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Resilience and water utilities

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Main points of my presentation

- Meaning of resilience for water utilities
- Main challenges and development needs in the WSS sector in Finland
- Risk and continuity management in water utilities

MEANING OF RESILIENCE FOR WATER UTILITIES

Resilience ??

Sustainability

Resilience

"The capacity of individuals, communities and systems to survive, adapt, and grow in the face of stress and shocks, and even transform when conditions require it"

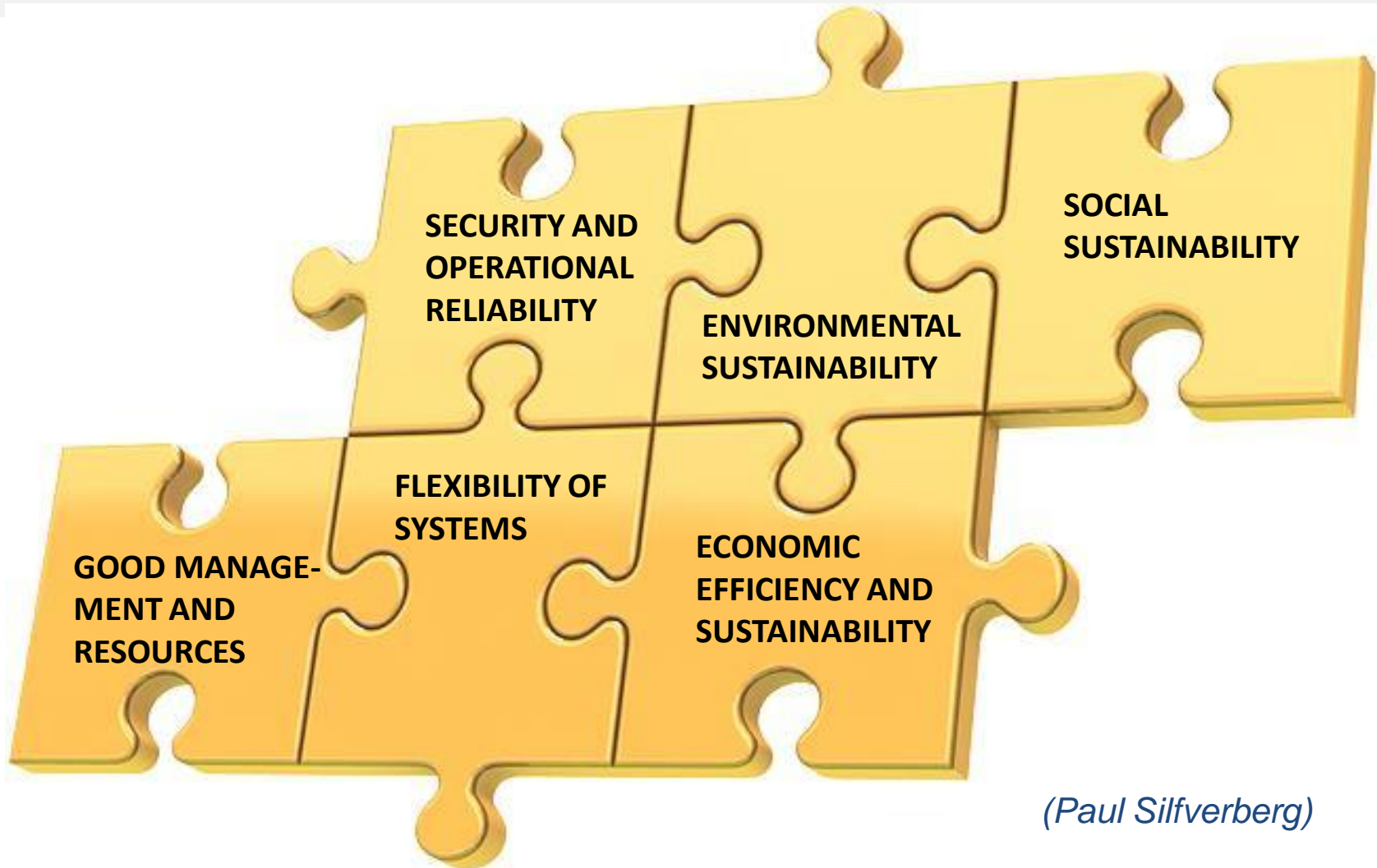
(Brown, 2016)

