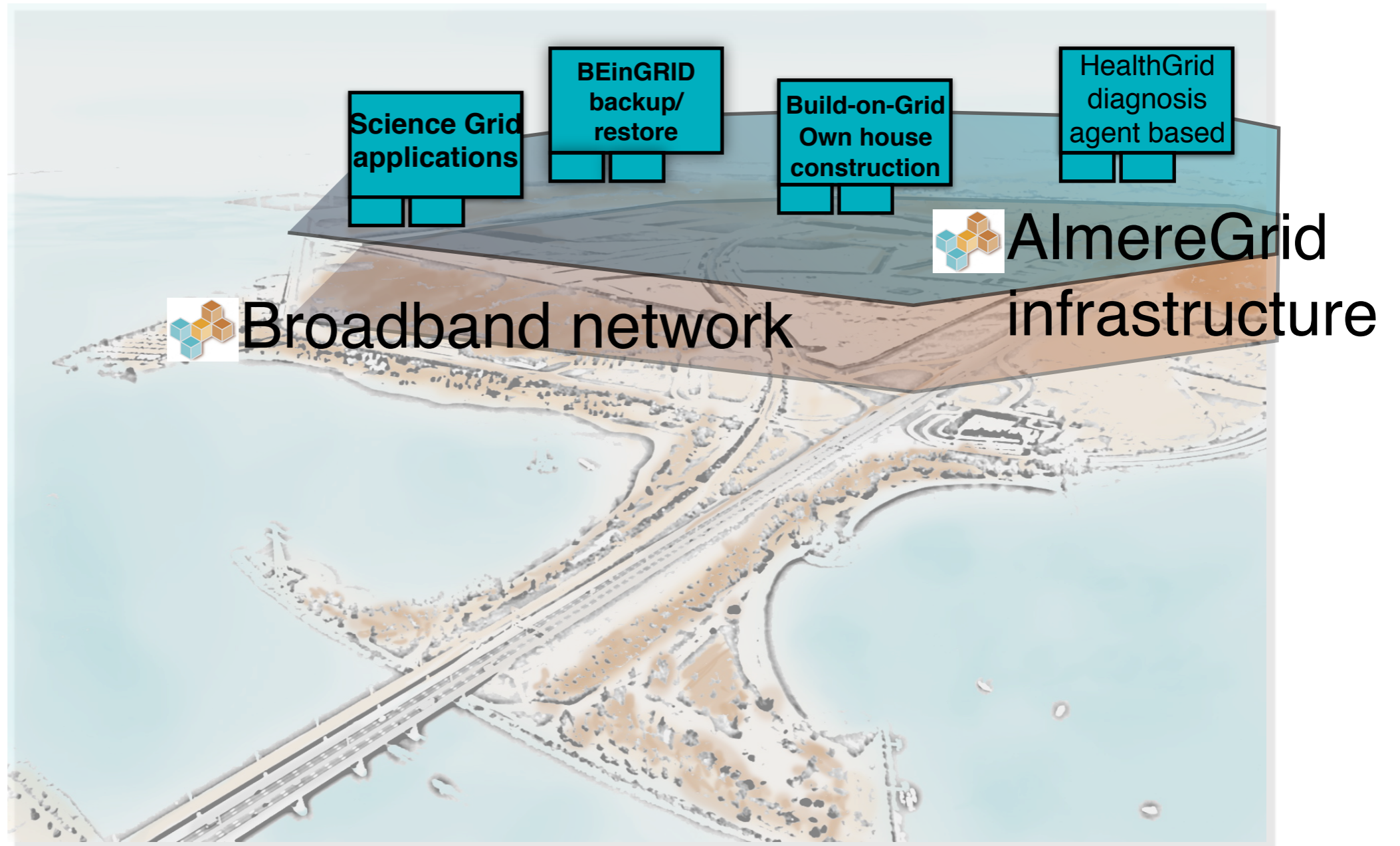


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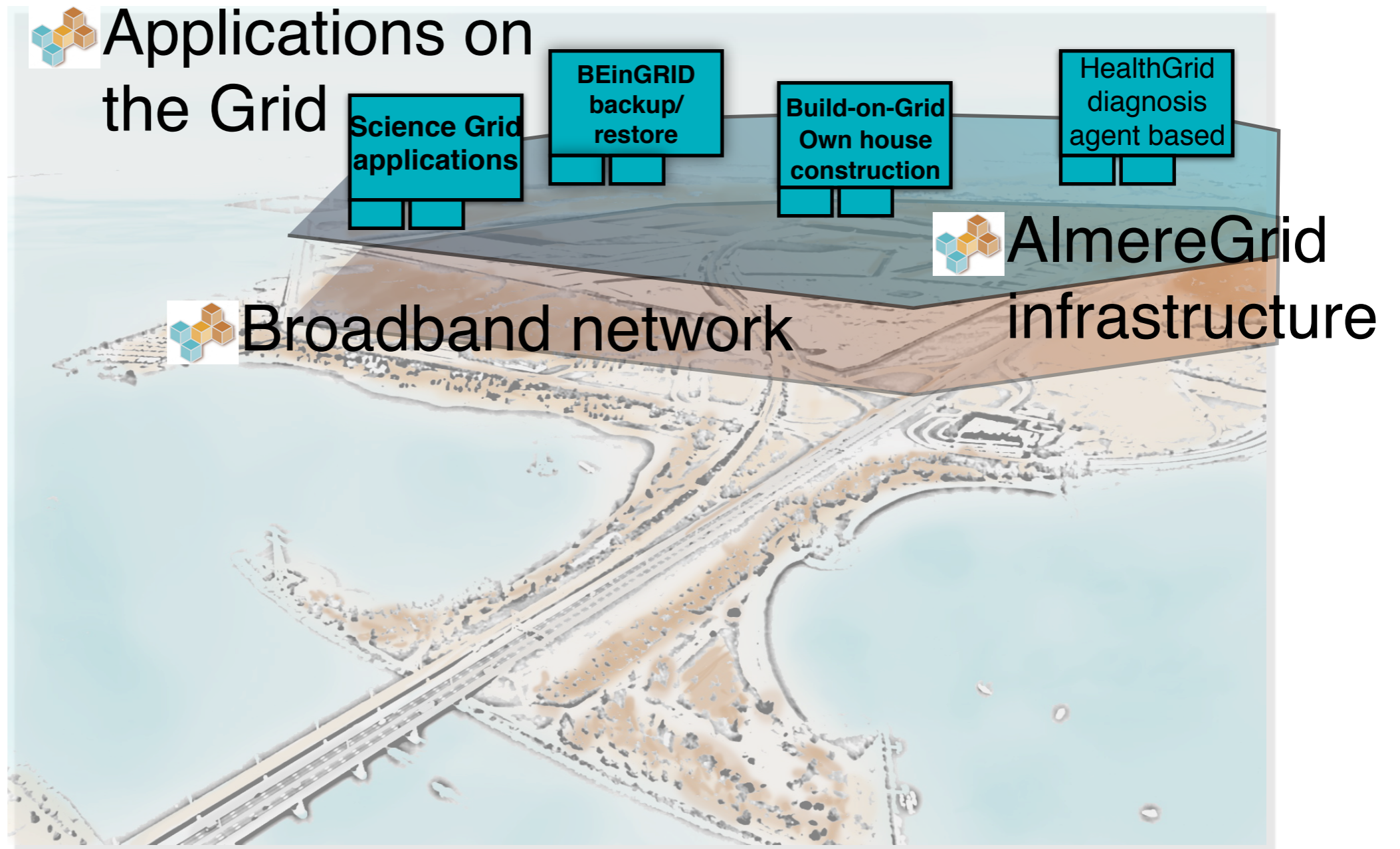


