

The Smart City in Germany

Re-considering Challenges of Sustainable Urban Development

德国智慧城市- 城市可持续发展挑战再思考

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UNI
FREIBURG

弗莱堡大学

Background of the talk

背景

Senior researcher at Freiburg University

弗莱堡大学高级研究员

Building up a research group on “Urban Environmental Governance”

“城市环境治理” 研究团队

Disciplinary background: 学科背景

- Political Scientist, Geographer,
- Phd in STS (Science, Technology & Society) from 2009
- 政治学家, 地理学家 - 2009年获得科学、技术和社会博士学位

Besides:

- Co-founder (1997) & inhabitant of housing cooperative “Genova” in Freiburg-Vauban
- Vauban社区住房合作社（Genova）的合作创建者，同时其本人也居住其中

Current research project: „Smart Eco-Cities“

当前研究项目：智慧生态城市

Overall objective: 整体目标：

Understand ‚Smart‘ and ‚Eco‘ - urbanism in interplay,

i.e. dynamics of city-positioning & implementation of changes

探究智慧城镇化和生态城镇化之间的相互作用关系（例如：城市定位动力和改变的实施）

Means: 方式&途经：

Compare cases (cities + projects) from UK, NL, F, GER & China

英国、荷兰、法国、德国和中国的案例对比研究（城市+项目）

Specific objects: 特定研究对象：

-identify patterns in governance arrangements

-explore potential for learning across cities

-deduce policy recommendations(e.g. re. framework conditions)

- 1: 识别治理模式

- 2: 从城市学习中挖掘潜力

- 3: 推测政策建议

Key data of the research project

研究的主要数据

Period: 3 years (April 2015 - April 2018)

时间跨度: 3年 (2015年4月-2018年4月)

Funding: 5 national research funders

资金: 5大国家研究投资方 (欧洲+中国)

Europe: UK - ESRC, NL - NWO, F - ANR, D - 

China:



Partners:

合作方:

King's College London

& Universities of...

Nottingham-Ningbo-China, Utrecht, Freiburg,
Toulouse, Westminster, Cardiff

Structure of the talk 演讲框架

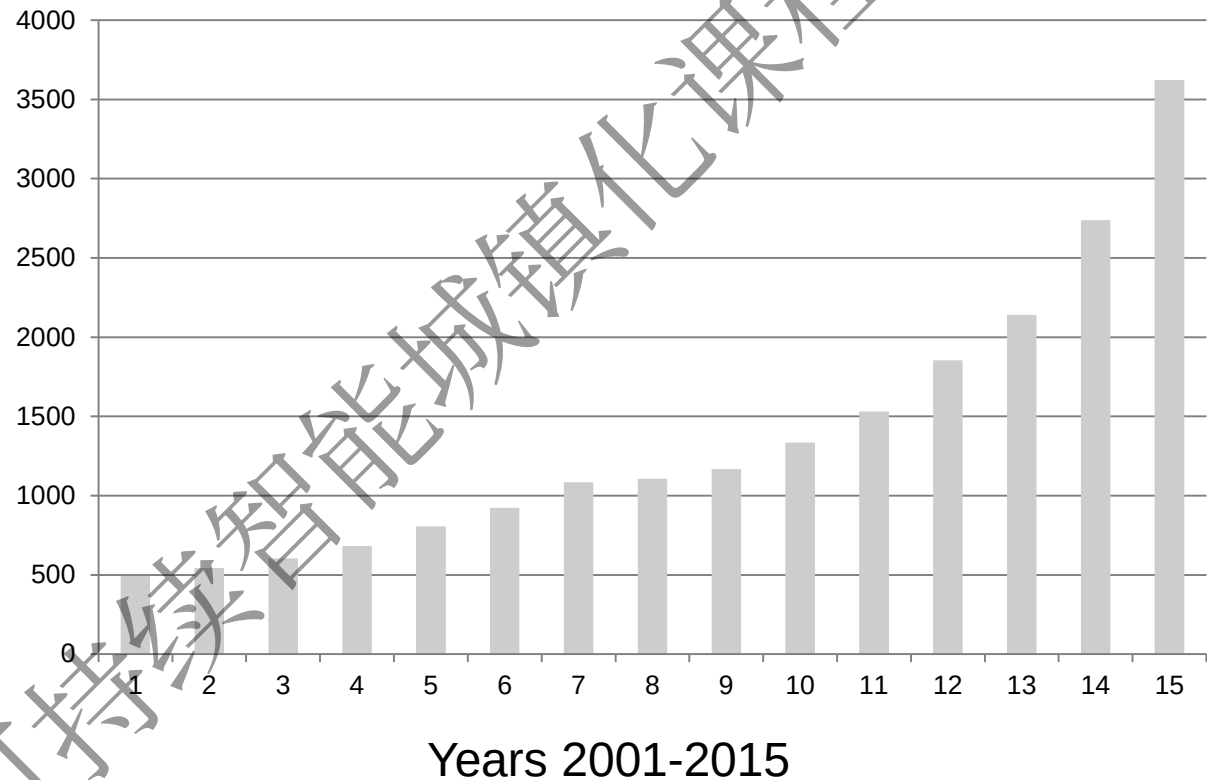
1. The smart City in Germany – Status Quo
德国智慧城市的现状分析
2. Example Projects, from Hamburg & Munich
案例分析（大多来自汉堡和慕尼黑）
3. The priorities of and obstacles for Smart Cities in GER
德国智慧城市发展的重点和障碍
4. A recent example of a PPP to reach a climate target: Bottrop
实现气候目标的公私合作案例——Bottrop
5. A historical example of community building: Vauban
一个具有历史意义的社区建造案例——Vauban
6. Final reflections
小结与反思

Smart City – a shooting star

智慧城市是当今炙手可热的议题

of publications
retrieved with
„Smart City“ (/ies)
in *Sciencedirect*

在*Sciencedirect*中
检索到包含“智慧
城市”的出版物的
数量



Retrieved: 2. Dec.2015

Smart City – What is it?