Viability

Recovery

Survival

Key elements of good water services



(Paul Silfverberg)

Key elements of good water services – BSC approach

Originally by Kaplan & Norton, 1996

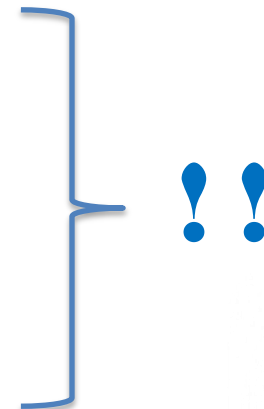


MAIN CHALLENGES AND DEVELOPMENT NEEDS IN THE WSS SECTOR IN FINLAND

Challenges for water services

FUTURE CHALLENGES FOR FINNISH WATER SERVICES n = 48

| Over the next 20-30 years | Relative importance | | | | | GRADE | |
|---|---------------------|---|---|---|---|-----------|----------|
| | 1 | 2 | 3 | 4 | 5 | \bar{X} | σ |
| AGING INFRASTRUCTURE | | | | | | 4.6 | 0.7 |
| VULNERABILITY & RISK MANAGEMENT | | | | | | 4.4 | 0.7 |
| HUMAN RESOURCES & KNOW-HOW | | | | | | 4.2 | 0.9 |
| RESEARCH | | | | | | 4.0 | 0.9 |
| EDUCATION AND TRAINING | | | | | | 4.0 | 0.8 |
| WATER QUALITY | | | | | | 4.0 | 1.0 |
| TECHNICAL PERFORMANCE | | | | | | 3.8 | 1.0 |
| UTILISATION OF SLUDGE | | | | | | 3.8 | 1.0 |
| EFFICIENT WASTEWATER TREATMENT | | | | | | 3.7 | 0.9 |
| TACIT KNOWLEDGE TRANSFER | | | | | | 3.6 | 1.0 |
| TRANSPARENCY AND OPENESS OF DECISION MAKING | | | | | | 3.6 | 1.0 |
| MANAGEMENT OF SOCIAL AND POLITICAL RELATIONS | | | | | | 3.5 | 1.1 |
| CUSTOMER SATISFACTION | | | | | | 3.5 | 0.9 |
| LEVEL OF LEADERSHIP AND OPERATIONS AT UTILITIES | | | | | | 3.5 | 0.9 |
| ECONOMIC EFFICIENCY | | | | | | 3.3 | 1.0 |
| ENERGY RELATED ISSUES | | | | | | 3.3 | 1.2 |
| ADEQUACY OF WATER RESOURCES | | | | | | 3.2 | 1.3 |
| WASTEWATER TREATMENT IN DISPERSED RURAL AREAS | | | | | | 3.2 | 0.9 |
| IMAGE AND ITS IMPROVEMENT | | | | | | 3.1 | 0.9 |
| ACCESS TO SERVICES | | | | | | 3.1 | 1.0 |
| DEVELOPMENT OF LEGISLATION | | | | | | 3.1 | 1.0 |
| DEMANDS FOR HIGHER RATES OF RETURN | | | | | | 3.1 | 1.2 |
| STORMWATERS DUE TO CHANGES IN LAND USE | | | | | | 3.1 | 1.0 |
| STORMWATERS DUE TO CLIMATE CHANGE | | | | | | 3.1 | 1.1 |
| PRESSURES FROM OTHER SECTORS | | | | | | 3.0 | 0.9 |
| INTERNATIONAL COOPERATION AND VISIBILITY | | | | | | 3.0 | 1.0 |
| WATER SUPPLY IN DISPERSED RURAL AREAS | | | | | | 3.0 | 0.9 |
| COMPETITION WITH OTHER MUNICIPAL SERVICES | | | | | | 2.5 | 1.1 |
| INTERNATIONAL COMPETITION | | | | | | 2.4 | 1.1 |



\bar{X} = ARITHMETIC MEAN, σ = STANDARD DEVIATION

AREAS/11CHALLENGES_NEE
TKQHF 19 March, 2011

Figure 1: Ranking of 29 identified challenges for Finnish water services for the next 20–30 years, as seen by 48 water sector experts in 2008.

