



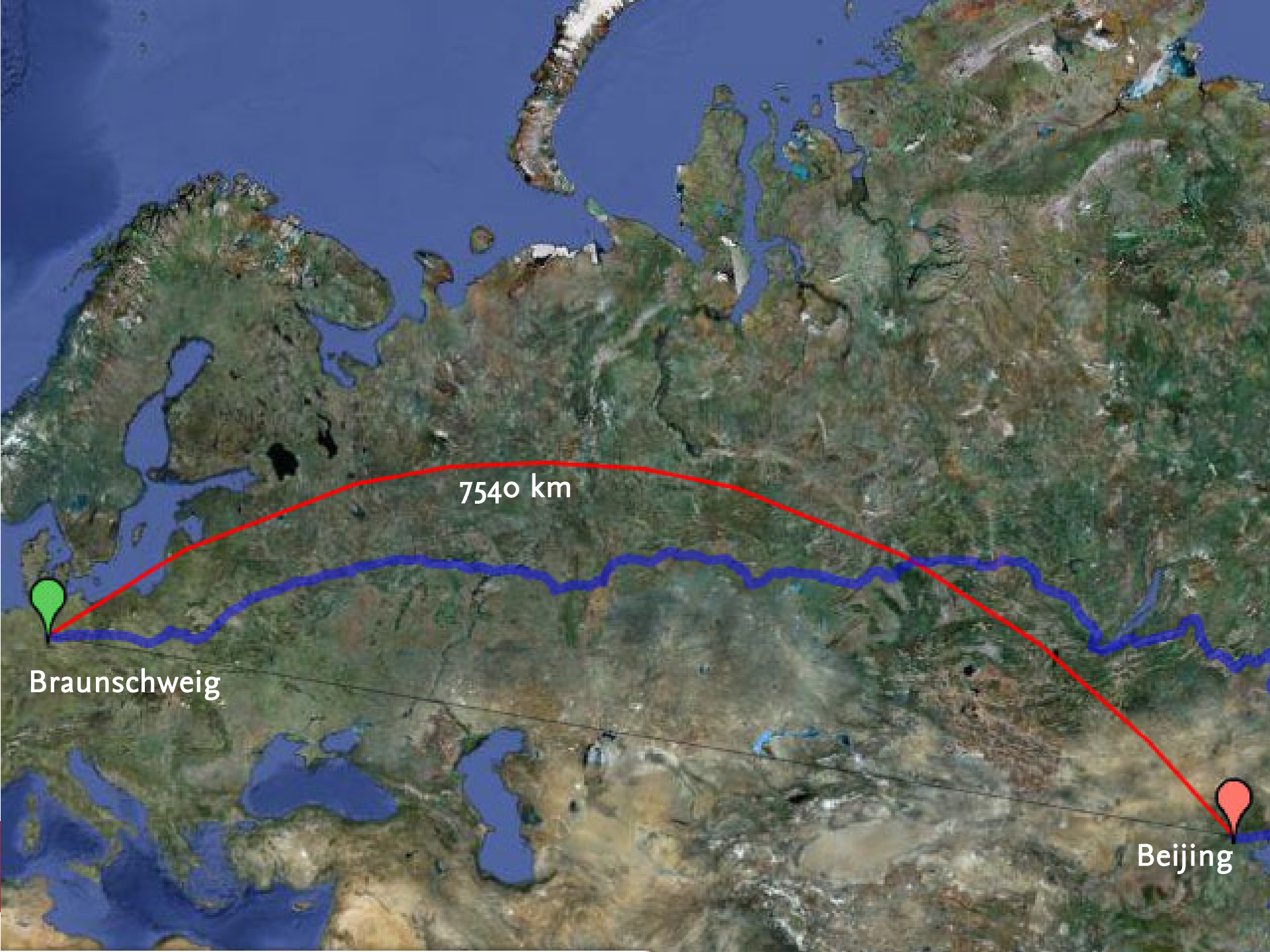
Technische
Universität
Braunschweig

Institute of Operating Systems
and Computer Networks



The GAL Monitoring Concept for Distributed AAL Platforms

Felix Büsching, Maximiliano Bottazzi, Lars Wolf

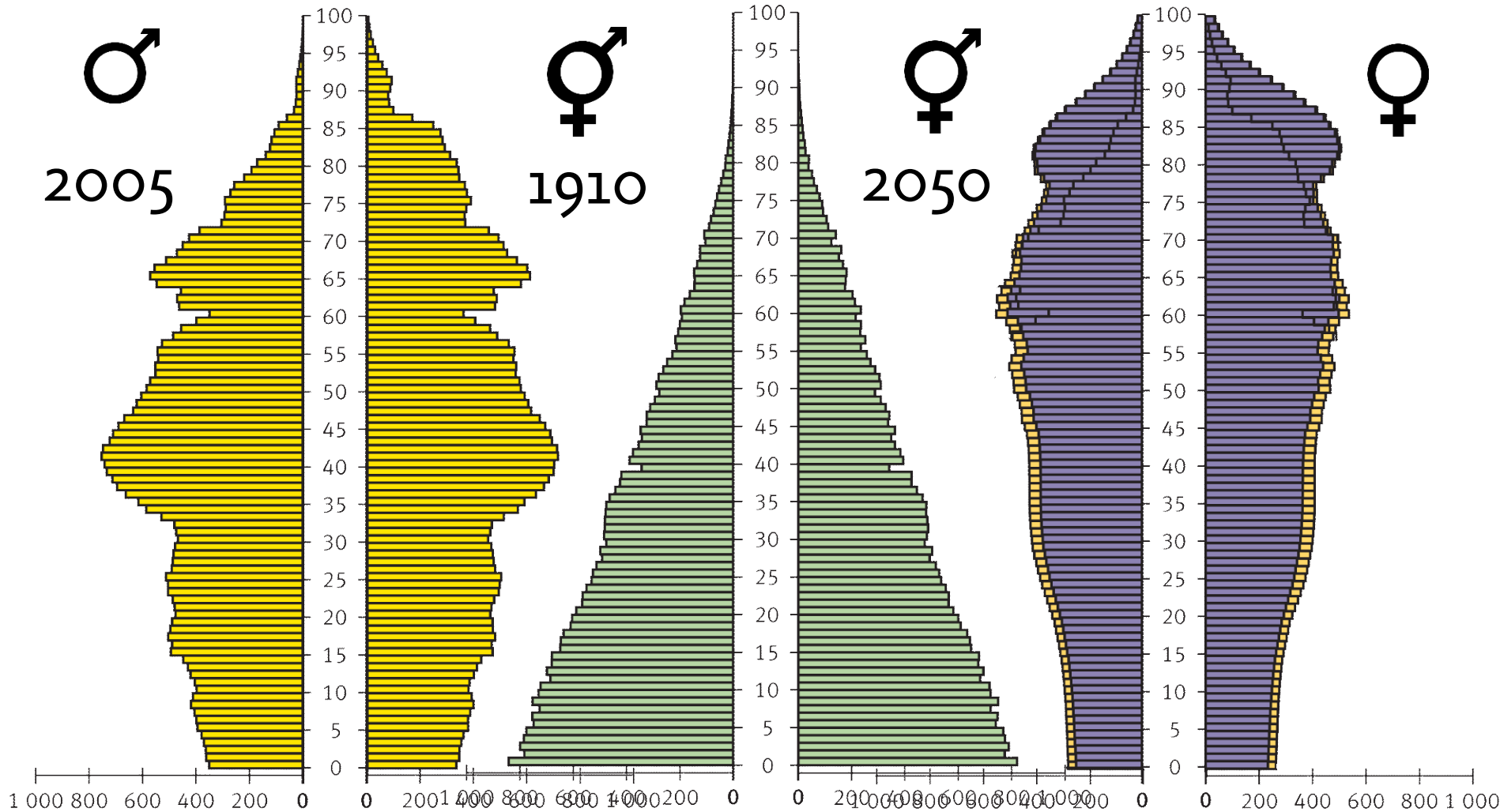


7540 km

Braunschweig

Beijing

What are we dealing with in Germany?



What the hell is GAL?

German Project “GAL”

Gestaltung

Alternergerechter