For science and beyond





For science and beyond

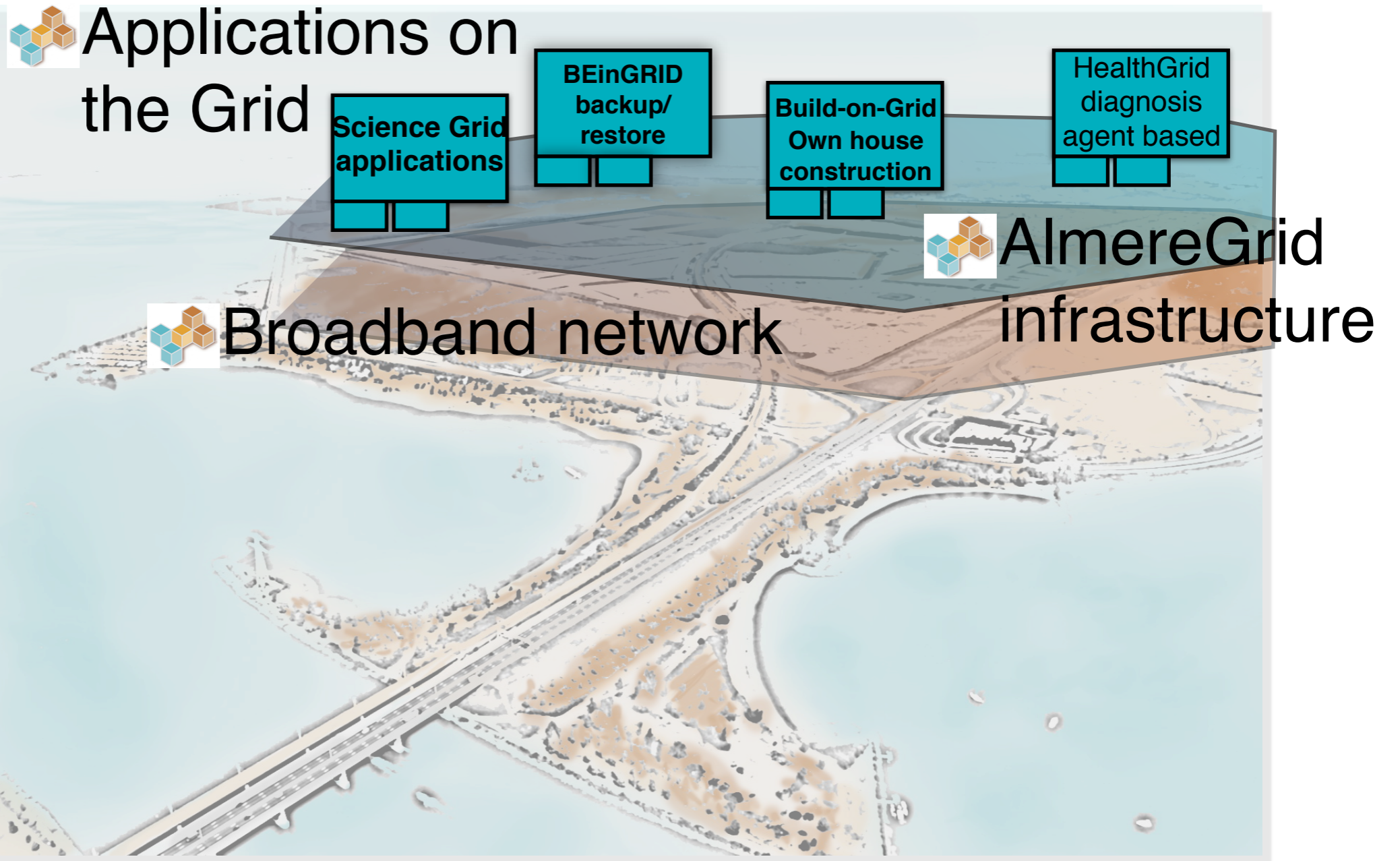




For science and beyond

e-Education using Grid

Strengthen knowledge infrastructure of the city





EDGeS project background

- ▶ *Service Grids* have typically order 10.000 trusted processors; *Desktop Grids* have order 100.000 untrusted processors.
- ▶ Largest Service Grid: EGEE: 90.000 processor cores
- ▶ Largest Desktop Grid: SETI@Home: 2.100.000 hosts
- ▶ Service Grids have *untrusted applications* but trusted resource providers; Desktop Grids have *trusted applications*, but untrusted resource providers



EDGeS -

Enabling Desktop Grids for e-Science

- ▶ Connect Service Grids (EGEE, BIG-Grid,...) with Desktop Grids (SZTAKI Desktop Grid, AlmereGrid, Extramadura Grid..., to provide even more resources to scientists
- ▶ Provide a Bridge between these types of Grids for automatic job sharing
- ▶ Provide an Application Development Methodology to port applications to the Grid; Port a number of (new) applications to the Grid
- ▶ Organise users and industry
- ▶ Two year, EU funded project (started 1-1-2008)

