



REPUBLIKA HRVATSKA
Državna geodetska uprava



Data centre Disaster Recovery following the earthquake and new products for the prevention of natural disasters

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Introduction

- Every day, our business relies on documents, applications, and existing data to function.
- Businesses continuously increase their dependence on ICT systems for routine business processes
- What would happen if we suddenly lost access to these things?

- **Maybe this?**

Introduction

- What is the solution in case of disaster?
- **Disaster Recovery Plan** - designed to ensure the continuation of vital business processes in the case that a disaster occurs.
- Effective disaster recovery plan ensures that we can quickly recover our data if it is lost.

International and national Framework for Disasters Risk

- The Sendai Framework for Disaster Risk Reduction 2015-2030 - international agreement adopted in 2015 at the Third UN World Conference on Disaster Risk Reduction

The Sendai Framework emphasizes the need for the involvement of the entire society in disaster risk reduction and identifies four priorities for action:

- Understanding disaster risk
- Strengthening disaster risk management
- Investing in disaster risk reduction
- Improving disaster preparedness

- Law on Information Security
- LAW ON STATE INFORMATION INFRASTRUCTURE
- Regulation on Information Security Measures
- EU General Data Protection Regulation (OJ L 119, 4 May 2016),
- Law on the Implementation of the General Regulation on Data Protection (OG 42/18),
- HRN EN ISO/IEC 27001:2017 Information security management systems.
- Law on cyber security
- **Strategic documents**
- and others

Strategic documents regarding climate change *adaptation and disaster risk management*

Disaster risk assessment for the Republic of Croatia (2019)

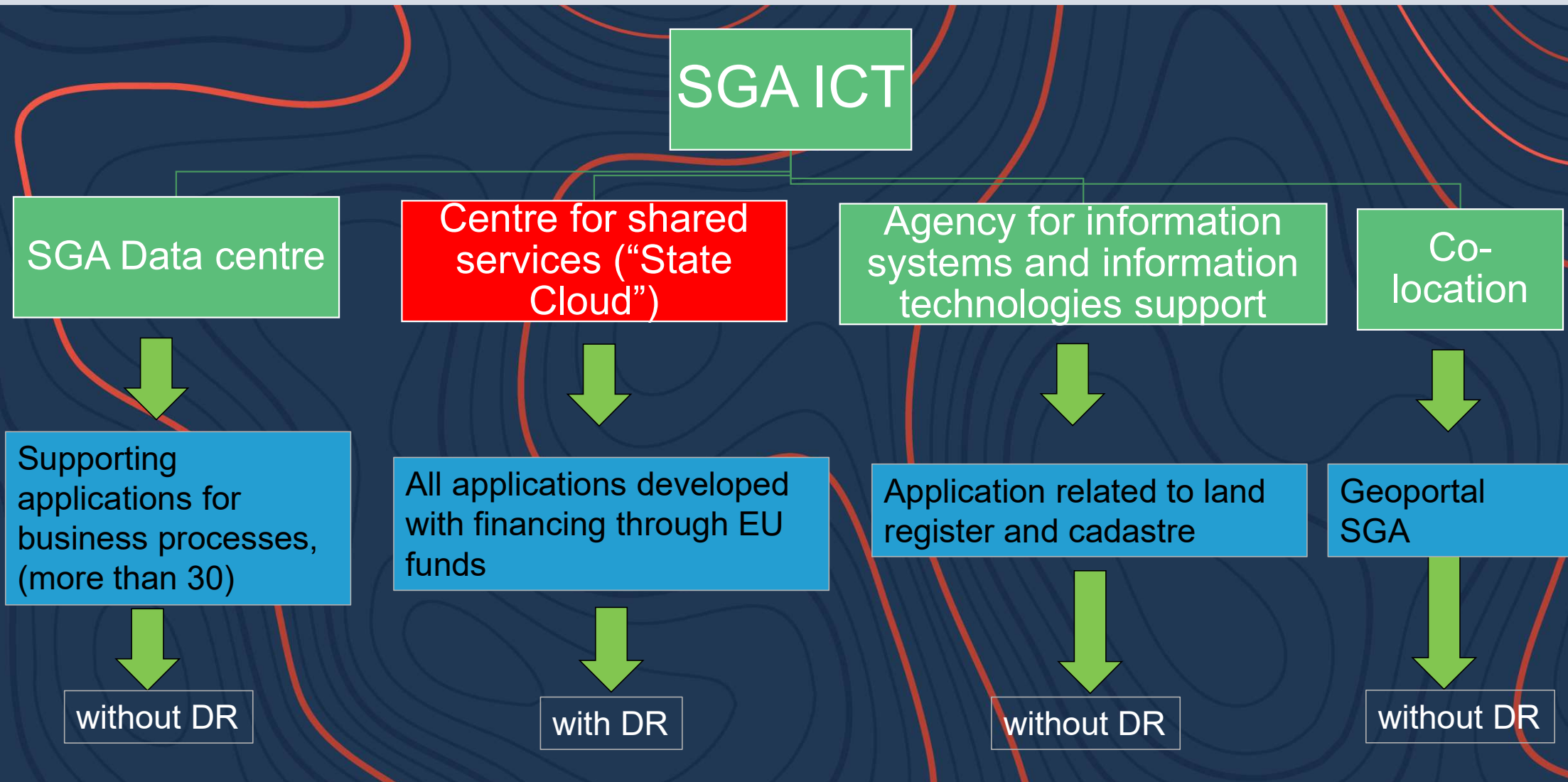
- 15 possible events processed,
- Unacceptable risks - national priority:
 1. Floods caused by the spilling of inland bodies of water,
 2. Earthquakes,
 3. Open fires.