什么是智慧城市?

Many competing definitions exist

Locally specific definition is necessary.

The shortest definition:

“...a city in which ICT is merged with traditional infrastructures, coordinated and integrated using new digital technologies.”

(Batty et al. 2012)

ICT= Information & Communication Technologies

...reflects the core of many practitioner's definitions globally.

最简短的定义是:

Batty等(2012)认为智慧城市是城市中ICT和传统基础设施的融合, 协同一体化地使用新型数字技术。

其中, ICT为信息和通讯技术, 反映了大部分概念的核心。

Empirical findings

实证研究结论

Scanning the official websites of all 79 large cities (i.e. >100.000 inh.):

浏览所有79个大城市（人口大于10万人）的官方网站

⇒ Very few committed and coordinate projects.

=>几乎没有很肯定或进展顺利的项目

⇒ Many announced commitment in 2014/2015 but show no coordinated activity since.

=>许多城市承诺在2014和2015年间建设智慧城市，但至今未付诸行动。

Mostly referred to by experts:

=> Hamburg, Munich, Berlin, Cologne

被专家引述最多的城市：汉堡，慕尼黑，柏林，科隆

Results of a “horizon scanning”

基本概况

Germany:

Large cities (> 100.000) in total 81

大城市（人口大于10万）

No smart city ambition found in 43

没有智慧城市愿景

Very few projects, no coordination in 19

很少项目，不完善

Projects in multiple sectors + coordination in 19

有多个部门的项目，较为完善

Empirical findings (cont.)

实证研究结论

Our findings in UK, NL, F, GER
are in line with EU- DG IP/ Manville et al. 2015:9

Scandinavia: 斯堪的纳维亚半岛	virtually all large cities aim to be SCs 实质上所有大城市都有目标成为智慧城市
Italy, Austria, NL: 意大利、奥地利、荷兰	a majority of large cities “ “ “ 大部分大城市有目标成为智慧城市
UK, Spain, France: 英国、西班牙、法国	about half “ “ “ “ “ “ 将近半数的大城市有目标成为智慧城市
Germany, Poland: 德国、波兰	relatively few “ “ “ “ “ “ 相对几乎没有大城市有目标成为智慧城市

Smart City in Germany – Status Quo

德国的智慧城市现状分析

Of the 19 most active cities,

在这19个最活跃的城市里

some aim to pioneer/ become demonstration sites

- 一些城市有成为具有引领性示范城市的目标

Typical focus of German “Smart Cities”

德国智慧城市典型的聚焦领域

They typically address primarily: 通常主要集中在:

- **energy**

(pilot smart grid areas)

- 能源（试点智能电网领域）

- **mobility**

(charging stations, information tools, public bicycles, parking management, car sharing ...)

- 机动性（充电站，信息工具，公共自行车，停车管理，汽车分享 ...）

- **e-governance**

(registration services etc.)

- 电子政务（注册服务等）

Support? The national level

国家层面的支撑

Main support: from Fed. Ministry of Edu & Research (BMBF)

主要支撑：教育科研部

Initiative “*Zukunftsstadt / City of the Future*” “未来城市” 倡议
(e.g. “Sustainable Urbanisation”, May 2015 in China)

如 “可持续城镇化”, 2015年5月, 中国

Programme “*Sustainable
Megacities of Tomorrow*”

未来可持续超大城市项目

Focus: energy- & climate -efficient structures

关注：能源、气候的高效组织架构

Overall: strong focus on experimentation & demonstration

整体：极其注重实验和论证示范



Implementation: driven by European funding

实施驱动力：欧洲的投资资金

EU funding in the “Horizon 2020” programme

“Horizon 2020” 计划有欧盟的基金支持

For teams of municipalities, industry, R&D org.s...

城市政府，业界，研发组织等的支持

(i.e. again: mostly R&D/ demonstrations,
plus collective learning)

(大部分研发/示范+协同合作学习)

EU Project “Smarter Together”

欧盟项目 “共同智慧”

Lead partners: Vienna (A), **Munich** (D), Lyon (F)

领头合作伙伴：维也纳（奥地利），慕尼黑（德国），里昂（法国）

Aim: “deliver smart & inclusive solutions & to improve citizens' quality of life”

宗旨：“提供智能和包容性的解决方案，提高市民的生活质量”

(First) Period: 2016-2020 (第一) 阶段：2016-2020

Funding: 29 Mio. EUR 资金：2900万欧元

Topics: citizen engagement

holistic refurbishment

district heating & renewables

data management platform & smart services

e-mobility solutions

议题：公民参与

全面更新

区域供热和可再生能源

数据管理平台与智能服务

电动交通解决方案

“Smarter Together” (in Munich et al.)

