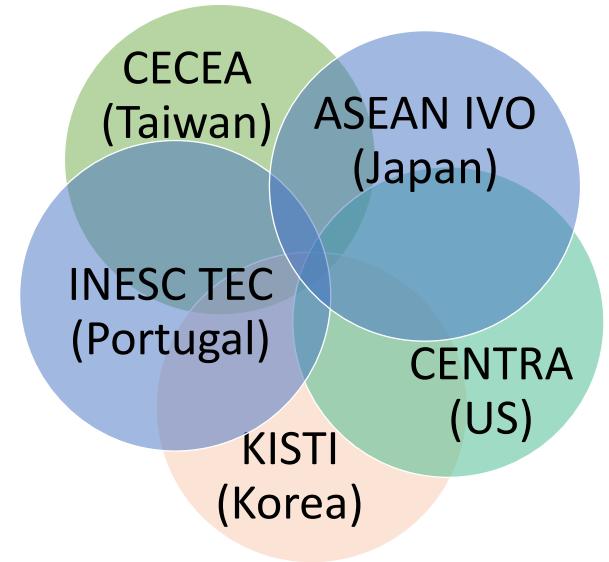




Introduction to CENTRA: a framework for sustained global Collaborations to Enable Transnational Cyberinfrastructure Applications (4/2019)



José Fortes, U. of Florida (USA)

Kum Won Cho (Kisti, Korea)

Shinji Shimojo, U. of Osaka (Japan)

Fang Pang Lin, NCHC-NARL (Taiwan)

Rui Oliveira, INESC TEC (Portugal)



Brief history



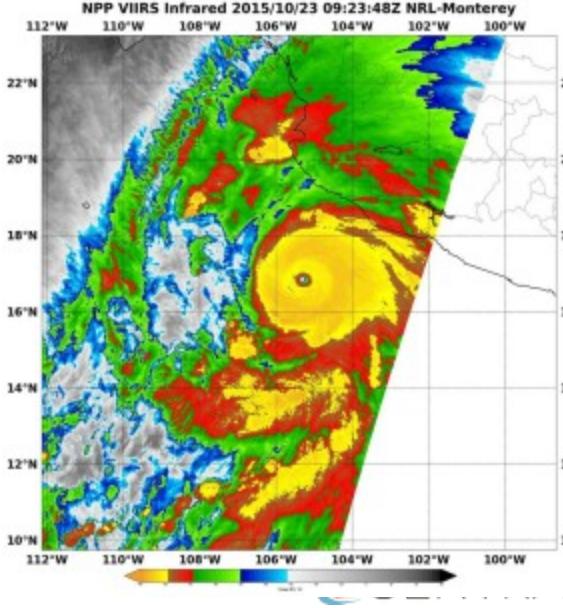
- Evolution and spinoff from several international activities: PRAGMA, SEAIP and IVO (2014-2015)
- Concurrent proposals to US NSF, Taiwan MOST and Japan NICT
 - Funded October 2015
- Kickoff meeting March 30 – April 1, 2016
- Founding Institutional Members
 - Center of Excellence for Cyber-Enablement of Applications ([CECEA](#)) – Taiwan
 - ASEAN International Virtual Organization (IVO) – Japan
 - Advanced Computing Systems Laboratory (ACIS) – USA
- INESC TEC (Portugal) and KISTI (Korea) joined CENTRA

Application areas: smart & connected communities, environment and disaster management

- Inherently international and dependent on IT
- Technically challenging with dynamic requirements
- Intersecting and important to huge populations