Disaster Risk Management Strategy Until 2030

- Main goals of the Strategy are:
 1. Reducing the risk of disasters
 2. Increasing preparedness for disaster management.

Events	Consequence	Probability	Total
Flooding - terrestrial water	3	4	7
Earthquake	2	3	5
Open fires	3	2	5
Landslides	3	3	6
Extreme temperatures	2	2	4
Epidemics and pandemics	2	2	4
Snow and ice	3	1	4
Nuclear accidents	2	2	4
Radiological	2	1	3
Industrial accidents	2	1	3
Drought	2	1	3
Sea pollution	2	1	3
Plant diseases	1	1	2
Animal diseases	1	1	2
Land salinization	1	1	2

SGA - applications, services and data

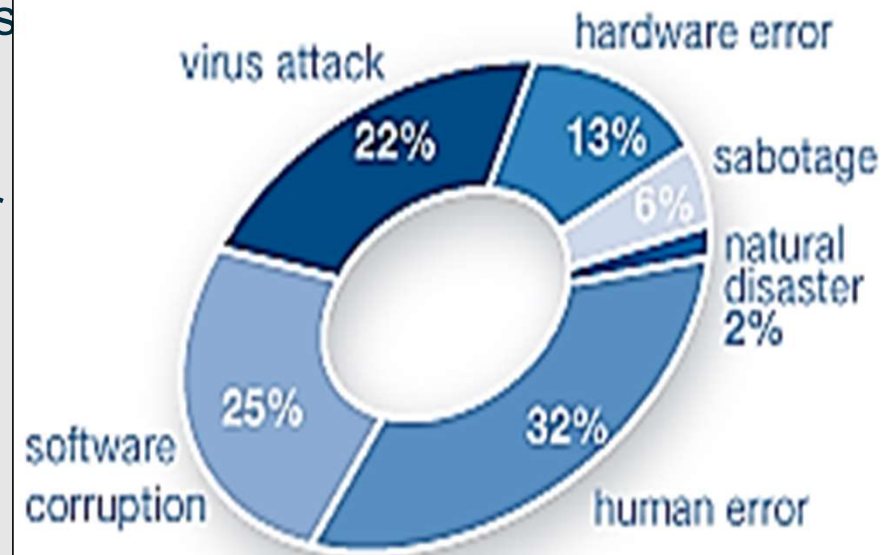


Data Centre Disaster Recovery

- **DR site** - also known as a backup site, is a place that a company can relocate in case of a security breach or natural disaster. The site is just one facet of the company's larger disaster recovery or business continuity plan.
- If a disaster occurs and a company has a plan in place, it can continue operations at a DR site until it becomes safe to resume work at its usual location or a new permanent location.
- A business continuity plan (BCP) is a system of prevention and recovery from potential threats to a company. The plan ensures that personnel and assets are protected and are able to function quickly in the event of a disaster.

Reasons we need a Disaster Recovery Plan

- **Natural disasters** (storms, fires, floods, earthquakes,...)
- **System and infrastructure** (power supply, cooling systems, network, hardware, etc.), - may result in the loss of all data
- **Human errors** - failure to save changes, deletion of an important document, etc. can lead to a significant loss for the company, training programs reduce errors, backup