(慕尼黑等地的) “共同智慧” 项目

- **Living Labs** 生活实验室
participation of citizens & users
公民和用户参与

- **District heating & RES**
for lowest energy area

对于能源最紧缺地区实行地区集体供暖和推行使用可再生能源

- **Renovation** 更新
of public and private buildings
公共和私人建筑的更新

- **data manag't platforms & smart services**

for integrated infrastructure
综合基础设施的数据管理平台和智能服务

- **E-mobility** 电动交通



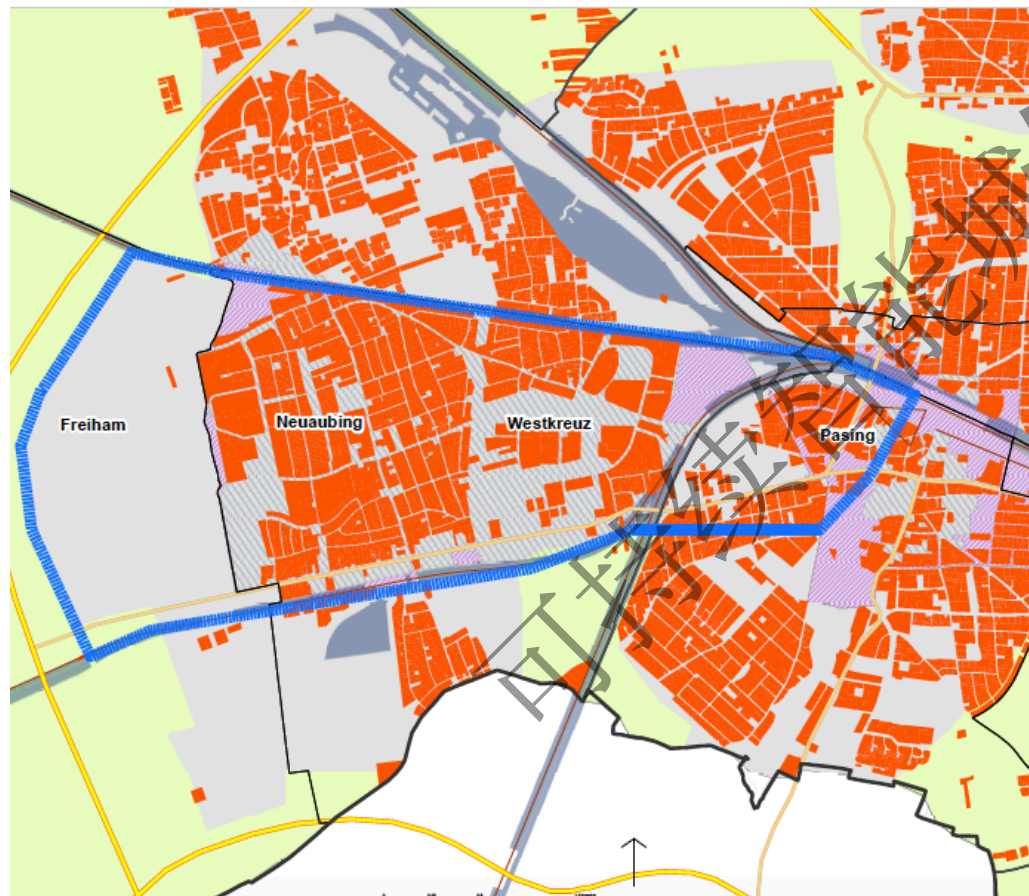
Smart Together Munich (cont.)

慕尼黑共同智慧（续）



Project area: OLD+NEW Neuaubing-W-Kreuz & Freiham

项目位置：新和老的Neuaubing-W-Kreuz & Freiham



Smart City München
Projektgebiet
- Münchner Westen

Overall: 3,5 km²,
• 20,000 people,
• 7,500 work-places,
• density 6570/km²

Freiham: newest & biggest residential area

Freiham: 最新最大的居住区

• **Neuaubing-W-kreuz** to be refurbished (under national program since 2014)

11.04.2017

spaeth@envgov.uni-treiburg.de

根据2014的国家项目，Neuaubing-W-kreuz将要进行更新

Open / E-government in Munich

慕尼黑开放/电子政务

Datasets at www.opengov-muenchen.de

 Bevölkerung (40) 人口	 Wirtschaft und Arbeit (11) 经济与就业	 Transport und Verkehr (5) 运输与交通	 Geographie, Geologie und ... (4) 地理、地质
 Soziales (3) 社会	 Politik und Wahlen (2) 政治与选举	 Bildung und Wissenschaft (2) 教育与科学	 Infrastruktur, Bauen und ... (2) 基础设施、建设
 Gesundheit (1) 健康	 Kultur, Freizeit, Sport u... (1) 文化、休闲、体育	 Öffentliche Verwaltung, H... (1) 公共管理	 Weitere Gruppen... 更多...

Lessons from the Munich case

慕尼黑案例的启示

Typical focus: 典型的关注点:

energy (retrofit & new), (e-)mobility & open data

能耗（既有更新和新建）、电子交通和开放数据

Re-labelling of longstanding initiatives as “smart”

将长效的措施重新定义为“智慧”

Subordination of the Smart City Agenda

into the overall planning strategy

(“Perspektive München”)

将智慧城市议程从属于总体规划策略

Importance of EU funding

欧盟资助的重要性

Funding & support (at national level):

limited to R&D

(国家级) 资助和支持: 仅限于研究和发展

When EU funding is not achieved or ends:

many projects are not actively continued

当欧盟的资助没有实现或者资助结束, 很多项目没有很好地继续

Smart City – Hamburg

智慧城市——汉堡

Memorandum **Hamburg + Cisco** in 2014

汉堡+思科 2014备忘录

Pilot projekts in: Transport,
Lightning, e-services,

试点项目：交通，照明，电子服务领域

First tested in: the harbour,
uiversity hospital and new
HafenCity district

最初试点：港口、大学医院和新的海港新城地区



Hamburg und Cisco vereinbaren Zusammenarbeit - Executive Vice President von Cisco Systems Wim Elfrink, Wirtschaftssenator Frank Horch und Hamburgs Erster Bürgermeister Olaf Scholz unterzeichnen im Rathaus das Memorandum of Understanding.