Heino, Takala & Katko,
2011 (E-Water)

Features of WSS sector in Finland

Table 10.2. Four key levels of water services in Finland with their key characteristics.⁵³ (Katko, T.S., 2016: Finnish Water Services)

| Level | Features | No. of systems | Population served (%) |
|---|--|----------------|-----------------------|
| On-site systems | Dispersed rural areas | many | 10 |
| Water Users Associations | Villages and towns | 1,400 | 5* |
| Urban water and wastewater utilities | Water and wastewater often merged | 300 | 50 |
| Inter- and supra-municipal systems | Inter-municipal agreements | many** | n.a. |
| | Wholesale water | 24 | n.a. |
| | Wholesale wastewater | 12 | n.a. |
| | Regional water and wastewater companies*** | 3 | 28 |

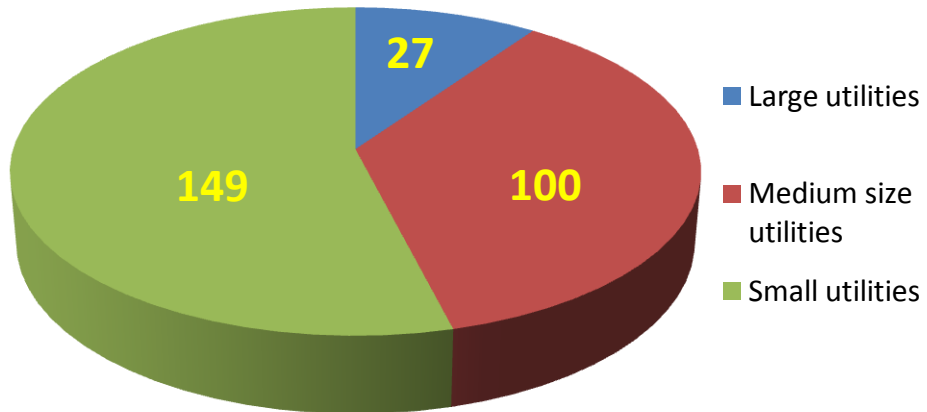
* some 20 in large villages and towns ** some continuous, some reserve

*** 2 stakeholder companies owned by municipalities, 1 federation of municipalities

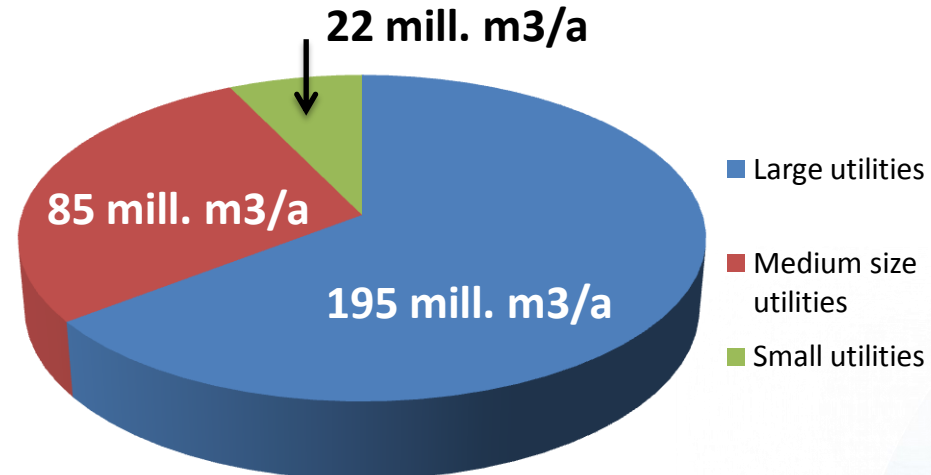
n.a. not available

Diversity of WSS sector in Finland

Size distribution of FIWA's member WSS utilities



Number of WSS utilities



Amount of water sold (m3/year)