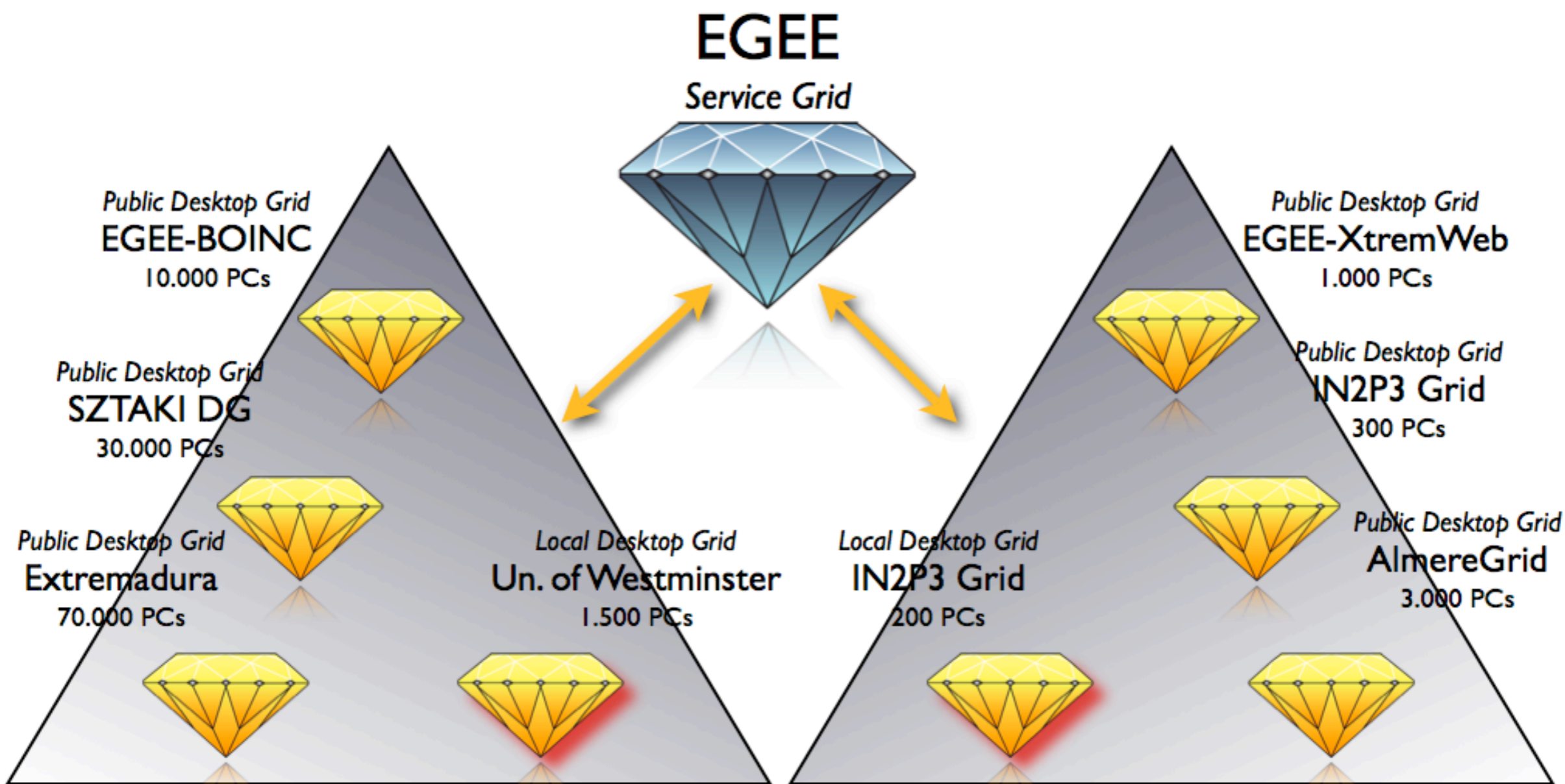


EDGeS Partners

	<i>Partner</i>	<i>Participant short name</i>	<i>Country</i>
1	Computer and Automation Research Institute of the Hungarian Academy of Sciences	MTA SZTAKI	Hungary
2	Centro de Investigaciones Energéticas Medio Ambientales y Tecnológicas	CIEMAT	Spain
3	Foundation for the Development of Science and Technology in Extremadura	Fundecyt	Spain
4	The French National Institute for Research in Computer Science and Control	INRIA	France
5	University of Westminster	UoW	UK
6	Cardiff University	CU	UK
7	Faculty of Sciences and Technology of the University of Coimbra	FCTUC	Portugal
8	Stichting AlmereGrid	AlmereGrid	The Netherlands
9	Centre National de la Recherche Scientifique - Institut National de Physique Nucleaire et de Physique des Hautes Energies	IN2P3	France