(Bild: Cisco Systems GmbH)

<http://www.hamburg.de/smart-city/>

The perspective of Cisco

从思科的视角来看

Hamburg Smart City Leadership

Wim Elfrink, EVP, Industry Solutions &
Chief Globalisation Officer, Cisco

April 30, 2014



High expectations (in 2013)

期望很高

德国的经济价值有多少？

What is the Economic Value in Germany?

~\$914 BILLION* 9140亿
美元



私人

智慧工厂

联合营销/广告

实体/逻辑的安全

未来办公

Private **\$736B**

- Smart Factories
- Connected Marketing/ Advertisement
- Physical/ Logical Security
- Future of Work

Public **\$178B**

- Mobile Collaboration
- Cyber Security
- Chronic disease
- Travel avoidance
- Telework .

公共

移动合作

网络安全

慢性病

避免旅行

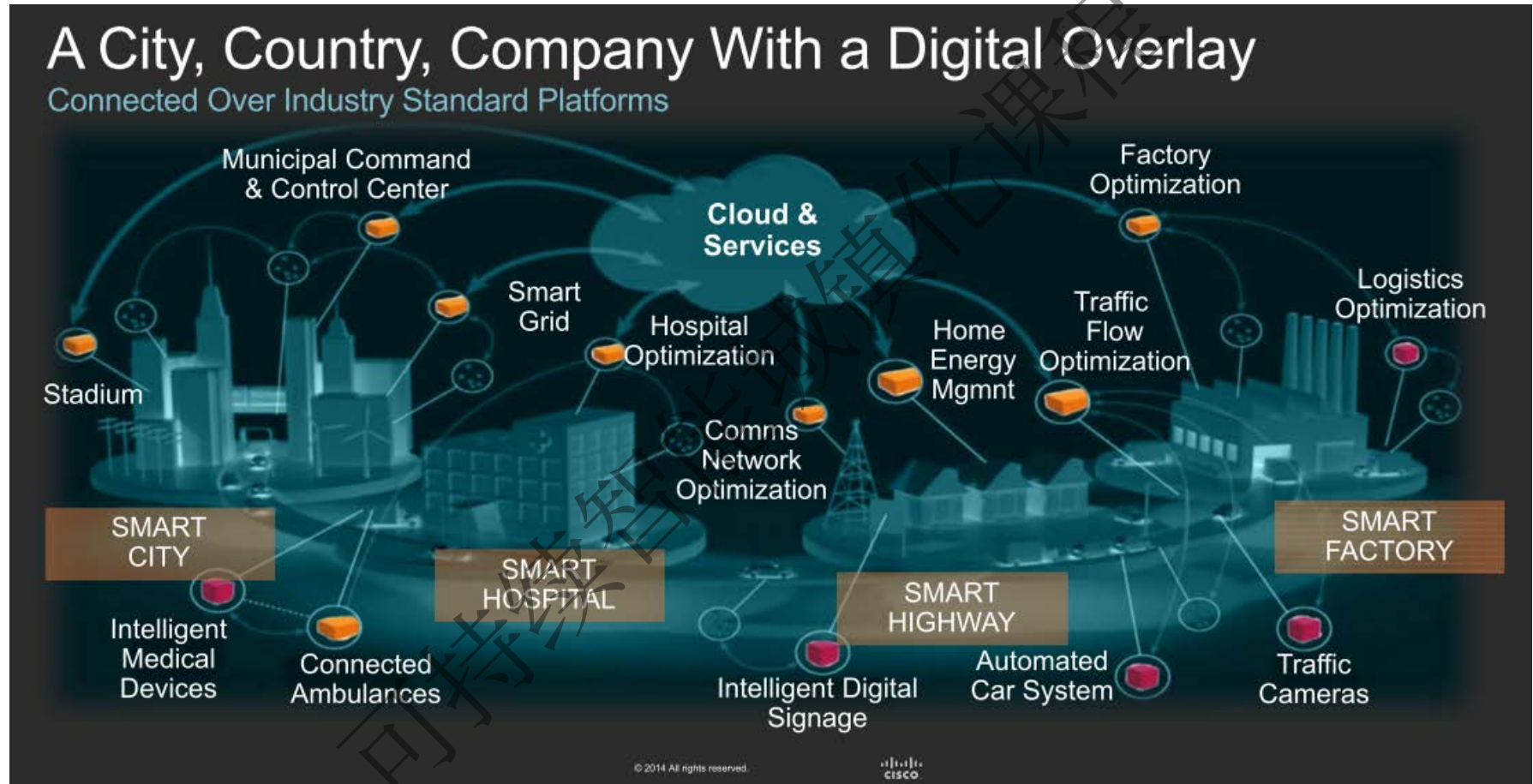
远程办公

Source: Cisco Internet Business Solutions Group, 2013

*2013-2022 - 10-year NPV

The strategy/ promise

在数字覆盖下的城市，乡村和公司



And outlook (wish list) for the future

未来展望（期望表）



An example from university hospital

大学医院的案例

Connecting one pupil in hospital with his class

将住院的学生与其班级联系起来

using mobile teleconferencing equipment.

运用移动视频会议设备

Very innovative?

很创新?

But incontestable!

但是不容置疑!

Lessons from the Hamburg case

汉堡案例的启示

Again: full-bodied announcements to pioneer,
but rather mundane, incremental work in practice

雄心勃勃，但实践中却显冗长乏味

Industry keen to demonstrate its abilities,
but many barriers: Lacking laws/standards, hesitation
in administration, sceptic publics.