Lebenswelten

“Design of Environments for Aging”

- Research project
- Funded by the state of Lower Saxony
- Interdisciplinary approach

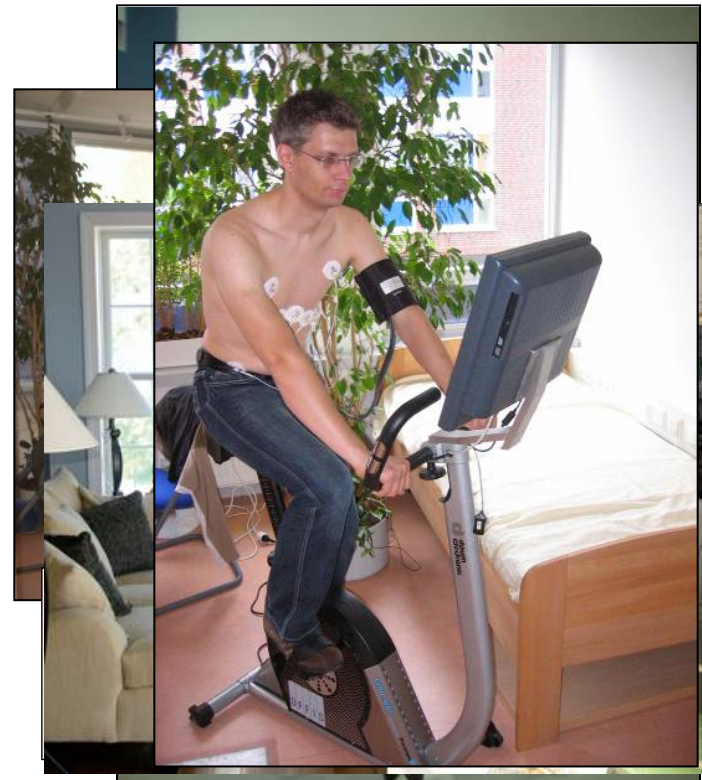


Use Cases / Scenarios

Exemplary Assisting Systems

1. Personal activity and household assistant
2. Monitoring of sports activities in prevention and rehabilitation
3. Sensor-based activity determination
4. Sensor-based fall prevention and fall recognition