Large utilities: over 2 million m³ / year

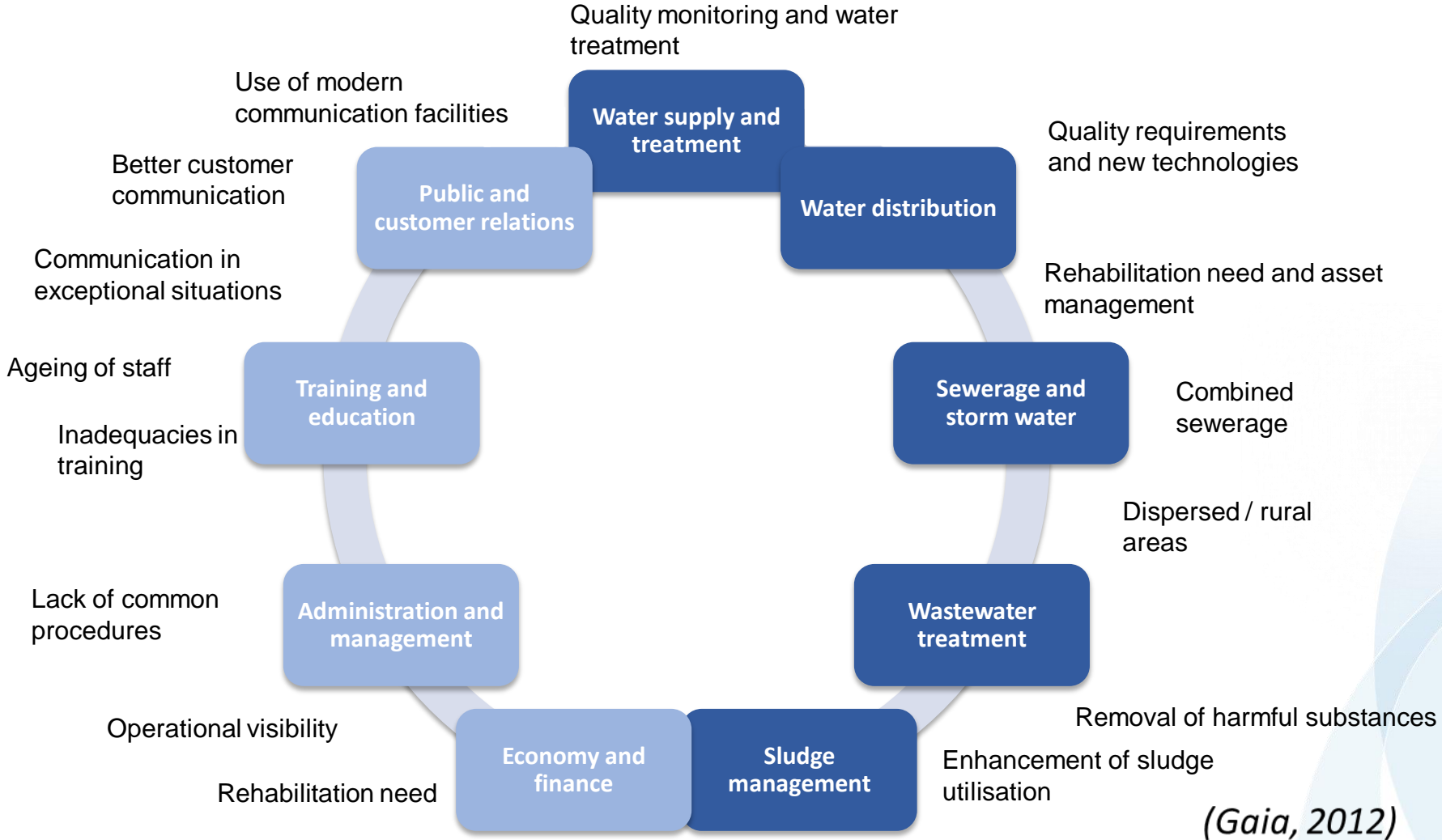
Medium size utilities: 350 000 – 2 million m³ / year

Small utilities: less than 350 000 m³ / year



© Happy Orange Oy

Development needs of WSS utilities



(Gaia, 2012)

Water infrastructure – networks and asset management

Table 10.4 Estimated investment gap in water services infrastructure in selected OECD countries.¹⁷⁰