EDGeS - Grid infrastructure

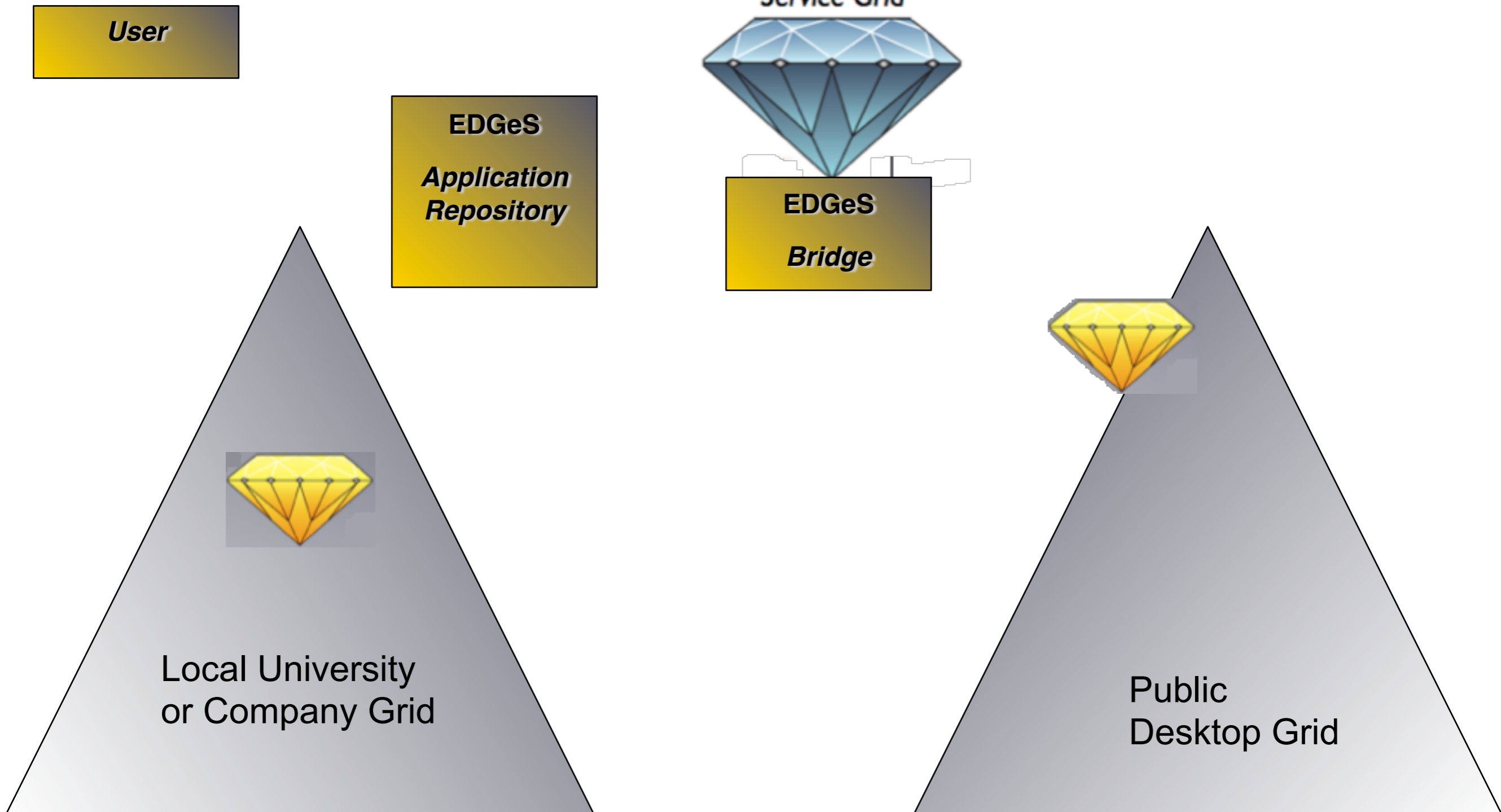


BOINC based Desktop Grids

XtremWeb based Desktop Grids

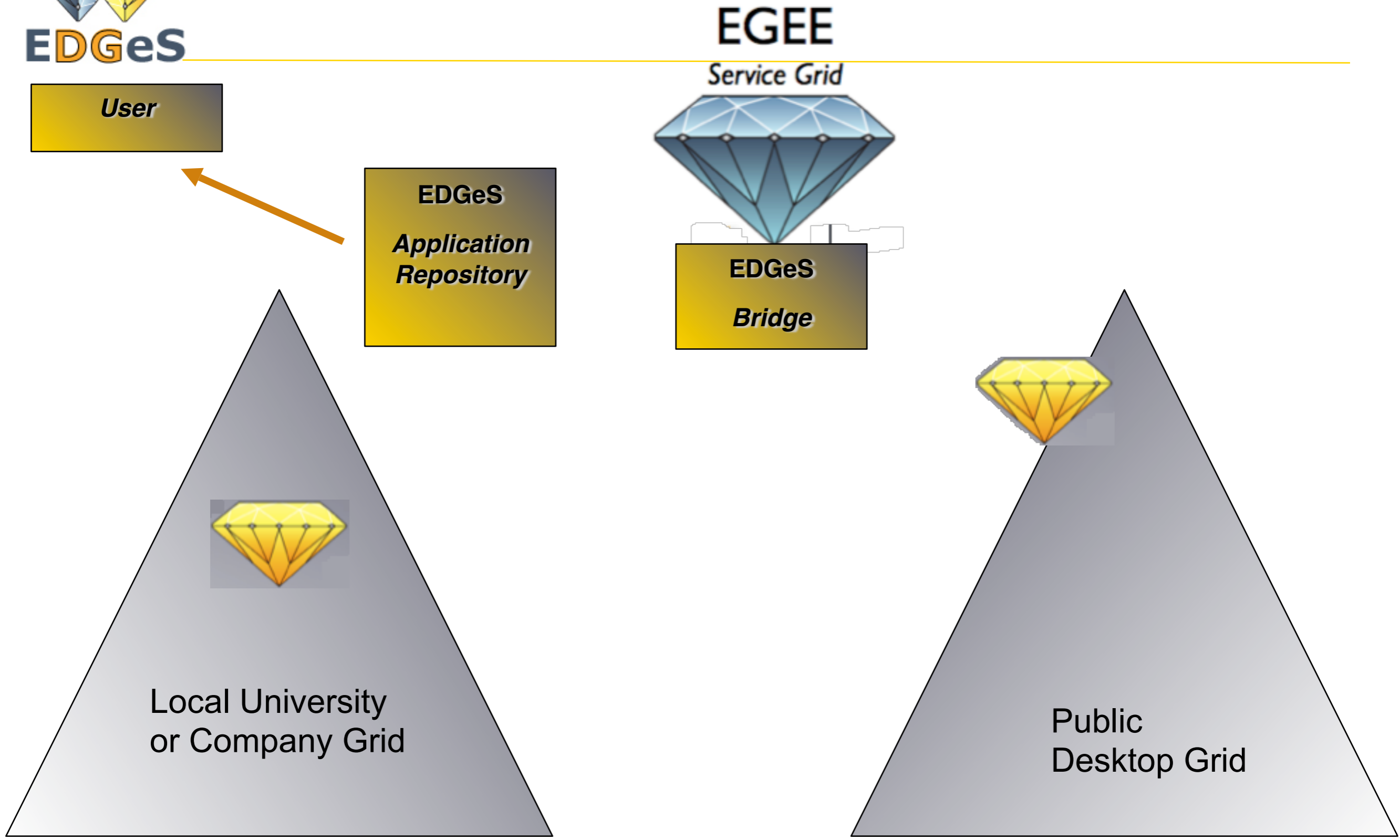


Typical scenario for EGEE users



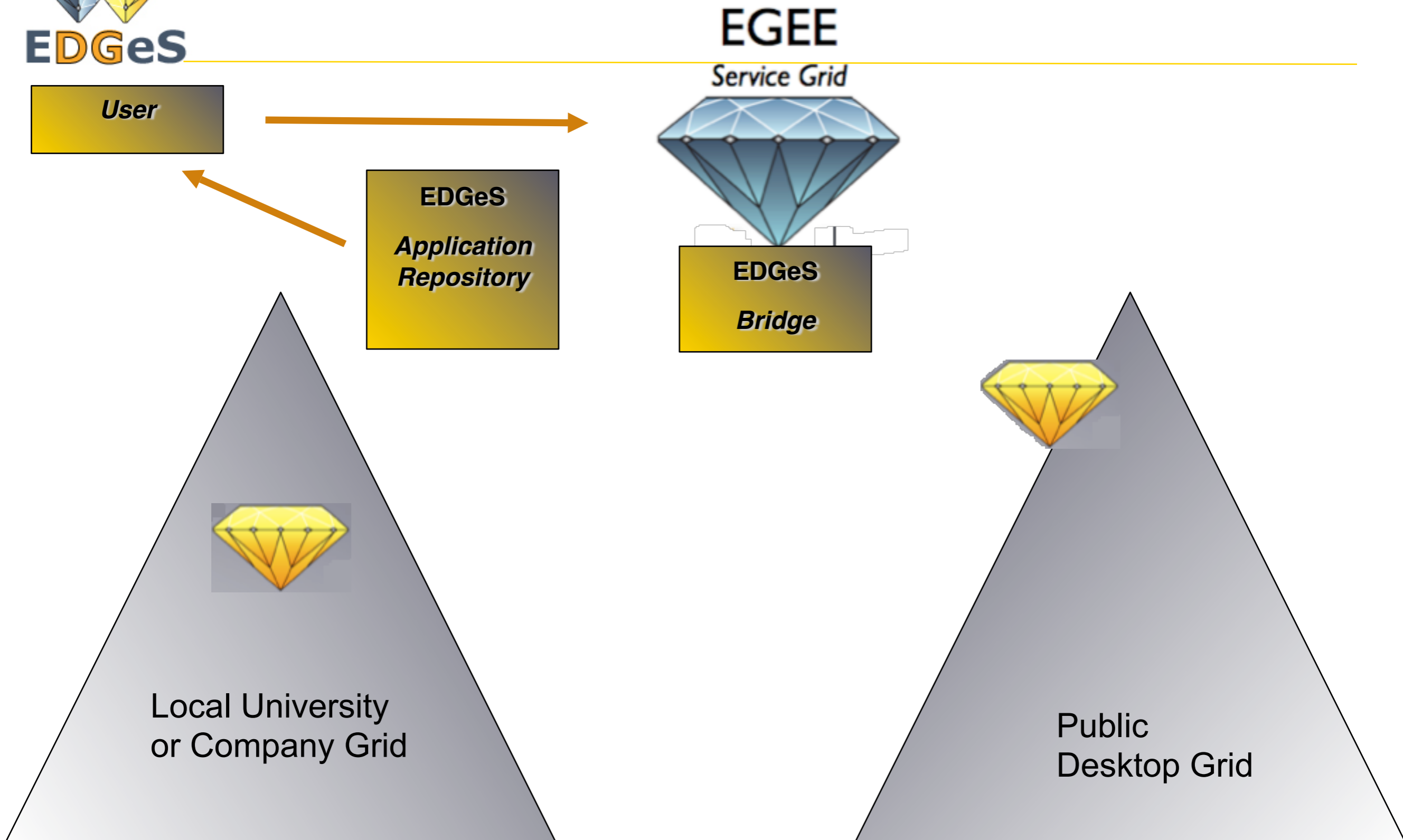