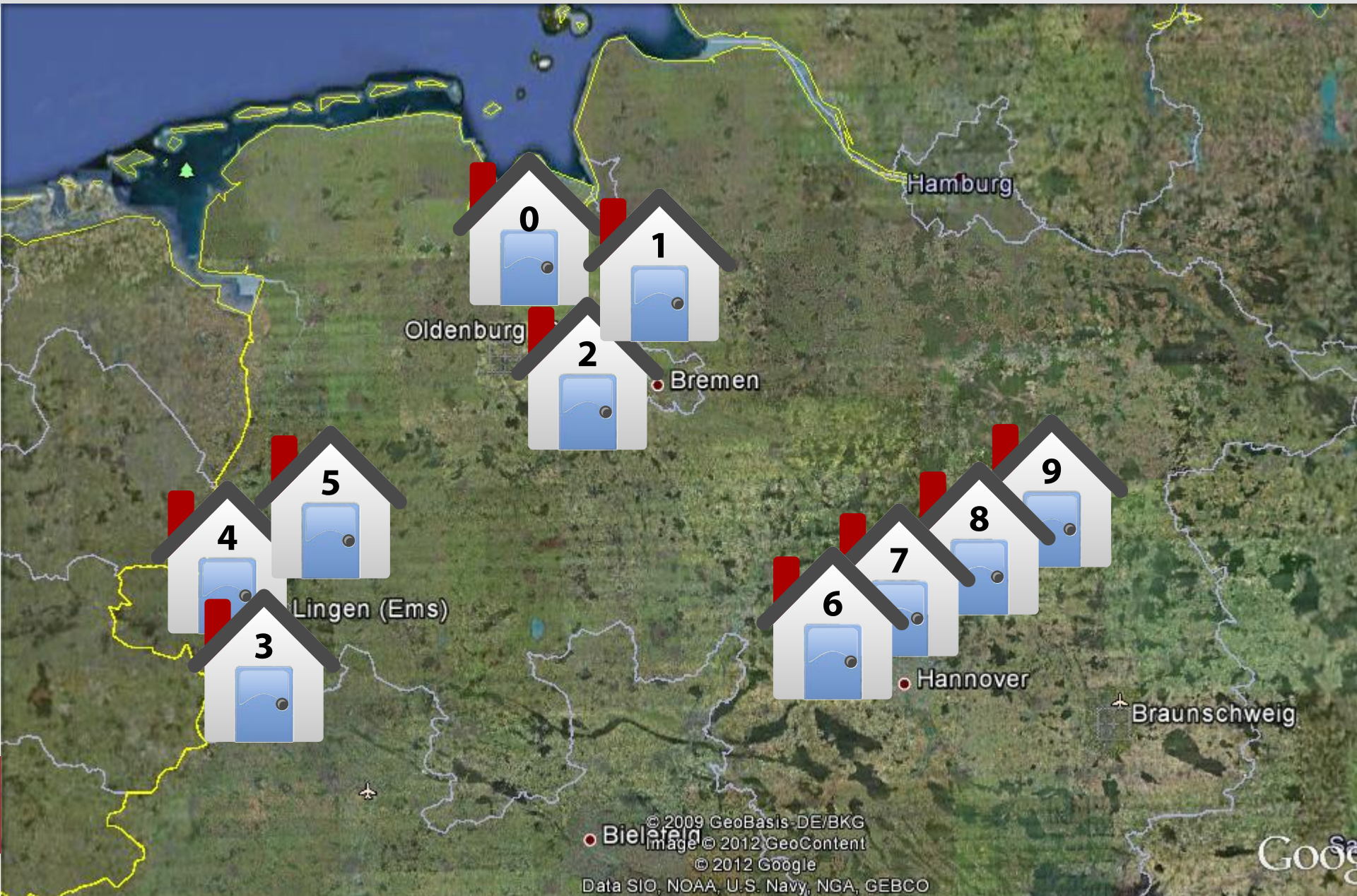
All running on the same platform
@home of an elderly person