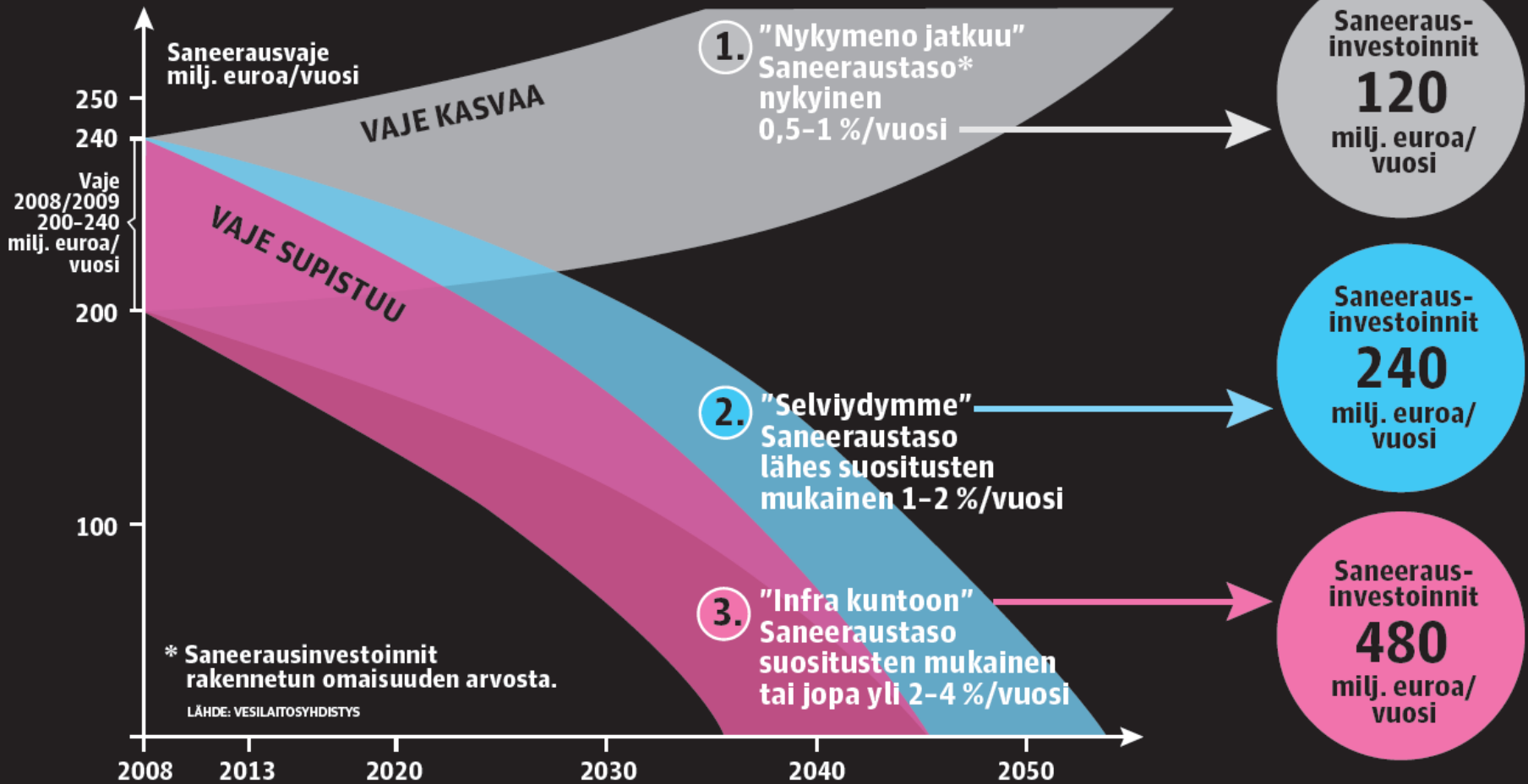
| Country | Population | State of water services infrastructure (Scale) | Estimated current funding gap (million US\$) | Estimated funding gap per person (US\$/household) |
|---------|-------------|--|--|---|
| Canada | 35,182,000 | Good (Very good–very poor) | 72,100 | 2,050 |
| Finland | 5,426,000 | 7 (10–4) | 6,580 | 1,210 |
| Norway | 5,043,000 | Water networks 3; sewers 2 (5–1) | 18,120 | 3,590 |
| USA | 320,051,000 | D (A–F) | 556,800 | 1,740 |

Note: Currency exchange rates on 3 March 2014; Population figures: UN-DESA, 2013.