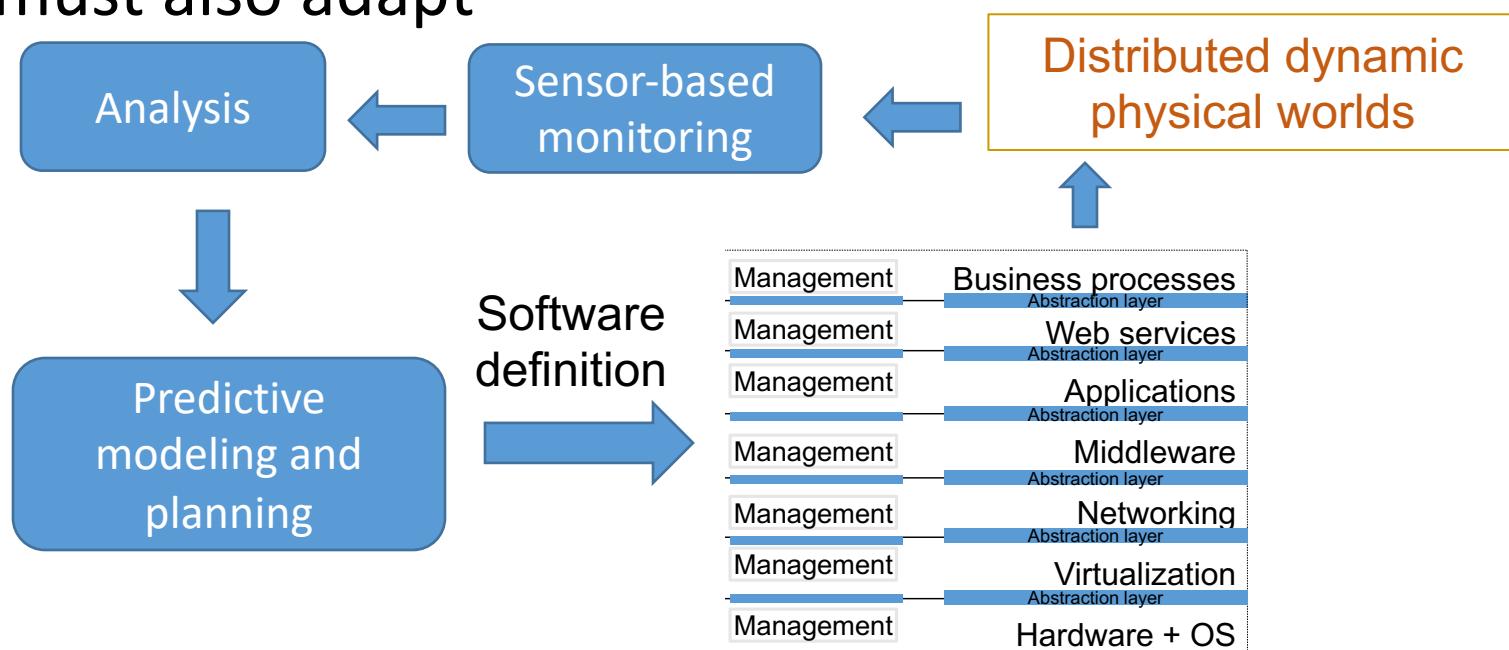


<http://www.claimsjournal.com/news/international/2015/10/23/266570.htm>



IT research umbrella: software-defined/adaptable IT systems

- Requirements of smart cities/connected communities, environment modeling and disaster management change and interact over time -- thus IT solutions must also adapt





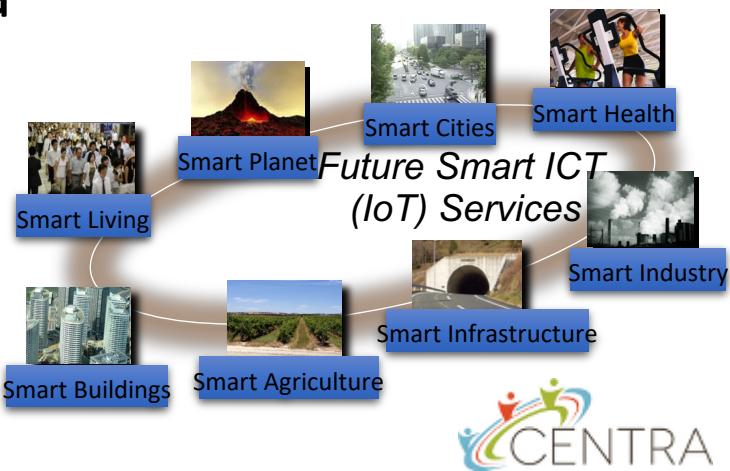
Why international collaboration networks?