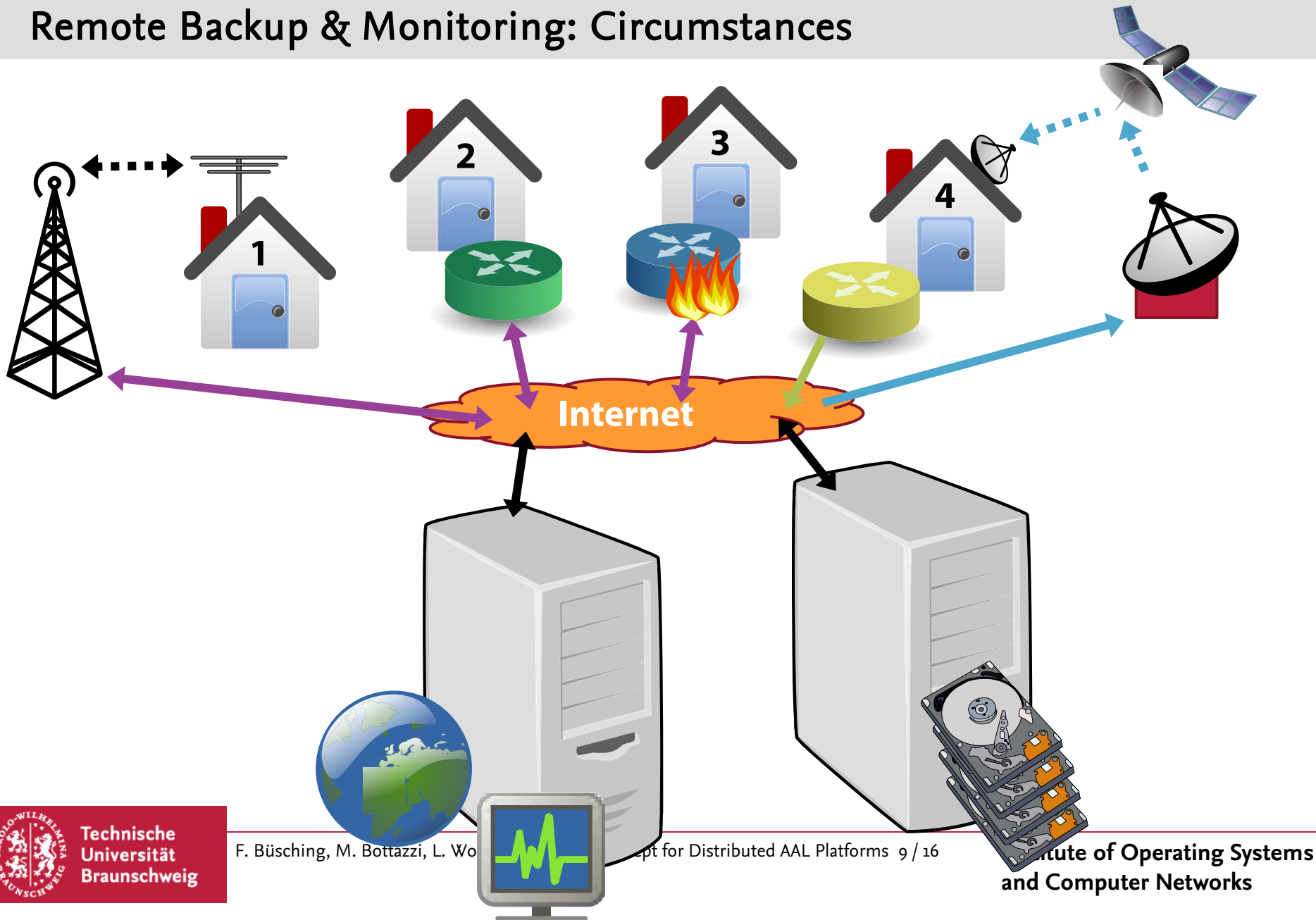
Multi-Services Home Platform – Middleware and Gateway



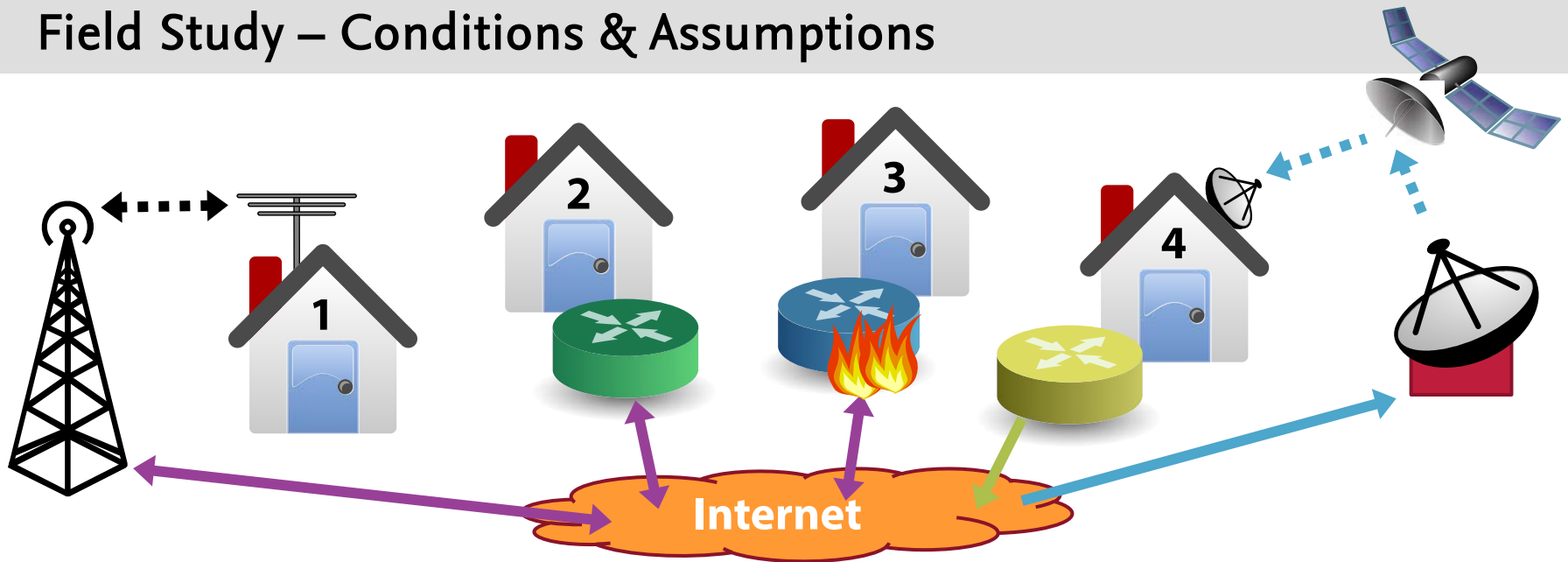
Motivation: Going outside!