(Katko, T.S., 2016: Finnish Water Services)

Scenarios for WSS networks

Vesihuollon verkostojen skenaariot



(Kauppalehti 30.1.2013)

Current employment in the water services sector

| | Total staff number (estimate) | Of which have higher education and work with water services (estimate) |
|--|-------------------------------|--|
| Water utilities | 4000 | 360 (9 %) |
| Companies | 1500–1800 | 600–720 (40 %) |
| Public sector, research organisations (water supply) | 200 | 200 (100 %) |
| Total | 5700–6000 | About 1100–1200 (about 20 %) |

The amount with higher education has declined in the water utilities by almost 200 in the last 10 years (total staff number has decreased by 1000). The amount of staff with university level education is much lower than in other Nordic countries.

- **Recruitment needs of employers: about 165–220 new persons in the next 5 years** (about 33–44 per year) just to replace staff to retire.
- In order to make the sector develop and grow more university level educated staff are needed.
 - E.g. 5 % growth in the staff number of sector's companies would increase total staff demand by 25-30 persons each year.

RISK AND CONTINUITY MANAGEMENT IN WATER UTILITIES

Business Continuity Plan

*Business Continuity Planning for
Water Utilities: Guidance
Document, Water Research
Foundation, 2013*

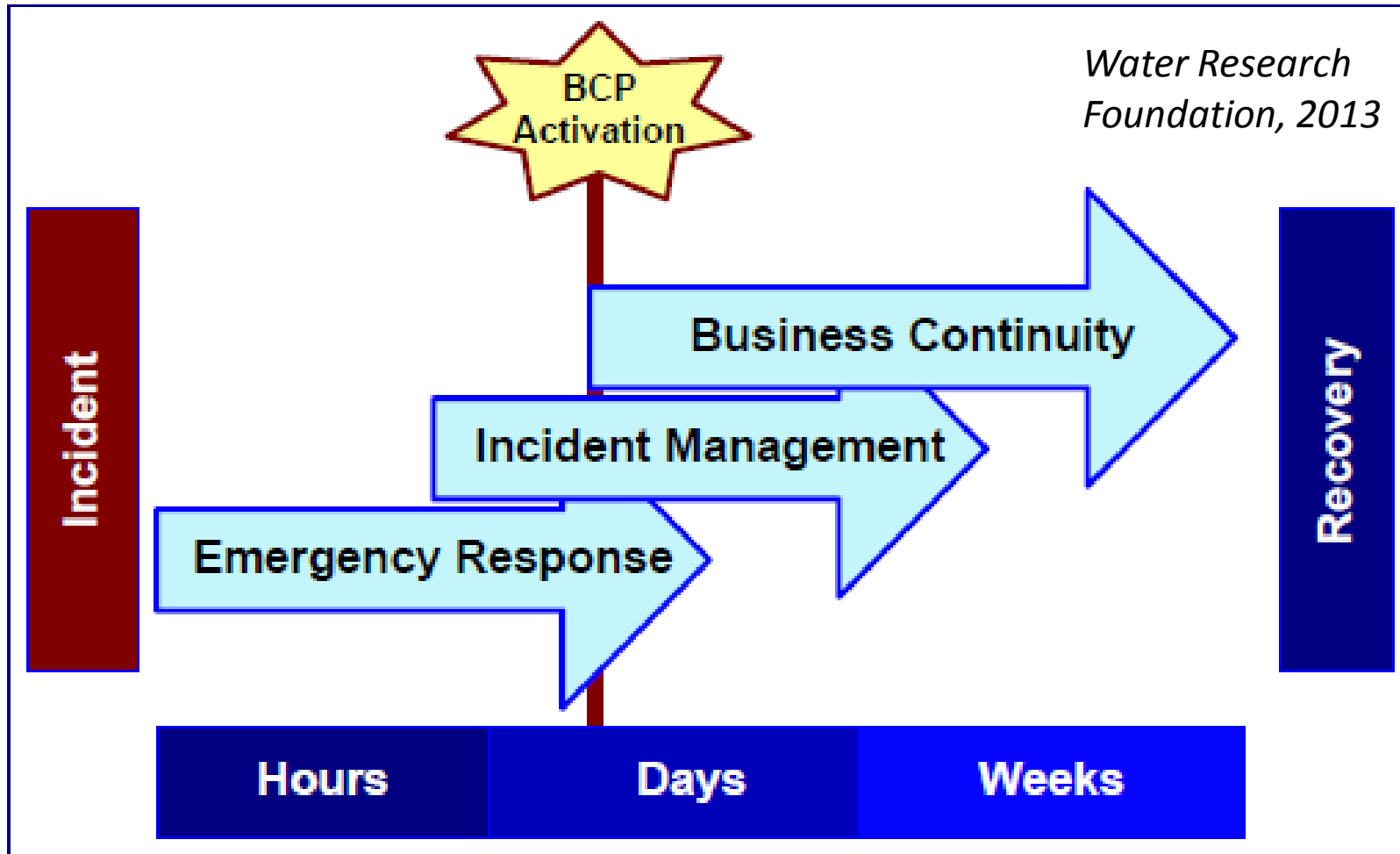


Relationship btw various plans

| Type of Plan | Included Documents |
|--|--|
| Hazard Mitigation Plans | Vulnerability Assessment / Risk Analysis Business Impact Analysis (BIA) Impact Assessment Hazard Identification Risk Mitigation Plan (RMP) |
| Standard Operating Procedures to support Mission Essential Functions | Documentation Policy Timekeeping Procedures Safety and Security Plans |
