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Source:	Johannes Tanne Consulting
Title:	Att.2 - Presentation - Data sharing for AI in Dentistry

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Abstract:	This PPT contains a presentation on data sharing for AI in Dentistry given in the AI for Dentistry Symposium on 21 March 2023.

Data sharing for AI in Dentistry

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Introduction to Data Sharing

- Benchmark Data Sets TG-Dental:
  - Large dental data sets necessary for augmented software (AI software) to assist dentists in diagnosis and treatment

- Background: Benefits and challenges of sharing dental images (for AI), roles & responsibilities (data owner, controller/processor)

- Ethical and privacy concerns to be addressed

- Conclusion and **ToDos**

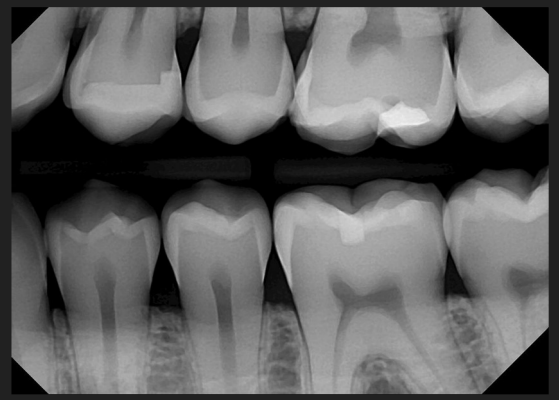
Benefits of data sharing

- Improvement of model quality
- More accurate and robust models
- Improving time saving and patient communication

→ DEL2.2 TG-Regulatory

“Good practices for health applications of machine learning: Considerations for manufacturers and regulators”

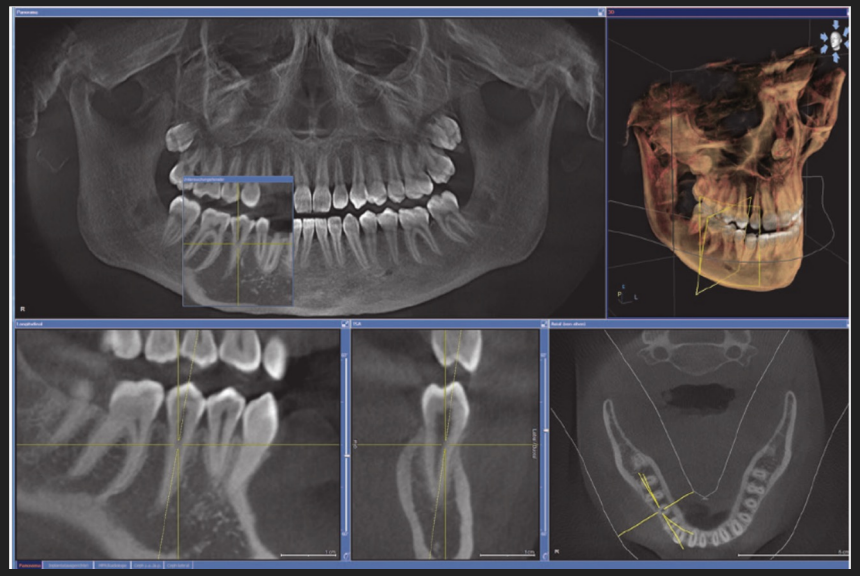
Overview of dental images



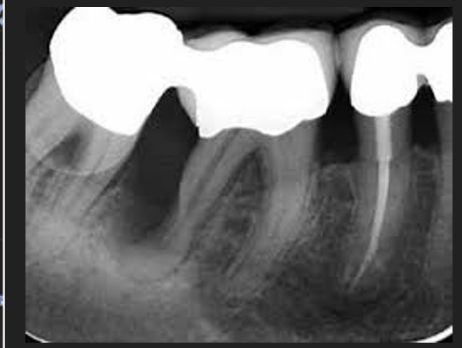
https://dentistry.com/topics/bitewing-x-rays/

https://www.zm-online.de

- Visualization teeth, jaw, surrounding structures
- X-rays, intraoral photo, CBCT, MRI
- diff. settings & modalities (X-Ray: BW, PERI, PAN etc.)
- Detecting pathological and non-pathological structures, anatomic features, evaluating the alignment of teeth etc.