- For proper formulation and solution of problems that are transnational or global
 - Internationalization
- Sustained long-term collaborations require next-generation researchers
 - Who also get valuable training
- Diversity brings multiple points of view
- Leading world experts and brightest minds
- “**Being global requires starting global**”



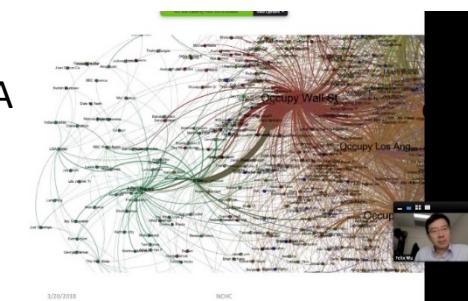
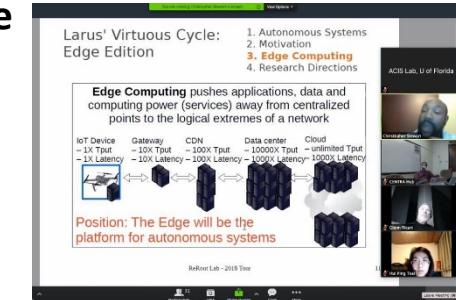
What CENTRA enables now

- Face-to-face interdisciplinary meetings of experts on application domains and cyberinfrastructure
- Interactions between senior world-class experts and junior researchers
- Seeding/advancing projects
- Access to unique testbeds and data
- Exchange visits between sites
- Distributed collaboration means
- Site researchers funded by their CENTRA site to do above



Spring 18&19 Global CENTRA Webinar Series

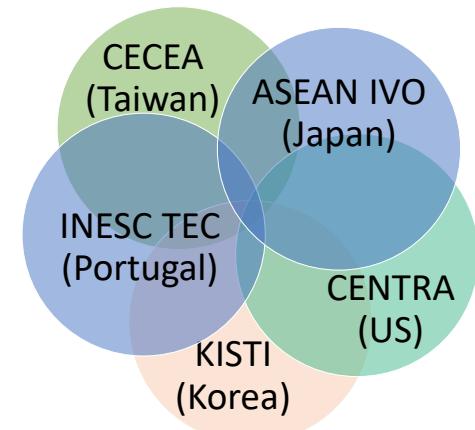
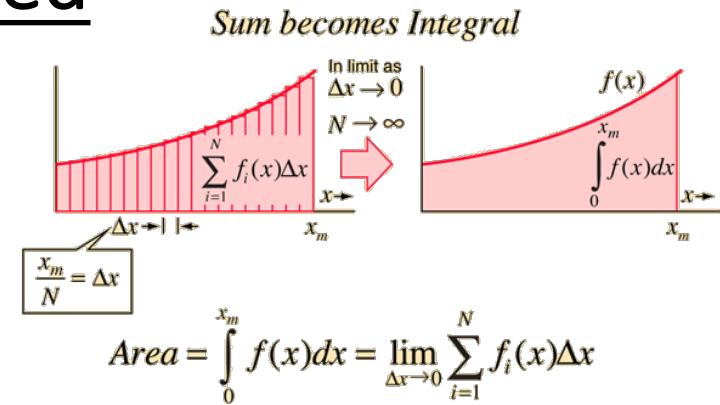
- 1/09 **Development and Opportunities in the New Digital Society** Shuo-Yan Chou, National Taiwan University of S&T.
- 1/16 **PRAGMA-ENT: An International SDN testbed for cyberinfrastructure in the Pacific Rim** K. Ichikawa, NAIST, Japan
- 1/24 **Edge Computing for Autonomous Systems** C.Stewart, OSU, USA
- 2/06 **Implementation of a Transnational Testbed with Layer 3 SDX**, Te-Lung Liu, NCHC, Taiwan
- 2/13 **Dynamic Information Flow for IoT in Hardware** D. Oliveira, UF, USA
- 2/28 **Beyond Databases: Rethinking New Approaches to Virtual Collaboration and Data-sharing** T. Nguyen, U. of Virginia, USA
- 3/13 **Automatic Traffic Control with Surveillance Cameras** H-J. Lee, SNU, S Korea
- 3/28 **SafeFS: Secure Software-Defined Storage** J. Paulo, INESC, Portugal
- 4/10 **SafeDB: Secure Database Processing** F. Maia, INESC, Portugal
- 4/25 **Analyzing Online Social Interactions for Cyber Security, Framing, and Network Interference** F. Wu, UC Davis, USA
- 1/17 **Integrating Autonomy into Transportation Systems**, C. Wu, Microsoft, USA
- 3/21 **Machine Learning and Application in Remote Sensing**, A. Zare, UF, USA
- 4/10 **ABCI: An Open Innovation Platform for Advancing AI Research and Deployment**, R. Takano, AIST, Japan.



Propose/volunteer your own webinar!!!