| Preparedness Plans | Facility Response Plan (FRP) Hazard-Specific Preparedness Plan (e.g., Hurricane, Flood) Spill Prevention Control and Countermeasure (SPCC) |
| Response Plans | Emergency Response Plan (ERP) Emergency Operations Plan (EOP) Fire Evacuation Plans Incident Management Plans Crisis Communications Plan (CCP) Point of Dispensing (POD) Plan Hazard-Specific Response Plan (e.g., Flood, Tornado, Bomb-Threat, Water Quality Emergency) |
| Recovery Plans | COOP Laboratory COOP Pandemic Plan Information Technology (IT) Disaster Recovery Plan (DRP) |

*Water Research
Foundation, 2013*

Business Continuity Plan activation



PPPs for resilience...

- **P**lan
- **P**repare
- **P**ractice

Plan for managing emergency situations (requirement by the new WSA 15 a §)

| MODUULI 1 Jatkuvuudenhallinnan johtaminen | MODUULI 2 Toimintavarmuuden kehittäminen | MODUULI 3 Häiriö- ja kriisisuunnittelu | MODUULI 4 Häiriönhallinta ja kriisijohtaminen |
|---|--|--|---|
| Perusteet, ohjeistus, vastuut | Toimintavarmuuden periaatteet / prosessi | Suunnitelmat ja toimintamallit | Tilannekuva ja tilannetietoisuus |
| Organisointi, resursointi, osaaminen | Sisällyttäminen TTS-prosessiin | Johtamisen edellytykset | Reagointi ja hälyttäminen |
| Nykytilan arviointi | Avaintoimintojen tunnistus, priorisointi | Viranomais- ja sidosryhmäyhteistyö | Kriisijohtaminen |
| Johdon tahtotilan määrittäminen | Riskiarviointi ja riskienhallinta | Varautuminen poikkeusoloihin | Operatiivinen toiminta häiriötilanteessa |
| Kehittämisen polun rakentaminen | Sopimuskumppanien jatkuvuudenhallinta | Perehdyttäminen ja täytäntöönpano | Tiedottaminen ja kriisiviestintä |
| Seuranta ja ohjaus | Keskeiset ja kriittiset asiakkaat | Koulutus ja harjoittelu | Toipuminen ja arviointi |
| Johdon rooli korostuu | | Yhteistyö korostuu | |