Remote Backup & Monitoring: Circumstances



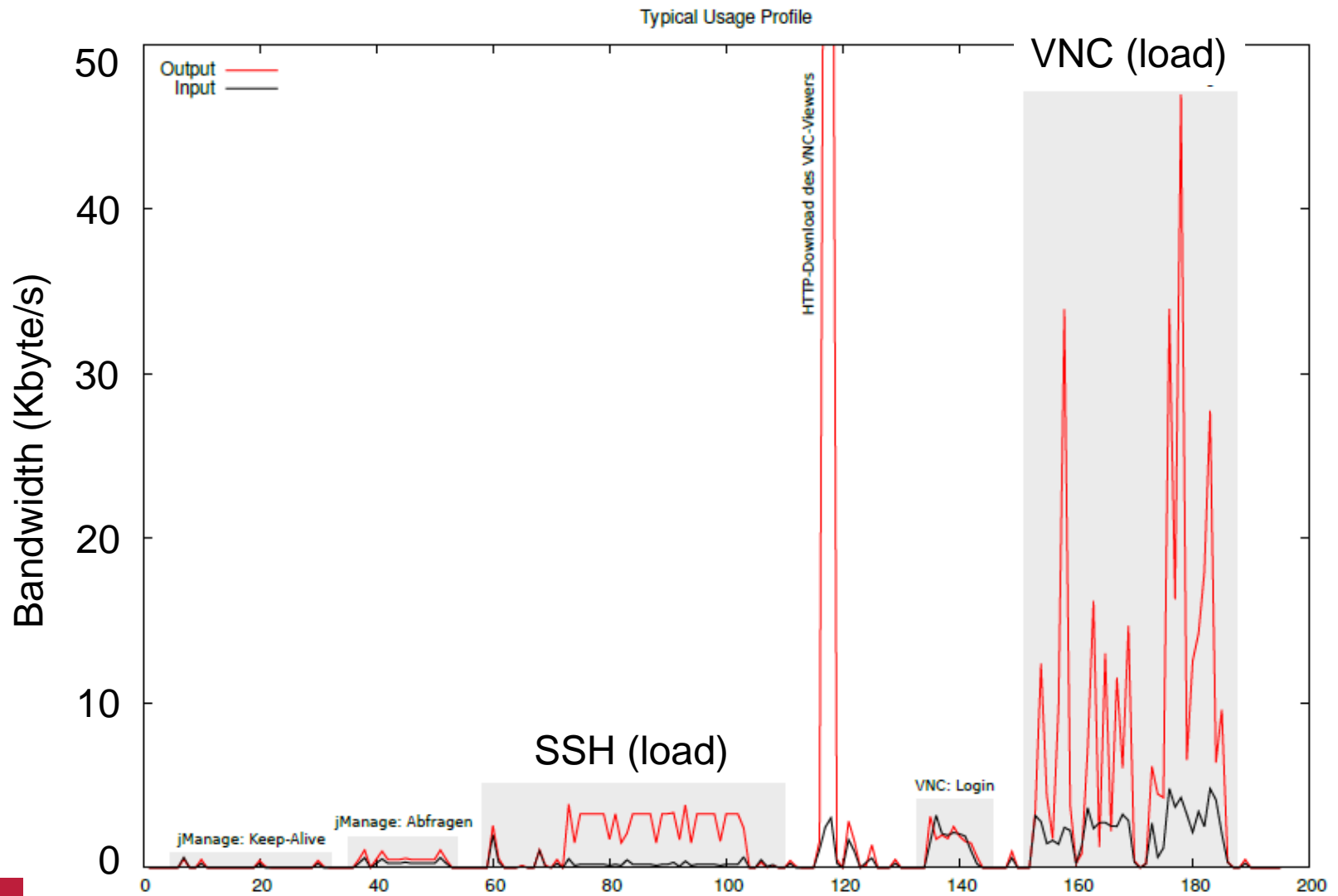
Field Study – Conditions & Assumptions



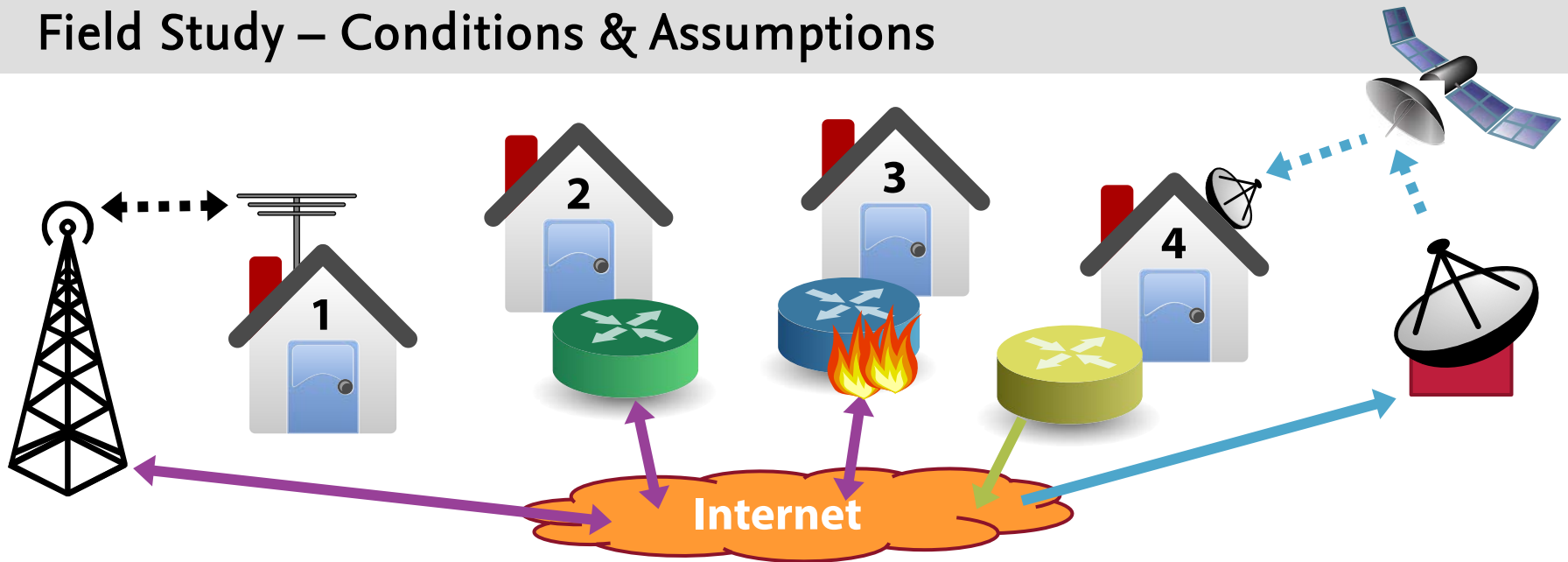
Scattered MSHP-Systems

- Connection to the internet
 - Various physical layers (Modem, ISDN, xDSL, GSM, 3G, 4G...)
 - Various (asymmetric) connection speeds (56 kbit/s → >100 Mbit/s)
 - Firewalls, NAT
- No access to intermediate systems (routers, provider networks, ...)

Connection Speed



Field Study – Conditions & Assumptions