Typical scenario for EGEE users



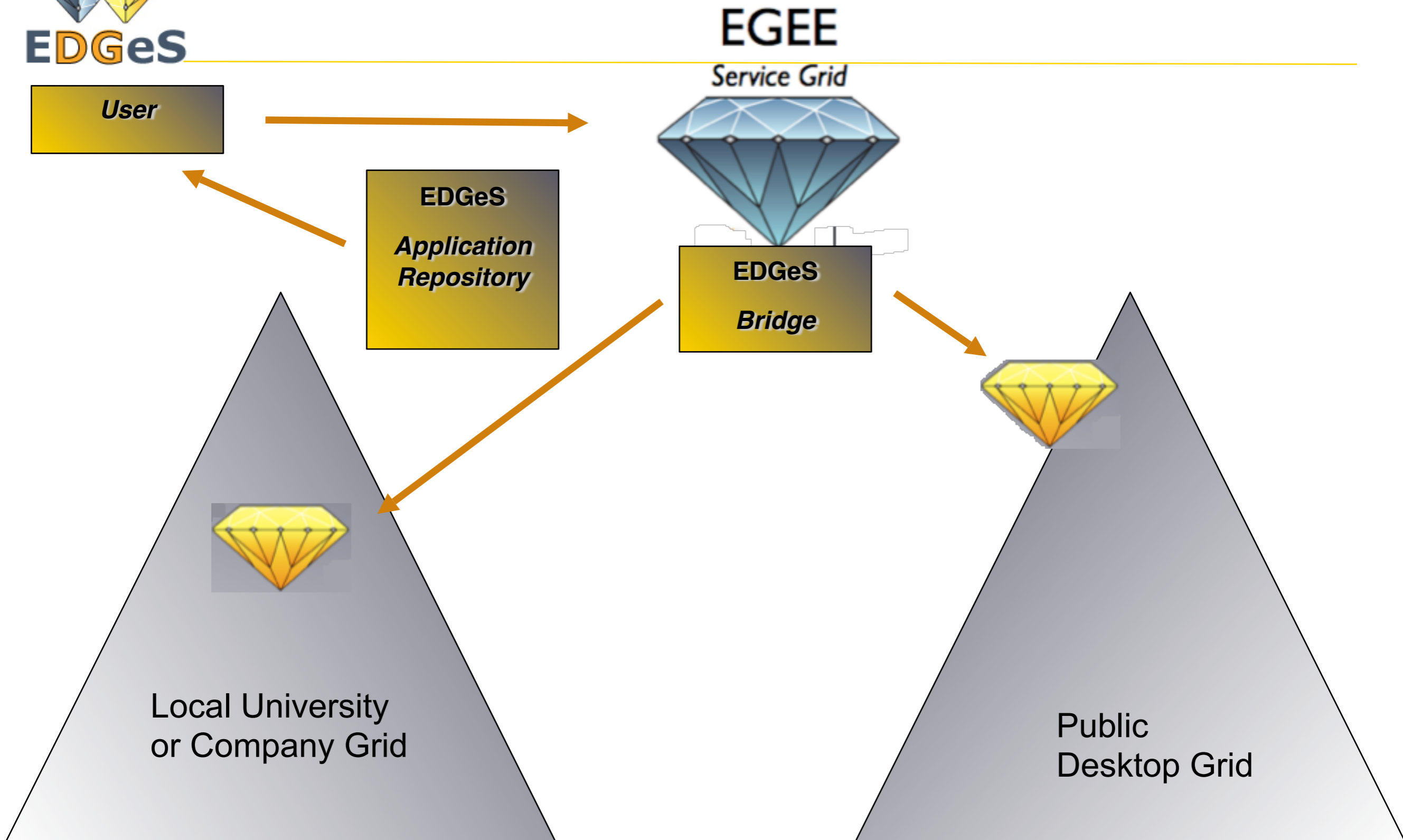


Typical scenario for EGEE users



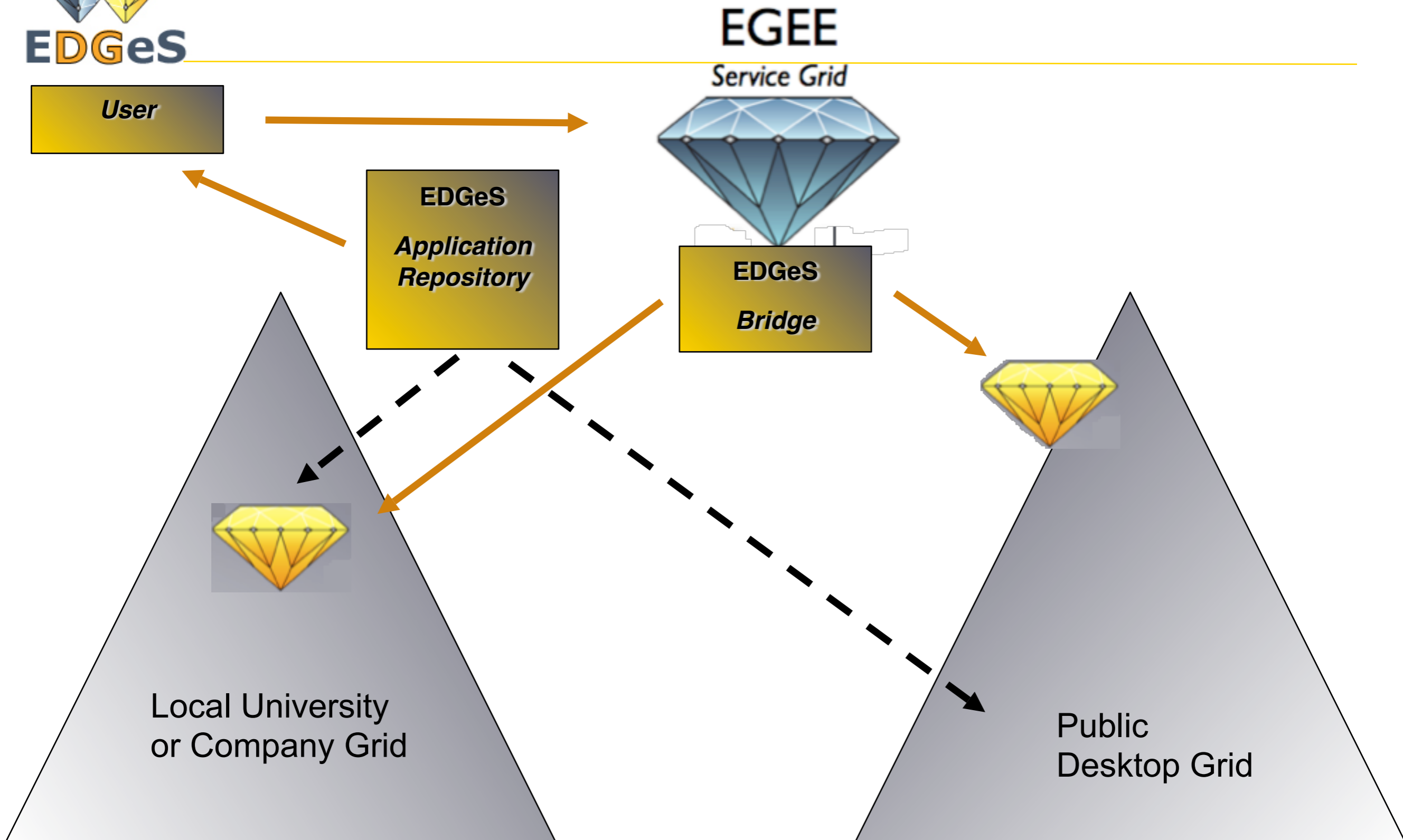


Typical scenario for EGEE users





Typical scenario for EGEE users





For EGEE users wanting to run on Desktop Grids

- ▶ Bag-of-tasks type of EGEE applications are selected and ported to BOINC and XtremWeb
- ▶ Porting is a joint work of EDGeS and the application developer
- ▶ No certificate support in BOINC: all applications are validated by the EDGeS team
- ▶ Validated applications are placed in the EDGeS Application Repository
- ▶ Desktop Grids connected by EDGeS can register applications from the EDGeS Application Repository
- ▶ EGEE users can take applications from the Application Repository and submit via the EGEE->Desktop Grid bridges