Kuva 5: Varautumisen ja jatkuvuudenhallinnan kokonaiskonsepti sovellettuna vesihuoltolaitoksille (Kuntaliitto, Jaakko Pekki). Kuvassa TTS = talouden ja toiminnan suunnittelu

Holistic approach to the water cycle in Finland

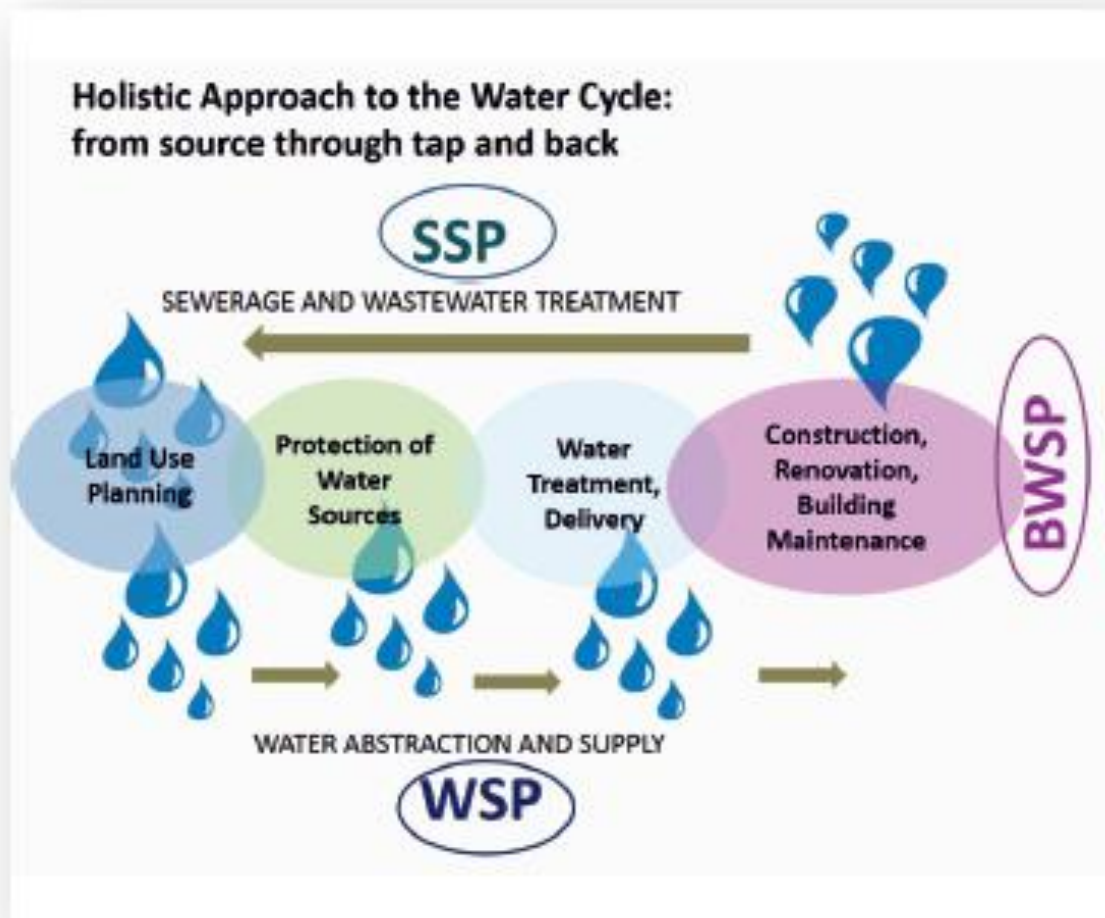


Fig. 12.6 Interconnections between Water Safety Plan, Building Water Safety Plan, and Sanitation Safety Plan.²⁷

(Katko, T.S., 2016: Finnish Water Services)

Risk management – prepare for future

- Water utilities currently make risk assessments and risk management plans -> fine, but ...
- More **future oriented approaches** could make utilities even better prepared for unexpected (and expected) anomalies and events
- Suggestion: Incorporate **futures tools** (e.g. scenarios and foresight tools) as part of the routine utility management practices



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