Scattered MSHP-Systems

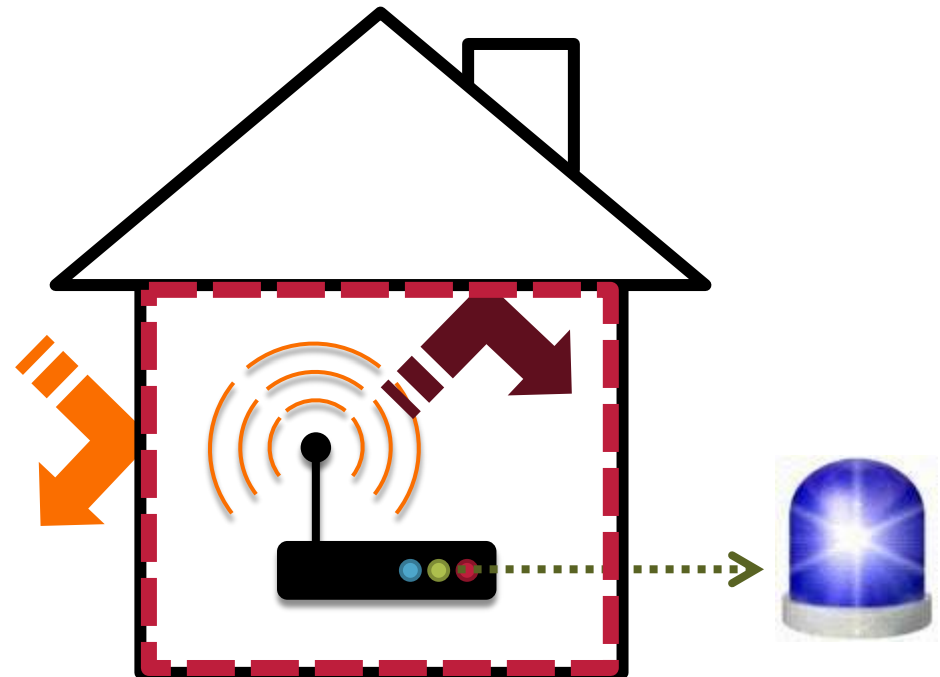
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GAL Privacy and Security Paradigm

- “**Every bit** of recorded and processed data **stays at** a persons **home** on their own MSHP(-System)”
 - All processing is done “at home” – no online-service/cloud/server involved
- Only high level alarms leave the platform
 - No transmission of low-level data
 - User may initiate transfer
- No way in (from the outside)