产业界很想展示其能力，但是面对重重阻碍：法律法规不健全，管理的迟疑，公众的怀疑

Limits (to exclusive PPPs) due to competition rules

由于有竞争法则，所以（公私合作的包容性）受限制

=> Experimentation & demonstration

rather than full implementation

所以基本是实验性和展示性的项目，而不能全面实施

Reasons for “the German approach”

“德国方法” 的理由

There is hesitation in public administrations,
partly due to own interests or considerations,
partly because of scepticism in the public,
to go beyond narrowly delineated experiments.

公共管理的迟疑，一部分是由于各自利益和权衡，一部分是由于公众的怀疑

要跨越仅仅是描绘性的实验

(Is smart (= high tech) really the best?

智慧（高科技）真的就好吗？比如和 骑行，公交，空间路线相比？

e.g. vs. cycling, public transport, spatial approach

What if it fails?, What does it cost?, Who pays?)

如果失败了呢？要花费多少？谁来出钱？

And legal constraints: 法律上的限制

- On what basis can 1 company run a platform?
- Request for data security not yet specified

一个公司要运行一个平台需要什么基础？

对于数据安全的请求还未明确

Smart City – Critique in the literature

对智慧城市的批判

Implementing the vision of the „Smart City“ ... 实现智慧城市愿景

... creates risks of **data security** and surveillance

(Greenfield 2013; Kitchen 2014, Klauser/ Albrechtslund 2014)

……带来数据安全和监控的风险

...can create **inequalities** due to restricted access to services (digital divide) (Graham 2002; Alawadhi et al. 2012)

……可能由于获取服务的限制而造成不平等

... often builds on PPP, meaning that **key services are privatized/** offered in a profit oriented way

(Greenfield 2013; Hollands 2008, 2015)

……通常基于公私合作建设，意味着核心服务以私有化或利润导向的方式提供

... suggests that key problems of urban development can be solved primarily by technical infrastructure/ engineering (**techno-fixes**). (Sennett 2012; Greenfield 2013;

Viitanen/Kingston 2014; de Jong et al. 2015; Hollands 2015)

……表明城市发展的关键问题，可以主要通过基础设施/工程来解决

Outlook: Remember the goals

前景：记住目标

Rather than technology-driven development, people (in Germany) argue for a goal driven approach

德国人需要目标驱动的方法，而不是技术驱动的发展

Key challenges (as perceived by the public):

一些主要的挑战（公众所感受到的）

- build affordable housing 建造保障性住房
- make cities ever more liveable 让城市始终宜居
- reduce carbon and material flows 降低碳和物质的流动
- make infrastructures more reliable/ resilient 让基础设施更可靠，更韧性

Two other cases of urban development

城市发展的另外两个案例

That are not particularly called “smart”

这两个不见得可以被称为“智慧”

but reflect (in my opinion) very important
dimensions of urban development (planning)

但是在我看来重要的反应了城市发展（规划）的方向

Bottrop

Freiburg

Bottrop „Innovation City“

博特罗普 “创新城市”



A city of 116,000
in Germany's largest
metropolitan area Rhein-
Ruhr

德国最大的大都市地区莱茵鲁
尔地区的城市，人口11.6万

De-industrialisation (coal,
steel) caused economic
decay, unemployment &
out-migration

(煤炭，钢铁) 去工业化造成
经济衰退，失业和人口外迁

⇒ Need for a vision of
development

⇒ 需要发展愿景

Bottrop Innovation City: The Vision

博特罗普“创新城市”：愿景

2010: A body of volunteers from business & politics announced a competition for city visions

2010: 一群企业家和政治家志愿者宣布为城市愿景举办一次竞赛

Urban planner is elected new mayor of Bottrop & creates a local network. They apply and win.

规划师被选为市长，建立了地方网络

The Vision: 愿景

A large district (~70,000) is exemplarily made

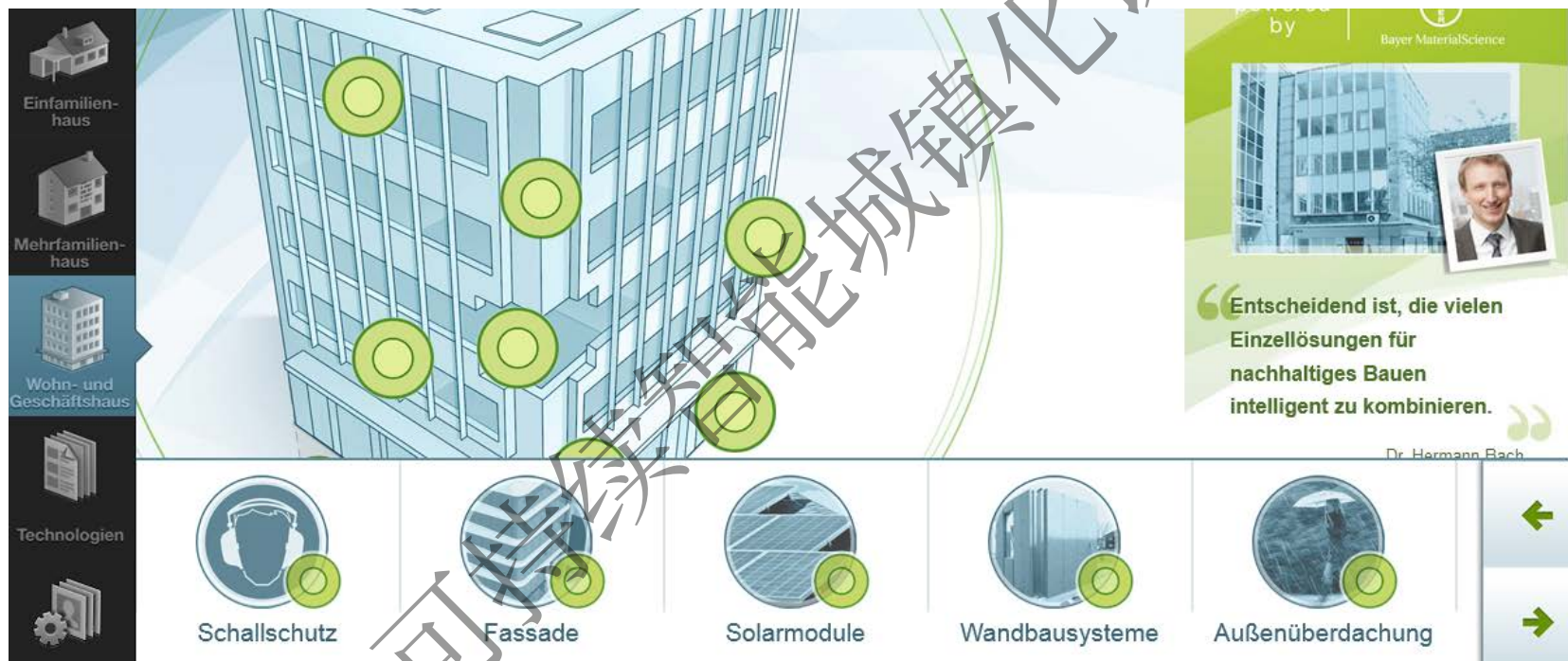
大型城区2020年前成为能效示范区 energy efficient by 2020.