- **Cybercrime** - on the rise and most businesses have been affected at some point, a disaster recovery plan should include steps to recover from hacking attempts, keeping data secure and accessible.
- **Customer Orientation** - If a business has to close or has a long service outage, we could lose valuable customers. The faster we get back on the feet, the happier our clients will be.



Source of data: The Cost of Data Loss by David M Smith

80% of businesses that close for more than 5 days never reopen.

Key Objectives of Disaster Recovery

Outline the main objectives of a disaster recovery plan:

- Minimize downtime and data loss.
- Ensure rapid recovery of critical systems and data.
- Maintain business continuity and customer satisfaction.
- Protect company reputation.

What Should a Company Consider

Company should keep the following factors in mind when choosing a site:

- **Location:** How far is the DR site from the parent site?
- **Time frame:** How long might the company use the DR site?
- **Cost:** How much is the company willing to spend for an adequate DR site?
- **Resources:** What company resources and technology are essential to the business to continue its operations?

Location Considerations

Being in a safe area but within an affordable distance from the location it will serve (min 40 km)

Be outside the mitigation radius

Not in the geological fault line

Small potential risks from disasters

Availability of local staff and vendors

Availability and quality of electricity / battery

Information technology can function at that location

Not prone to conflict and terrorism

Tax Incentive

RTO and RPO Assessment

RTO - recovery time objective

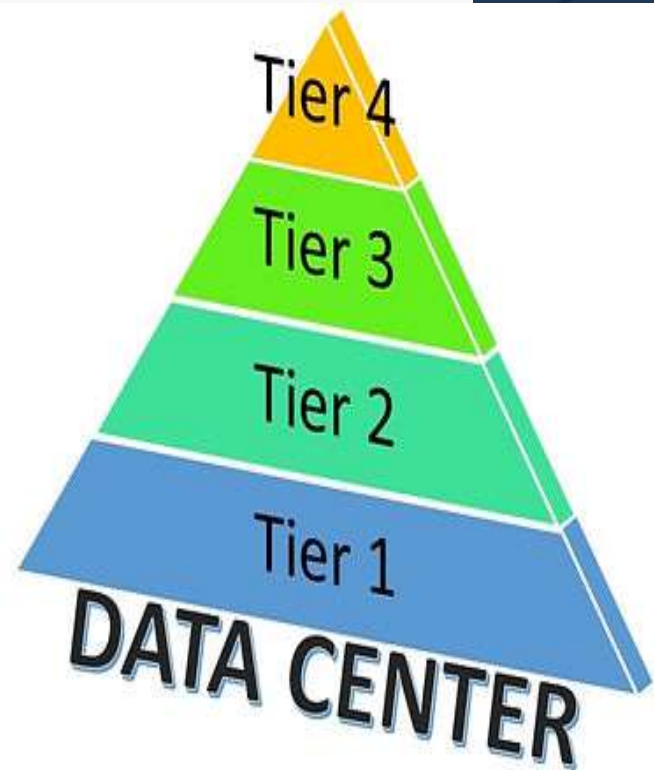
RTO - the target time within which it is necessary, after the incident, to establish the nominal operation of ICT services .