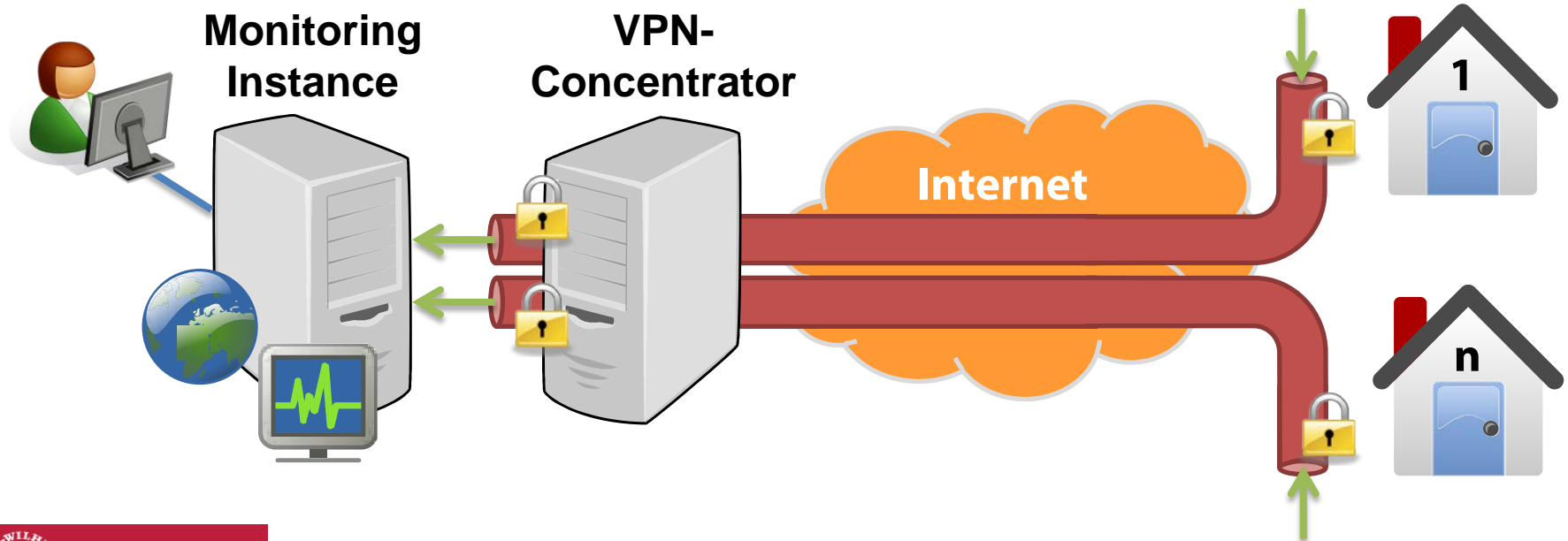
... in contradiction to

- Remote Monitoring
- Remote Configuration
- Remote Backup & Restore



VPN: Means of Choice

- VPN Concentrator at central place
- MSHPs establish connection to VPN concentrator
 - Initiated from each MSHP
 - TUN-Interface is the only usable Interface
 - MSHPs not reachable from “the Internet”