The goal: **Reduce CO₂ by 50 % in 2020 (+10 yrs)** while improving quality of life.

目标：2020年（10年间）减少二氧化碳排放50%，同时提高生活品质

Bottrop: activities

博特罗普：活动



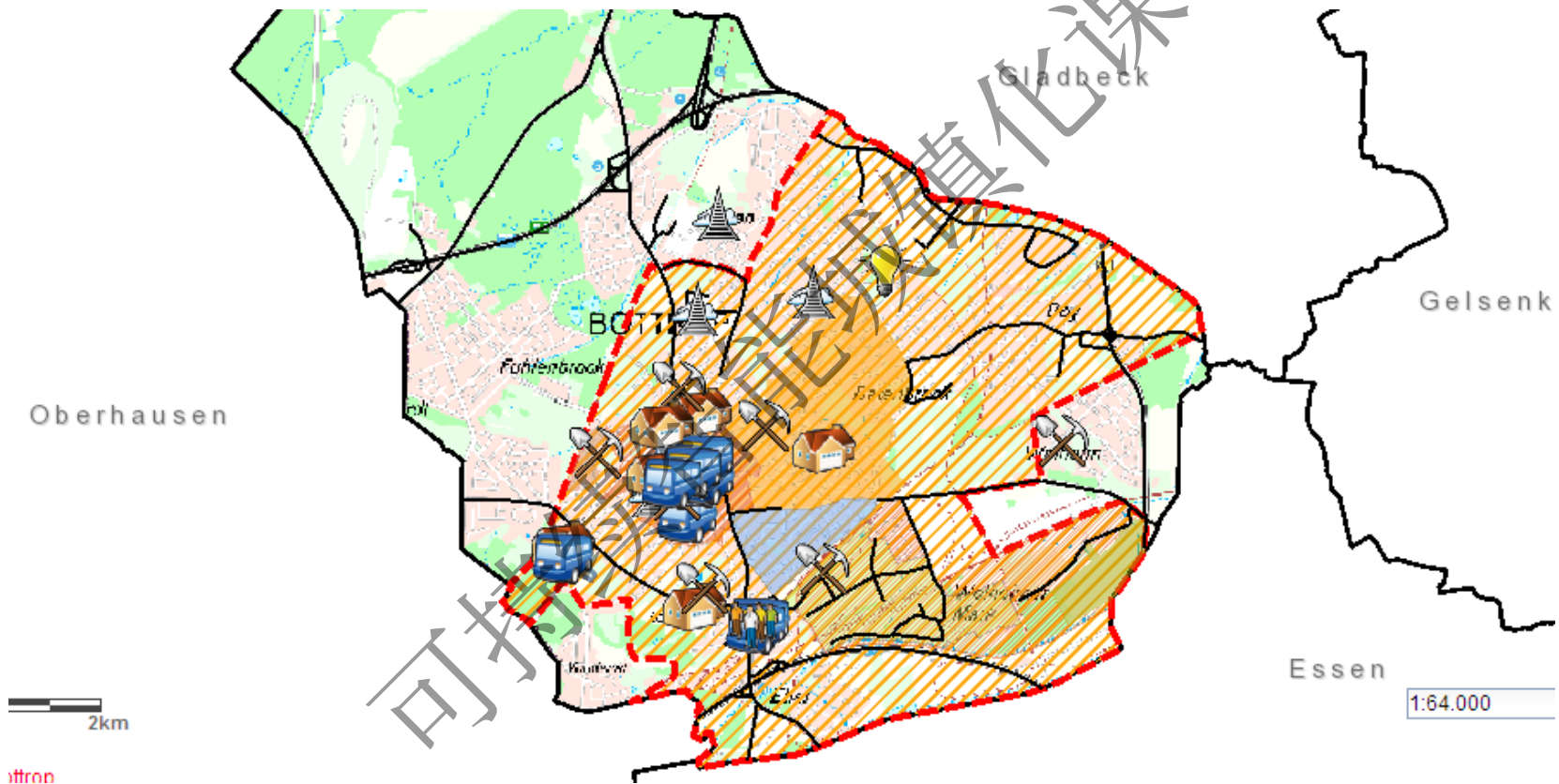
< 300 activities overall, invest ca. 240 Mio. EUR

小于300项活动

投资约2.4亿欧元

Bottrop as a testbed

博特罗普作为实验场



Bottrop: Interim results

博特罗普：中期成果

In 2015 (i.e. after 5 years!),

accompanying research testified:

Ongoing activities will reduce CO₂ by 38% (2020)

2015年：正在进行的活动将减少38%的CO₂（2020）

Roll-out to 20 other districts in the region has just started.