Highlights since CENTRA started

- Progress of projects (talks later today)
 - 8-9 active collaboration projects
 - 8 proposed in CENTRA 4
- Webinar series
 - 13 webinars since January 2018
 - 140 unique participants, ~35 views per webinar
- Exchange visits (~10)
 - Taiwan to Florida (H. Tsai, Smart Agriculture)
 - Florida to NICT (K. Subratie, Edge Sensing/Computation)
 - Kansas U. to Taiwan (Distributed Lifemapper)
- Four CENTRA meetings (including CENTRA 4)
 - Average 86 registered participants
 - ~30% are early career researchers
 - Average 8 countries
- Future meetings
 - CENTRA 5, May 13-15, 2020 in Porto , Portugal



What are CENTRA meetings for?

Connecting Data, Applications and People in Smart Cyberinfrastructure and IoT



Conceptualizing and reporting
on projects, each including

- Problem and ideas
- Team
- Work plans and testbeds
- Outcomes
 - Papers
 - Prototypes
- Schedule for team meetings and exchange visits

CENTRA 4 agenda: a pelican's view

Mon

- Flyby: Welcome and Keynote
- Dive-in: presentations of projects



Tue

- Panel discussions
- Catch: join projects/problems/ideas
- Demos



Wed

- Invited talk
- Planning: groups identify next steps
- Takeaway: status/future of projects



going forward to CENTRA 5 (2020)



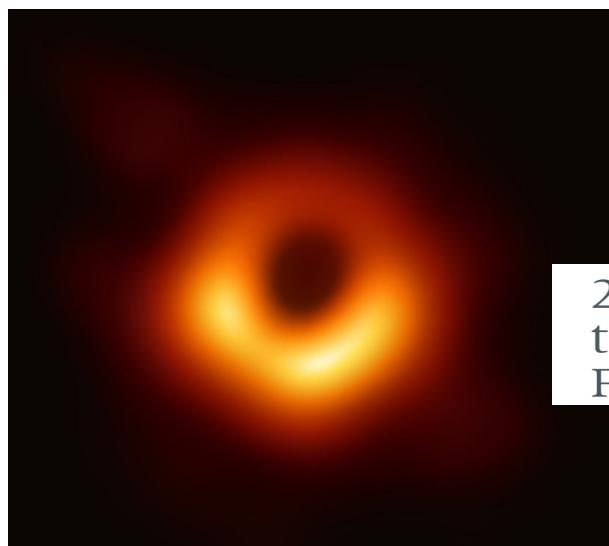
Think bold, do together...



The black hole in pics: Multinational observatories release first photo

The photo was taken with the help of the Event Horizon Telescope (EHT) project — a multinational collaboration of observatories, which was started in 2012.

From Moneycontrol.com



21 UA Students Contributed to Global Effort Resulting in First Black Hole Image

From U. Arizona News



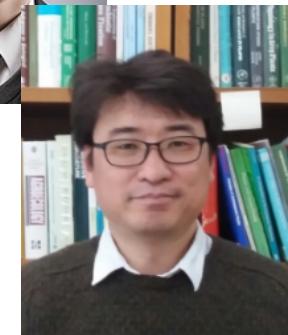
The EHT uses a global network of dishes to simulate a telescope of this size.

Invited speakers and panels

- “*P4: Its Concept and Applications to Data Science*”, Sangheon Pack (Korea University)



- “*Management of Crops Using On-Site Measurements*”, Kwang Soo Kim (SNU)
- **Panel 1:** “*What is good about CENTRA and how to make it better*”



- **Panel 2:** “*Sustaining and growing CENTRA towards CENTRA 10*”



CENTRA projects (ongoing)

1. Dynamically Aggregating Smart Community Sensors, Edge and Cloud Resources with Overlay VPNs, Renato Figueiredo



2. SDN-IP Peering for IoT Data Transmission, Te-Lung Liu



3. IT for Natural Disaster Management & Visualization Alliance, Jason Haga



4. Edge-Net.org, Glenn Ricart



5. AirBox: a Participatory Ecosystem for PM2.5 Monitoring, Ling-Jyh Chen



6. Collaborative Lifemapper, Aimee Stewart



7. Privacy-preserving Cloud Computing for IoT, Joao Paulo



8. “AVAU Applications for Smart Agriculture”, Ming-Der Yang, Hui Ping Tsai



9. Secure Data Collaboration Using GFFS, Tho Nguyen

CENTRA 4 New/Proposed Projects

9. “*ScienceLoRa: The Wireless IoT Network & Service in KREONET for IoT Applications in Science*”, Joobum Kim.