RPO - recovery point objective

"RPO - Maximum tolerance of data loss - a point in time before which all stored data must be safely preserved.

DR - Tiers Standards

Uptime Institute's Tier Standards



Tier IV: Fault Tolerant Infrastructure

Tier III: Concurrently Maintainable Site Infrastructure

Tier II: Redundant Site Infrastructure Capacity Components

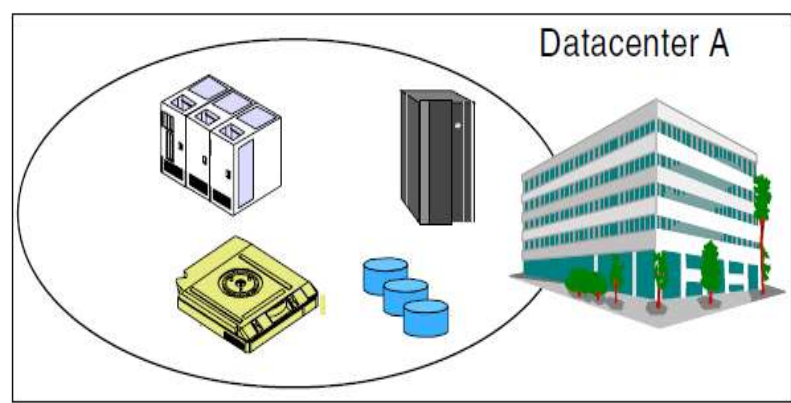
Tier I: Basic Site Infrastructure. Non-redundant capacity components and distribution pathways.

A data centre is only as good as the weakest component or system. For example, a data centre with a Tier IV electrical system and a Tier III mechanical system can only achieve an overall Tier III rating.

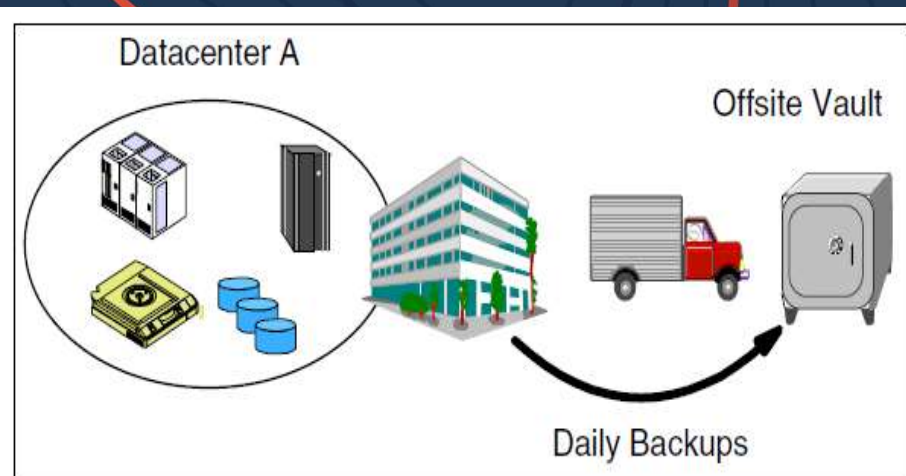
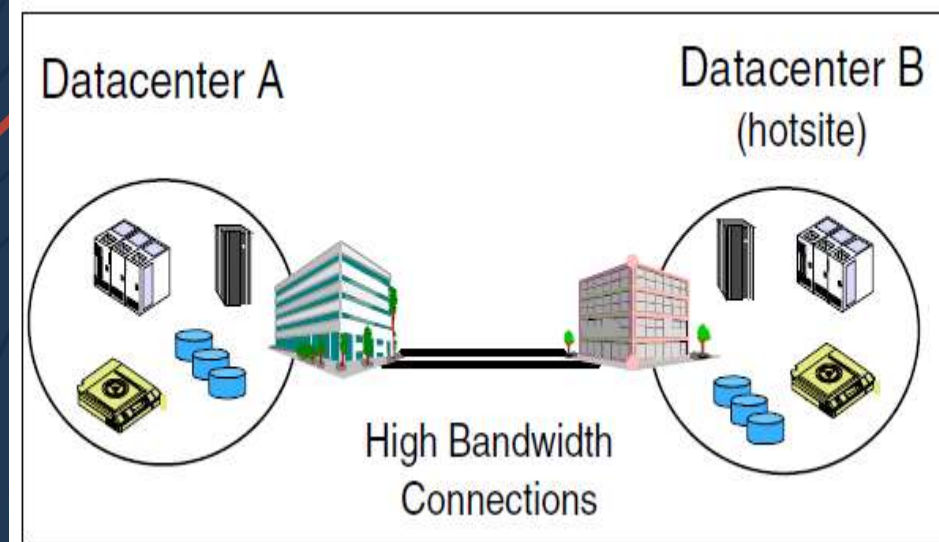
No off-site data