区域内其他20个城区的试验刚刚启动

Bottrop: The lessons

博特罗普：经验教训

The focus is on de-carbonization and liveability.

聚焦去碳和宜居

An ambitious vision can mobilize collective efforts if convincingly promoted.

一个雄心勃勃的愿景如果令人信服，可以调动共同的努力

Public-private partnerships worked well.

公私合作运转良好

However, they seem to have been exclusive
e.g. dominated by men, owners...

然而，似乎不够有包容性，例如由男性和业主主导

Background: Freiburg in Germany

背景：德国弗莱堡

Population:
220,000

人口：22万

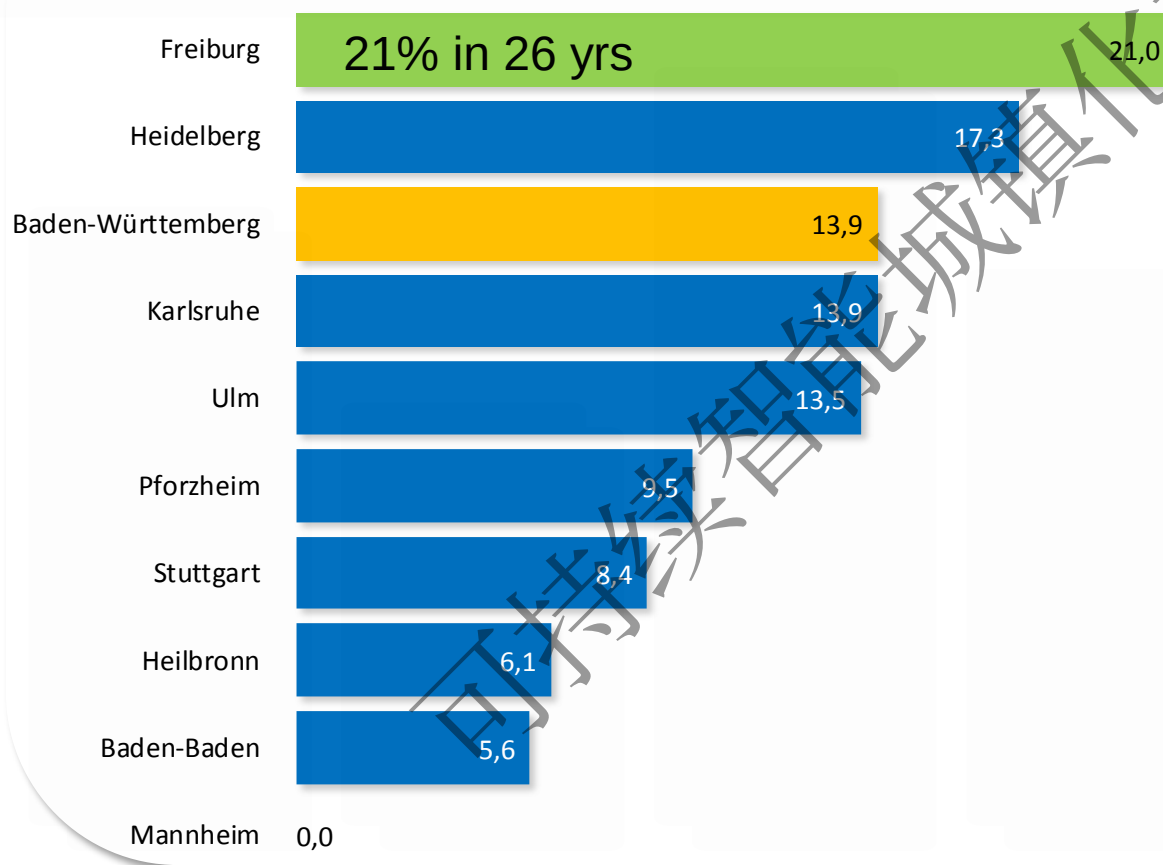
可持续智能城镇化课程

Fastest city growth rate in Germany

德国人口增长最快的城市

德国城市人口增长率 (1987-2013)

Growth rate of population 1987-2013



Sources: FWTM 2016, Hall 2014:252

Developing new districts: The challenges

开发新区：挑战

meeting current demands + open for future demands

- Inviting conditions for investors (and/or citizens organizations)
- Inviting conditions for future inhabitants

符合现在的需求+适应未来的需求

——吸引投资者（以及居民、组织）的条件

——吸引未来居民的条件

New Motto in the 1990s: “*Sustainable* Urban Development”

20世纪90年代的新口号，“城市可持续发展”

Prioritize *inner* development (growth within), dense, mixed use

内生式发展、高密度、混合使用优先

German building law provides for “fast track developments” in 10 yrs

德国建筑法规定10年“快车道发展”

(Städtebauliche Entwicklungsmaßnahme)

§ 137: participation “of affected bodies” is required (beyond BauGB § 3)

The Vauban military area in 1993

1993年的沃邦军事区域



From: Vauban.de

Enthusiast meet/ become professionals

积极分子参与/成为专业人士

人们希望建成一个可持续发展的示范区

沃邦论坛得到如下资助：

- 德国环境基金
- 欧盟 live program
- 迪拜奖
- 等等.....