10. “*Semi-Automated Emergency Response Systems*”, Tam Chantem.



11. “*Data Science Platform for Scaling Collaborative Research*”, Susana Barbosa.



12. “*Development of a low-cost camera system for object recognition/tracking and its applications*”, Hyuk-Jae Lee



13. “*Smart and Connected Communities Testbed*”, Glenn Ricart



14. “*HPC Demand Response*”, Jason Liu



15. “*SCALE3:A resilient IoT data gathering and real-time data processing for safe community alerting*”, Kyungbaek Kim



16. “*Social-Edge CPS: Social-Cyber-Physical Systems Meet Edge Computing*”, Hana Khamfroush



Example ongoing projects (1)

- “*Dynamically Aggregating Smart Community Sensors, Edge and Cloud Resources with Overlay VPNs*”,
Renato J. Figueiredo, Kensworth Subratie, Saumitra Aditya,
Vahid Daneshmand (**University of Florida, USA**),
Eiji Kawai, Hiroaki Yamanaka, Naomi Terada (**NICT, Japan**),
Glenn Ricart (**US Ignite, USA**),
Hyuk-Jae Lee (**Seoul National University, South Korea**),
Jingtao Sun, Tomoya Tanjo (**NII, Japan**),
Kohei Ichikawa (**NAIST, Japan**),
Ryousei Takano (**AIST, Japan**),
Susumu Date, Takuda Yamada, Yoshiyuki Kido (**Osaka U.**).

Example ongoing projects (2)

- “*SDN-IP Peering for IoT Data Transmission*”,

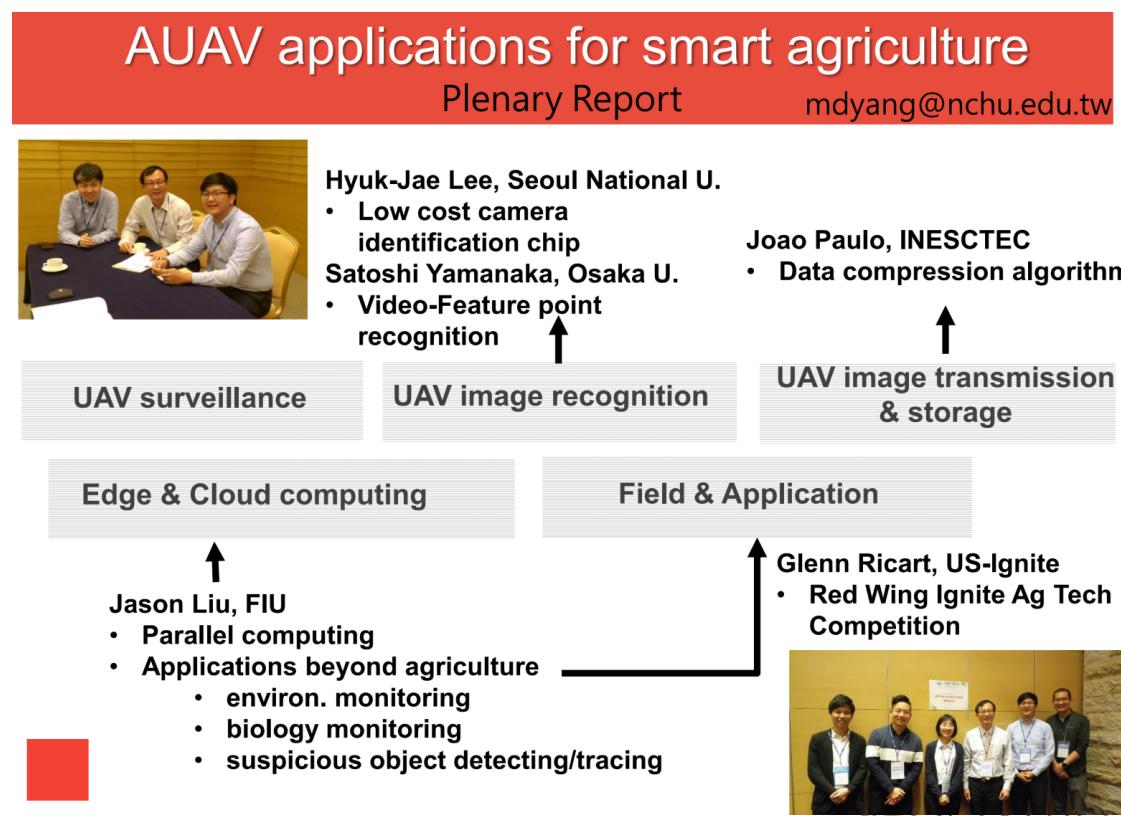
Te-Lung Liu, Grace Hui-Lan Lee, Jen-Wei Hu (**NARLabs, Taiwan**),
Shinji Shimojo, Naomi Terada, Yoshihiko Kanaumi, Eiji Kawai (**NICT, Japan**),
Yasuaki Shinzato, Fukumasa Morifuji, Hirofuyu Noguchi (**OOL, Japan**),
Chu-Sing Yang (**NCKU, Taiwan**),
Chien-Chao Tseng (**NCTU, Taiwan**),
Joe Mambretti, Jim Chen, Fei Yeh (**iCAIR, USA**),
Jelina Tetangco, Jay Combinido, Peter Banzon, Christian Matira, Jon Perdon (**ASTI, Philippines**),
Linh Truong Dieu, Binh Minh Nguyen, Ngo Hong Son (**HUST, Vietnam**),
Phạm Dinh Lam (**VNU, Vietnam**),
Chalermpol Charnsripinyo (**NECTEC, Thailand**),
Luke Jing Yuan (**MIMOS, Malaysia**).