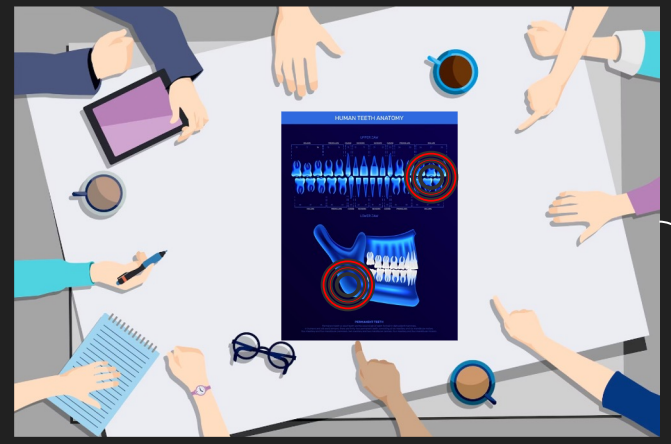
Grundlagen der DVT Technologie; January 2007; Quintessenz



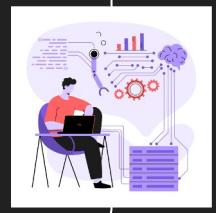
https://www.zmk-aktuell.de

Workflow for data sharing

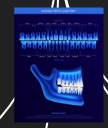
- Collection and **preprocessing** of dental imaging data
- Appropriate **consent** from patients & de-identification (patient privacy)
- Data transferred to a secure data sharing platform/ network, available ML
- Collaboration: appropriate processing, use and monitoring ethical and legal requirements



TG-Dental



Storage and processing



Data collection

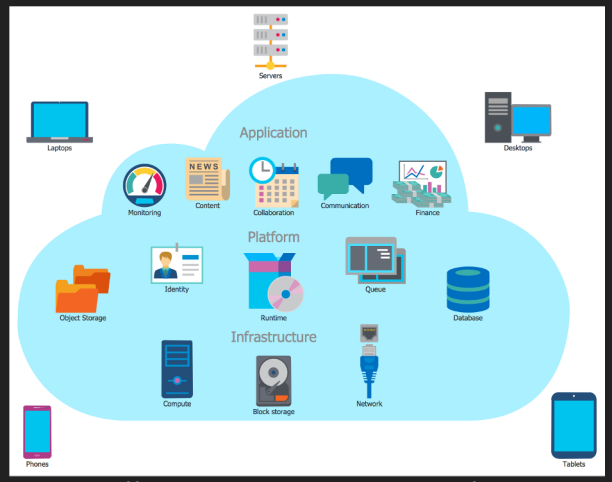
Data collection

- High-quality: essential for accurate and effective AI models
- Various imaging techniques (digital X-Ray, CT, intraoral images)
- Type of modality used depend on diagnostic condition
- Consent from patient

→ Standardized and consistent data collection method: accuracy and comparability across different datasets

De-identification

- Image may include personal information
  → pseudonymization techniques to protect patient privacy
- Risk of identification by contextual information or by combining multiple data sources
  → technical and organizational measures
- GDPR: informed consent for data sharing and data subjects' rights to access and control their data
- **Data protection impact assessment:** identify risk
- **Data sharing agreements** (data controller & processor): scope, purpose of data sharing, as well as mechanisms for ensuring data security and confidentiality
- Balance between the potential benefits of AI technology and the need to protect patient privacy and security



https://www.conceptdraw.com/

https://www.lepide.com/

Storage and Sharing - data owner obligations

- Data is stored securely and in compliance with relevant data protection regulations (GDPR, HIPAA)
  - Encryption and access controls to prevent unauthorized access or theft
- Origin of data and storage under consideration of transatlantic agreements
- Policies and procedures (authorized parties and specific purposes)
  - Sharing in a standardized and interoperable format
  - Balance the needs of patient privacy

Challenges of data sharing

- Range of technical, legal, and ethical issues
- How to handle retrospectively
- Technical challenges: data standardization, data quality, and data security
- Legal challenges: data ownership, intellectual property rights and privacy regulations
- Ethical challenges: informed consent, transparency

Conclusion

Data sharing important for built up benchmark data set but challenges include data privacy, security, and ethical considerations

Agreements for sharing patient data: define data processor, controller; define data owner (ITU first commitment, requirements to be clarified)

Use secure data sharing platforms: Standard Contractual Clauses for cloud providers

Comply with national/international data protection regulations and standards

ToDos

1. Data protection impact assessment: Consider the potential risks and benefits of data sharing
2. Data sharing agreement (WIP)

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