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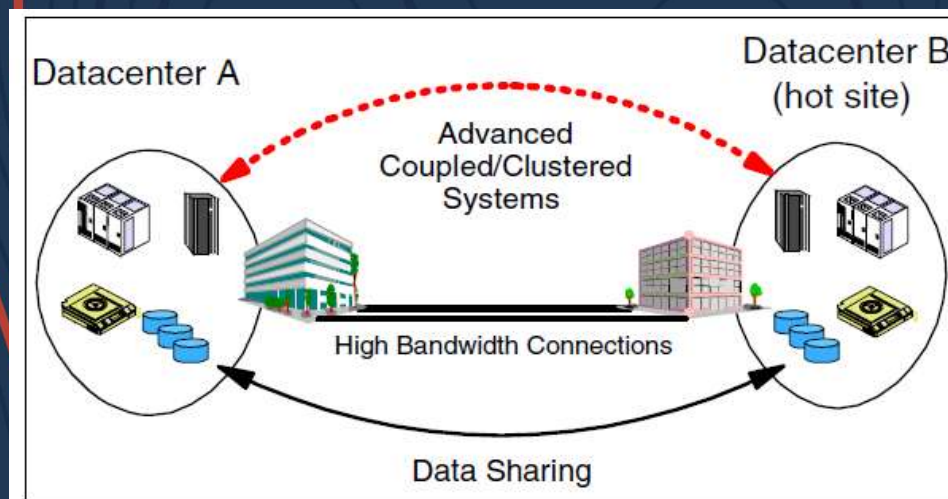
With DR site



No data outside the data centre



Data backup with no hot site



SGA – DR Location – ICT system - Requirements

The SGA plans to setup a DR location in case of need for disaster recovery through the following steps:

- DR location project (creating a conceptual solution for the setup of a backup data center),
- Setup of a DR location (implementation in accordance with the accepted conceptual solution).

ICT system of SGA

Data centre

WAN network

Directory service –(approx. 118 locations)

Mail system

File\Print

Technological Requirements

- **Network connectivity**
- **Virtualization platform**
- **Remote replication** - three types of remote replication:
 - Service level replication
 - Storage Area Network (SAN) replication
 - Replication at the virtual platform level

RTO/RPO requirements

RTO (recovery time objective) - according to criticality:

- Service criticality 0 and 1 – RTO time maximum 4 hours
- Service criticality 2 – RTO time maximum 8 hours

RPO (recovery point objective) - a point in time before which all stored data must be safely preserved:

- RPO time up to a maximum of 30 minutes

Other technical requirements

- uninterrupted power supply (UPS) that will ensure the operation of the equipment for a minimum of 30 minutes,
- additional power supply with sufficient power and capacity to ensure the smooth operation of all the mentioned equipment for a minimum of 24 hours.