Example ongoing/new project (3)

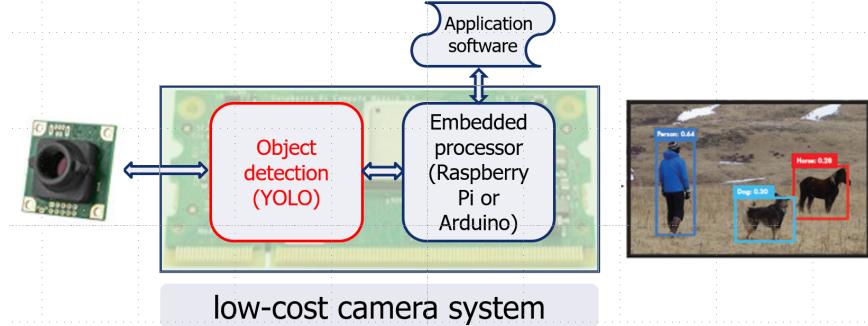
- “*AVAU Applications for Smart Agriculture*”,
Ming-Der Yang, Hui Ping Tsai, Cloud Tseng, Yu-Chun Hsu (**NCHU, Taiwan**),
Christopher Stewart (**Ohio State University, USA**).



- Evolved from PADE: Precision Agriculture with Drones and Edge,
Christopher Stewart; Using UAV Images to Monitoring Rice Paddy with Artificial Intelligence, Hui-Ping Tsai et al.



Example new project



- *“Development of a low-cost camera system for object recognition/tracking and its applications”*, Hyuk-Jae Lee (Seoul National University, Korea), Jinsung Kim and Kyujoong Lee (Sunmoon University, Korea).



Smart farming



Traffic monitoring



- Challenges in Object Recognition
 - food items, maybe wrapped in paper or hidden, and their life log
- Smart Fridge-enabled applications and services
 - The dynamics of your refrigerator, possibly shared with others, say a lot about your life and your relationships with others
 - Impact: health and nutrition, food safety, tracing and freshness, applications leveraging community-aggregated fridge data
- Consumer-based Smart Appliance Ecological System
 - Prof. Hyuk-Jae Lee, **Seoul National University**, Prof. S. Felix Wu, **UC Davis** (on sabbatical at Tunghai University), plus potential industrial partnership

Posters and demos

- Posters shared with PRAGMA
- Demos (partly shared as well)
- PRAGMA sessions open to CENTRA attendees