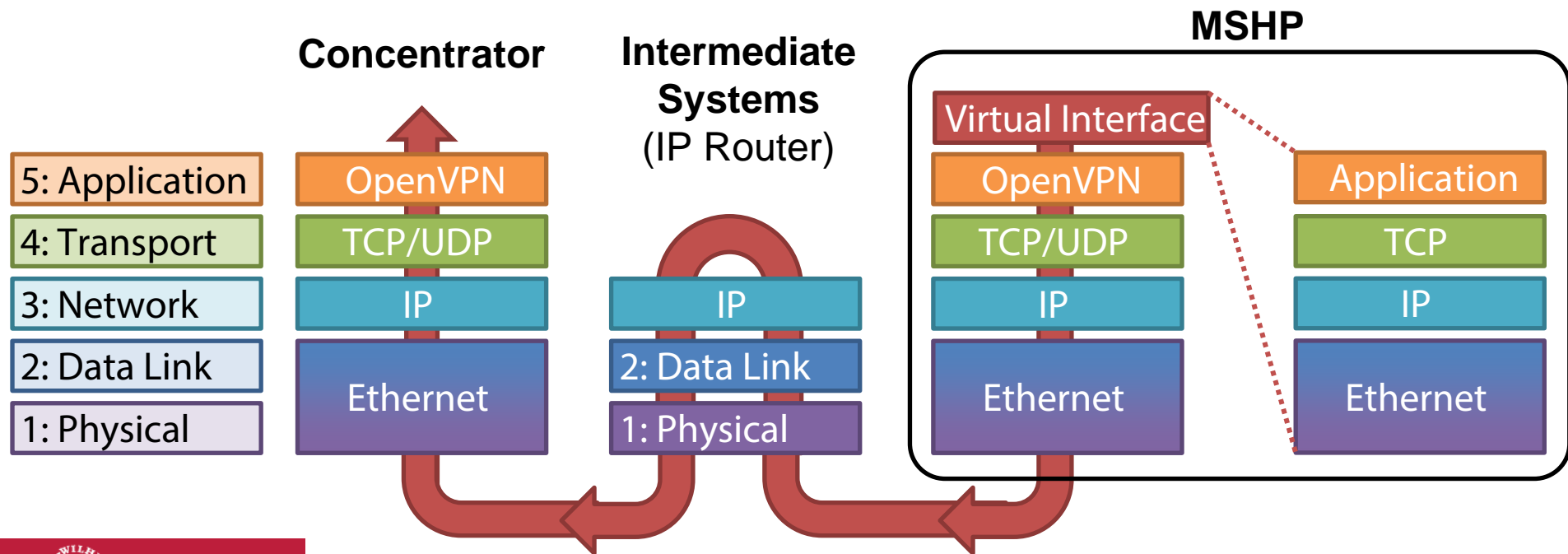


Application Layer VPN: OpenVPN

- Open Source
- Transport Layer Security (TLS)
- Little Overhead

Layer 5 – no problem for

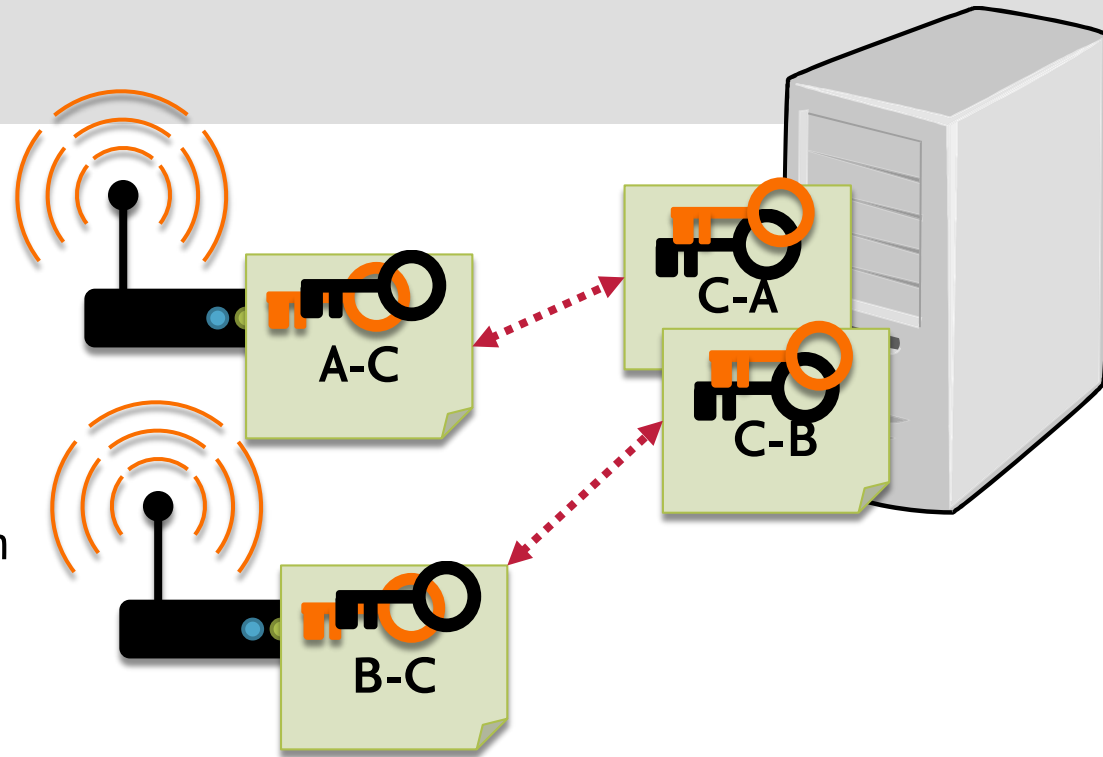
- Intermediate Systems
- NAT
- Firewalls



Implementation

Pre-install MHSPs

- Settings
 - concentrator address
- Certificates
 - Pairs of keys for every system



Just...

- ... carry the preconfigured system to end user!
- ... plug it in (existing Internet connection)
- -> System is capable of being monitored

Current status & Future Work

- Automated setup of MSHP systems ✓
- VPN concentrator up and running ✓
- Basic monitoring by heartbeat ping ✓
- Remote configuration by SSH access ✓
- Web interface for detailed monitoring and remote configuration ✓
- Encrypted remote backup and restore ✓

Just about to deploy the systems!

ID	Name	Value	Unit	Min	Max	Parent	Status
95	Sensor_95	8	test_unit	10	50	Node_95	online
98	Sensor_98	65	test_unit	10	50	Node_98	online
97	Sensor_97	19	test_unit	10	50	Node_97	online
94	Sensor_94	20	test_unit	10	50	Node_94	online
96	Sensor_96	81	test_unit	10	50	Node_96	online

ID	Name	Value	Unit	Min	Max	Parent	Status
68	Sensor_68	63	test_unit	10	50	Node_68	online
69	Sensor_69	58	test_unit	10	50	Node_69	online
70	Sensor_70	44	test_unit	10	50	Node_70	online
66	Sensor_66	82	test_unit	10	50	Node_66	online
67	Sensor_67	43	test_unit	10	50	Node_67	online

Summary and Conclusion

Privacy and Security have to be addressed in AAL Platforms

- Storing & processing the data **in place** may be an option!

Remote Monitoring of AAL Platforms is needed

- At least if deployed in rural areas

Application Layer VPN (e.g. OpenVPN)...

- Secures Monitoring Traffic
 - Even unsecure SNMP v1/2 is utilizable
- Deals with Firewalls, NAT, IS
- Solves some privacy & security issues
 - If connection is initiated by remote AAL system

Thanks for the attention!

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