Setup phases and scenarios

Phases

- The project should enable the scalable setup of a DR location (in several phases) depending on the criticality of the service;
- Phase I - services with criticality 0 and 1,
- Phase II – services with criticality 2,
- Phase III – other services determined by the SGA.

Three possible scenarios:

- A. Setup of a DR at a location owned by SGA and on equipment owned by SGA,
- B. Setup of a DR location with accommodation at the location of the data center service provider on equipment owned by SGA (Co-location),
- C. Setup of a DR location with accommodation at the location of the data service provider

PHASE I, elaboration of the scenario

1. Conceptual solution of the ICT infrastructure of the DR location, including the technical specifications of the necessary hardware and software and the specification of the works required for the implementation of the DR location in accordance with the Conceptual Solution,
2. All prerequisites that SGA needs to achieve on the existing ICT infrastructure to enable the setup of the DR location
3. List of all prerequisites (minimum and those recommended) that must be met for the establishment of a DR at the DGU location - for scenario A
4. List of technical requirements (minimum and those recommended) that must be met by the service provider - for scenarios B and C
5. **Calculating the cost** of setting up a DR location for all three scenarios. The cost calculation must be presented on a **5-year** basis, including the costs of equipment, accommodation and hardware maintenance.

Application and Data analysis

Data/Application Classification	Description
Critical (0)	Application data which is critical for business processes to provide minimum acceptable level of service in the event of a disaster.
Important (1)	Application data needed for standard business processes, which is impossible or extremely expensive to recreate. Data which is not needed for minimal critical operations, but has significant operating value.
Semi-Important (2)	Application data needed which is needed for normal operational procedures, but is possible and cost effective to recreate from original data sources at minimal to moderate costs.
Non-Critical (3)	Application data needed which can easily be recreated from original source data.

SGA services outside the data centre

Name of service	ICT service Type	Criticality	Location
Geoportal SGA	Application	0	Co-location
Geoinformation system of the state border	Application	0	CSC
System of digital geodetic elaboration	Application	0	CSC
Joint information system of land registration and cadastre	Application	0	AISITS
Single point of information	Application	0	CSC
Register of buildings	Application	0	CSC
Infrastructure cadastre system	Application	0	CSC

SGA ICT services in the data centre

The DR location must enable the operation of ICT infrastructure services that are rated as critical:

Name of service	ICT service Type	Criticality	Location
Active Directory	Infrastructure	0	SGA Data Center
DNS - local	Infrastructure	0	SGA Data Center
DNS - Public	Infrastructure	0	SGA Data Center
DHCP	Infrastructure	0	SGA Data Center
Exchange	Infrastructure	0	SGA Data Center
TMG	Infrastructure	0	SGA Data Center

SGA Applications in the data centre

The DR location must enable the operation of the application services that are rated as critical:

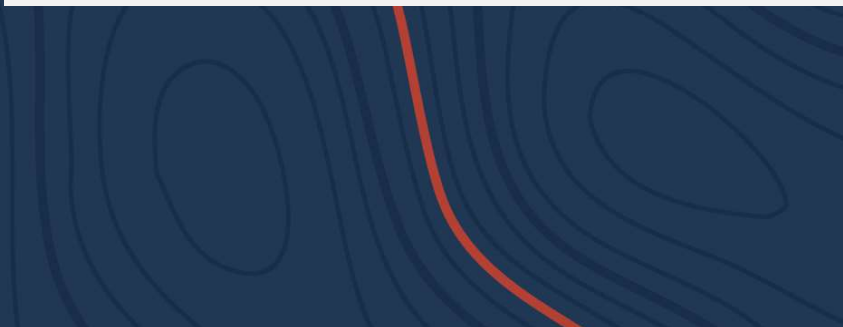
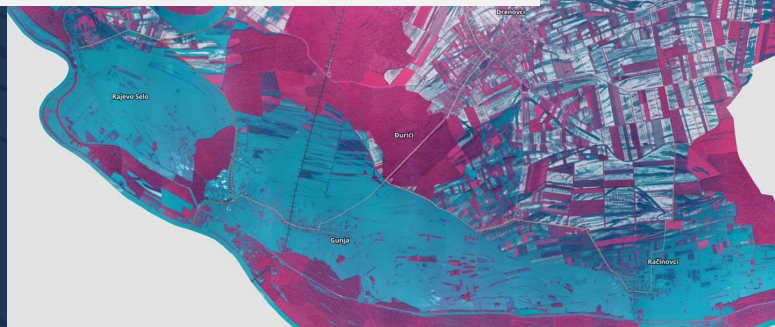
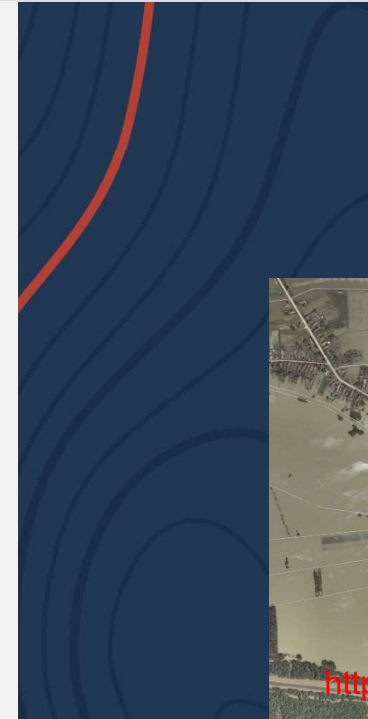
Name of service	ICT service Type	Criticality	Location
Human resources management system - HRNET	Application	0	SGA Data Center
Records of working hours - ERV	Application	0	SGA Data Center
SeUP (office)	Application	0	SGA Data Center
E-Order, E-Contract	Application	0	SGA Data Center

SGA – natural disasters - Flood

- Flood in the year 2014

THE ROLE OF THE SGA

- Producing data for the assessment of damage caused by floods.
- SGA Geoportal as WMS service.
- Sava river: aerial photogrammetrical shooting on 15,000 ha / 27 DOP5 and DTM
- Karlovac area; aerial photogrammetrically shooting on 213,000 ha / 355 DOP5 and DTM



SGA – natural disasters - Earthquake



Earthquake 22.03.2020

- Producing data for the purposes of assessing the damage caused by earthquake
 - Aerial photogrammetrically shooting - area of 77,000 ha
 - Production of 3.427 sheets of DOP 1:1000 (0.10 m)
- DOP 1:1000 is available at SGA Geoportal as WMS service

Earthquake 29.12.2020

- Drones recording the earthquake area of 40,000 ha
- DOP 0.5 (pixel size 0.05 m),
- high-quality DTM, 3D mash

DOP 1:1000 is available at SGA Geoportal as WMS service

Multisensor aerial photography of the Republic of Croatia for the needs of disaster risk reduction

The main activities of the project:

1. Aerial photogrammetric survey of the entire state (DOP and DTM)
2. LiDAR recording of the entire state on two levels:
 - Level 1 - 70% of the territory - density of 4 points/m² (outside urban areas),
30% - density 8 points/m² (urban areas)
 - Level 2 - recording approximately 4,100 km of embankment - density of 20 points/m², (for high-accuracy embankment condition analyses and reliability),
3. Hyperspectral and thermal imaging of the corridors of the rivers Sava, Drava, Kupa and Danube.

DOP and DTM - basis for modelling and disaster risk assessment, primarily earthquakes and floods

The methodology for the earthquake risk assessment will be created for Town Zagreb

Conclusion

- Restrictions for the establishment of a DR location in the legal regulation
- Dispersion of applications in several locations
- Weigh the risks
- Analyze and evaluate the importance of applications and data for business
- Scalable establishment of DR locations
- Creation of new products as a result of recognizing the needs arising from natural disasters
- Ensuring business continuity
- Determination of priority activities in terms of strengthening capacity and infrastructure of SGA for responding to risks

Thank you for the attention!



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