Conclusions and future



- CENTRA provides a framework (i.e. mechanisms and opportunities) for international collaborations in the use of IT technologies to solve transnational problems. **IT WORKS!!**
 - We (this includes all of you) helped build CENTRA.
 - Please get/continue to be involved to shape CENTRA's future.
- CENTRA 5 in Porto, Portugal, May 13-15, 2020.
- We are talking about CENTRA 10!!
 - Join CENTRA (as an individual or an institution)
 - Host a CENTRA meeting (CENTRA 6, 7, 8, 9 ...)
 - Talk/send email to CENTRA Steering Committee
 - José Fortes, U. of Florida (USA)
 - Kum Won Cho (Kisti, Korea)
 - Shinji Shimojo, U. of Osaka (Japan)
 - Fang Pang Lin, NCHC-NARL (Taiwan)
 - Rui Oliveira, INESC TEC (Portugal)



Acknowledgements



- KISTI (Korea Institute of Science and Technology Information)



- National Science Foundation (NSF) of USA

- ACI award 1550126 (Program Director Kevin Thompson)



- Ministry of Science and Technology (MOST) of Taiwan

- Center of Excellence for Cyber Enablement Applications



- INESC TEC, Portugal



- International Program of NICT, Japan



National Institute of
Information and Communications Technology

- ACIS, University of Florida



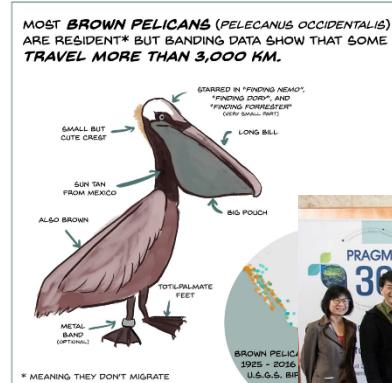
and AT&T Foundation



Why Pelicans?

(Let's check on Wikipedia)

- Collaboration plus traveling:
 - Pelicans are gregarious birds, travelling in flocks, hunting cooperatively, and breeding colonially.
- Next generation researchers:
 - In medieval Europe, the pelican was thought to be particularly attentive to her young, to the point of providing her own blood by wounding her own breast when no other food was available.
- It is poetic!



<https://gomann.org/project-pelican-graphic-novel>



Dixon Lanier Merritt, 1910

*A funny old bird is a pelican.
His beak can hold more than his belican.
Food for a week
He can hold in his beak,
But I don't know how the helican.*



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Thanks to CENTRA 4 organizers

- Woojin Seok, KISTI
- Joobum Kim, KISTI
- Kiwook Kim, KISTI



- Grace Hong, ACIS Lab, University of Florida
- All participants and volunteers



Exchange Visits (5/2017-4/2018)

- Overlay VPNs for Sensors, Edge and Cloud Resources project (UF visits NICT)
- Distributed Lifemapper: installation, tutorials and short courses (KU visits NCHC)
- Visualization Wall and Disaster/Environment Management (NCHU visits UF)





Did you do the pre-CENTRA 4 survey

<https://forms.gle/4mcJditakuTrcQ98>

CENTRA 4 Events (see program for details)

- Group Photo
 - Immediately after this talk
- Demo Session
 - Tomorrow at 5:00 PM after last session
- Poster showings
 - Throughout the meeting (see during breaks)
- Lunches, Dinners and Reception
 - See Program
- PRAGMA 36 – Wednesday, Thursday and Friday
- Networking day – Saturday (See Program)



Questions in post-CENTRA 4 survey

<https://forms.gle/7sofxW4YhDWKBLxy5>

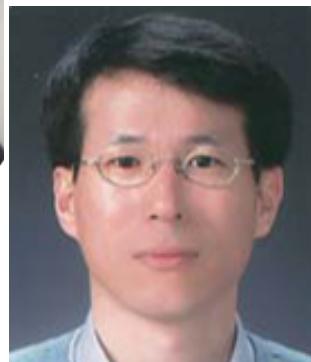


Thanks to our hosts and invited speakers

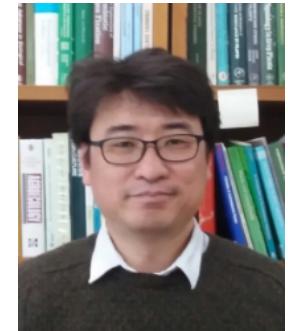
- Hee-Yoon Choi
 - President of KISTI



- Kum Won Cho, Vice-President of KISTI



- Sangheon Pack, Professor of ECE at Korea University
- Kwang Soo Kim, Associate Professor, Seoul National University



- Woojin Seok, Joobum Kim, Kiwook Kim
 - Senior Researchers at KISTI