For Desktop Grid users wanting to run jobs on EGEE

- ▶ EDGeS did create a new VO Virtual Organisation in EGEE called as *EDGeS VO*
- ▶ Sites in the EDGeS VO support the applications of the EDGeS connected Desktop Grids that are available in the *Application Repository*
- ▶ Jobs of the connected Desktop Grids can be seamlessly executed in the EDGeS VO



Desktop Grid User & Industry Forum

- ▶ The User Forum is intended for people who have applications that run, or could run on a Desktop Grid or a combined Desktop/Service Grid.
- ▶ The Industry Forum is intended for people from companies that are interested in setting up a local Desktop Grid (and port/run applications)
- ▶ The Fora provide:
 - ▶ Two meetings a year to meet face-to-face with the Desktop Grid developers and other Desktop Grid users
 - ▶ A directory with Desktop Grid resources. Grid news feed
 - ▶ Guidance with putting applications on the Grid. A Desktop Grid application development environment (2009)
 - ▶ Potential access to a European wide Grid with potentially a million computer nodes



Next User & Industry Forum activity

- ▶ ***1st EDGeS Grid training workshop & 2nd AlmereGrid Grid Experience workshop***
- ▶ 27-28 November 2008, Almere, NL
- ▶ EDGeS, AlmereGrid with support from Gridforum.nl (Dutch Grid Forum Society)
- ▶ State-of-the-art of Desktop Grid technology - BOINC, XtremWEB, and the EDGeS Bridge (and middlewares like Proactive and CoBRA,...)
- ▶ Successful Desktop Grid applications from both research and industry.
- ▶ <http://edges-grid.eu/web/userforum/1sttraining>



EADM - EDGeS Application Development Methodology

**1. Analysis of current
application**



EADM - EDGeS Application Development Methodology

1. Analysis of current application

2. Requirements analysis

3. Systems design

4. Detailed design

5. Implementation

6. Testing

7. Validation

8. Deployment

9. User support, maintenance & feedback



Applications ported to the EDGeS Grid

Application	Organisation	Runs on Desktop Grid	Runs on EGEE (EDGes VO)
Video Stream Analysis in a Grid Environment (VISAGE)	Correlation Systems Ltd - Israel	✓	✓
Digital Alias-free Signal Processing	U. of Westminster	✓	✓
Protein Molecule Simulation using Autodock	U. of Westminster	✓	
Patient Readmission Application	U. of Westminster	✓	



Applications being ported to the EDGeS Grid

Application	Organisation
Ultrasound computer tomography	Forschungszentrum Karlsruhe
Digital Alias-free Signal Processing	BIFI
Distributed Audio Retrieval	Cardiff University
Cellular Automata based Laser Dynamics	University of Sevilla
Radio Network Design	University of Extramadura
An X-ray diffraction spectrum analysis	University of Extramadura
DNA Sequence Comparison and Pattern Discovery	Erasmus Medical Center
PLINK - Analysis of genotype/phenotype data	Atos Origin

Collaborations

- ▶ EGEE III's first Memorandum of Understanding was signed with EDGeS
- ▶ Goals of the MoU:
 - ▶ Jointly select EGEE applications that should be migrated to EDGeS
 - ▶ Collaboration in porting these apps to EDGeS
 - ▶ EGEE support for the establishment and operation of the EDGeS VO
 - ▶ Organizing joint events (summer school, user forum meetings)
- ▶ Also MoU's with other projects, like ELAA2



Standardisation needs of EDGeS

- ▶ The EDGeS Bridges are there because of lack of standards
- ▶ Standards needed:
 - ▶ Authentication, authorization of users and applications. (To work in insecure and potentially hostile environments). Current schemes used in EGEE and the like are complicated.
 - ▶ Widely adopted jobs description language with not too many “profiles” *OGF JSDL* is a good start. *OGF BES* could be useful too, but not implemented for Desktop Grids yet.
 - ▶ Application repository. With possibilities to have approved unremovable trusted applications, There is *OGF ASC*. But that is not widely used.
 - ▶ We are also looking at OGF standards such as GLUE 2.0 (information on a Grid) and AUTZ (authentication on the Grid).



Activities in Open Grid Forum (OGF)

- ▶ Towards setting up a research group on Desktop Grids (BoF in Barcelona)
- ▶ Active in GIN-GC (Grid Interoperation Now Community Group)



Standardisation - continue

- ▶ There are also other Grid standardisation organisations
- ▶ One of them is ETSI
- ▶ How could ETSI help EDGeS?
- ▶ Hope to hear that from the next speaker!