组织未来的居民/专家，

于1996年成为了参与式开发的“最佳实践项目”（@联合国人居署，伊斯坦布尔）

people developed the idea to develop a „model district“ for sustainability

Forum Vauban e.V. gets funded by

- DBU German Envir. Foundation
- EU live program
- Dubai award
- etc...

Organizes future inhabitants/experts,

and in 1996 wins

- „best practice“ status (@ UN Habitat, Istanbul)
- for participatory development

Mobility: Area of centralized parking

机动性：中央集中停车区域



Quartier
Vauban

Realisierung und
Vermarktung

Privater
Stellplatznachweis

Legende

- Stellplatznachweis auf Grundstück möglich
- Stellplatzfreie Grundstücke
- Stellplatznachweis für Gewerbe auf Grundstück möglich
- Grundstück des Autofrei Verein
- Quartiersgaragen

Kartengrundlage: Vermessungsamt, Stadt Freiburg im Breisgau

Opacung-Service GmbH, Freiburg



Stadt Freiburg im Breisgau

Projektgruppe Vauban

Stand: Oktober 2004

Ownership: Predominantly building groups

所有权：主要建筑群



Vauban 15 years later...

15年前的Vauban



built ~1999-2009
now ca. 5.500 people
on ca. 38 Ha

The flea market (30 April 2016)

跳蚤市场 (2016年4月30日)



People realize their dreams

人们实现他们的梦想



use even the lawn of the power plant...
甚至在草地上建设电厂



& found cooperatives (e.g. for retailing)

成立合作社（用于零售）



住区商店
都是有机产品商店，消费者
自己所有
营业额：220万欧元/年，面
积120平方米

„Quartiersladen“,
all organic shop,
owned by consumers:
Turnover: 2,2 mio €/a
on 120 m²

They continue to care about it

人们持续关注



and enjoy community life 并享受社区生活



Some facts & figures

一些事实和数据

5,500 inhabitants today,

现在5500个居民，

Most dense district of Freiburg:

138 inhabitants/ ha (10.000 m²) of settlement area

(“Weingarten” from 1970s: 66 /ha)

弗莱堡最密集的地区：

住区面积:138人/公顷（10.000平方米）

（“Weingarten”，从20世纪70年代：66人 /公顷）

Homes are very hard to get, prices are very high

房子价格很高，很难买到

Lowest car density: 174 cars/1,000 Inhabitants (2014)

最低的汽车密度：174辆/1000个居民（2014年）

Key explanatory factors

主要解释因素

People felt a unique opportunity to shape their environment, leading to a particular image (self-organized, lefty, eco district).
人们觉得这是塑造他们环境的一个特定机会，创造特定的意象（自组织，左翼，生态城区）。

> People committed themselves in building groups and developed a sense of community.

人们在社区中遵守这些协议，并建立了社区意识。

> Every visitor could see/feel this commitment (next to very good location, planning/infrastructure + natural endowments)

每位访客都可以看到/感到这一协议的执行（旁边非常好的位置，规划/基础设施 + 自然禀赋）

> Many people wanting to move there (mostly families though).

很多人想搬到那里（虽然主要是家庭）。

=> A very unique (contingent?) opportunity for participation, building on the experiences (with participation) in “Rieselfeld”

一个非常独特（偶然？）的参与机会，建立在“里瑟菲尔德”的经验之上

Places... that make you meet neighbors

与邻居相遇的场所



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Summary on the Smart City in Germany

德国智慧城市总结

After some public commitment (in 2013-2015),
now hesitation to invest into ICT and cross-

sectoral integration 在公开承诺2013-2015之间建设之后，现在对于
投资信息和通信技术和跨行业整合存有疑虑

=> Commercial actors experiment/showcase in
small (incontestable) niches

=> 小众群体中的商业作用实验/展示

Reasons: - scepticism among population

原因:

- 人们的怀疑

- 不同的政治目标
(思潮)

- 规避管理风险

- 政治/法律支持进

展较慢

- different political objectives (climate)

- risk averse administration

- political/ legal support slow

and (still) a positive outlook

但前景依然乐观

Concrete, challenging and reachable targets can mobilize public and private stakeholders

(e.g. Bottrop: Let's reduce CO₂ by 50% in 10 yrs.)

具体、有挑战性和可实现的目标可以调动公共和私人利益相关者的积极性（例如博特罗普：让我们在10年间减少50%二氧化碳）。

Community-oriented district development can be very successful

(e.g. Freiburg-Vauban: People building collectively, co-shaping the ambitious model district)

社区导向的地区开发可以很成功

（例如弗莱堡 - 沃邦：人民共同建设，共同塑造了有前瞻性的示范区）

Maybe urban planning could provide for new “Tong Lau” like developments?

也许城市规划可以提供新的类似“唐楼”的新开发模式？

Structure of the talk 演讲框架

1. The smart City in Germany – Status Quo
德国智慧城市的现状分析
2. Example Projects, mostly from Hamburg & Munich
案例分析（大多来自汉堡和慕尼黑）
3. The priorities of and obstacles for Smart Cities in GER
德国智慧城市发展的重点和障碍
4. A recent example of a PPP to reach a climate target: Bottrop
实现气候目标的公私合作案例——Bottrop
5. A historical example of community building: Vauban
一个具有历史意义的社区建造案例——Vauban
6. Final reflections
小结与反思

Thank you for your attention!

感谢您的聆听

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