Cs Workshop
Fukushima
30 Sept-3 Oct 2013

Project integration

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Introduction

- The complete remediation of all contaminated areas in Fukushima plus associated waste management is likely to involve work extending over at least 3 decades
- Associated studies of the mobilisation of Cs and determination of the long-term consequences of this incident will run even longer
- Because of the huge integrated investment of resources, it is important to assure that the work is managed effectively
- The knowledge gained will be of interest both to the international community and to a wide range of different stakeholders in Japan

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Project coordination

- The principles of effective coordination are easy to state (even if often difficult to implement in practice):
  - Clearly define goals and responsibilities
  - Mine national and international knowledge bases to avoid duplication of effort or, even worse, repeating mistakes
  - Ensure all actions are carefully planned in advance in a top-down manner
  - Ensure all those involved have the experience, tools and infrastructure required
  - Rapidly and efficiently document all work and make it easily available to all potential users
  - Establish an effective **technical** QA system that is adopted at all levels within the project
  - Assure continuity of funding / support to reduce administrative loads and facilitate maintaining continuity of expert manpower

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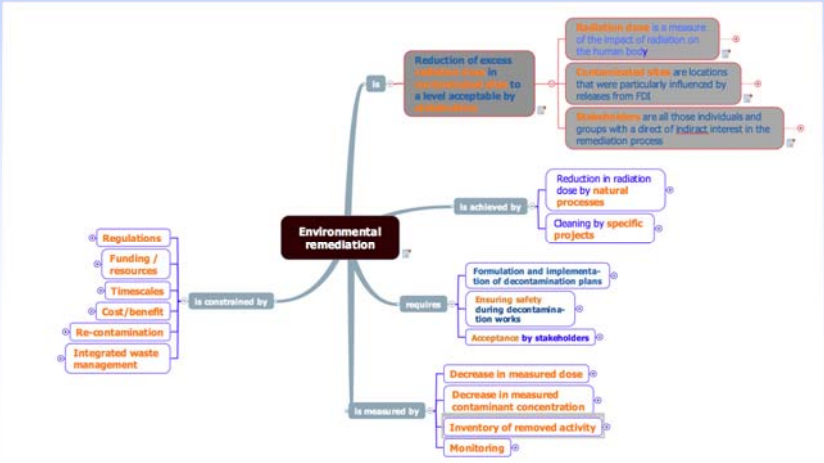
Starting point: ontology!

- All knowledge management systems emphasise establishing a clear ontology: in reality this simply ensures that everyone understands key terms
  - Essential to define goals and responsibilities
  - Required for effective mining of knowledge bases
  - Should be a component of top-down planning
  - Required for effective documentation and technical QA
- A useful technique for this involves Argumentation Modelling



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Is ontology important?

- Problems occur predominantly due to commonly used terms that are taken to mean completely different things by different individuals / groups, e.g.
- Cs sorption:
  - "Kd"
  - Fast, reversible uptake of Cs onto a surface from a liquid
  - Distribution of Cs between a solid and aqueous solution
  - Partitioning of Cs in a 2-phase solid/solution system where Cs concentration in the solid phase is a function of the concentration in solution
- Radiation dose:
  - Measured value at a specific point (e.g. 1 m above surface: mSv/h)
  - Calculated human exposure considered shielding for time spent indoors (mSv/y)
  - Integrated dose from all external and internal radiation sources (mSv/y for reference lifestyle)

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Ensure that we communicate clearly exactly what is done in sorption studies and how it can be used / where it is inapplicable in terms of understanding Cs mobilisation / reconcentration / waste volume reduction

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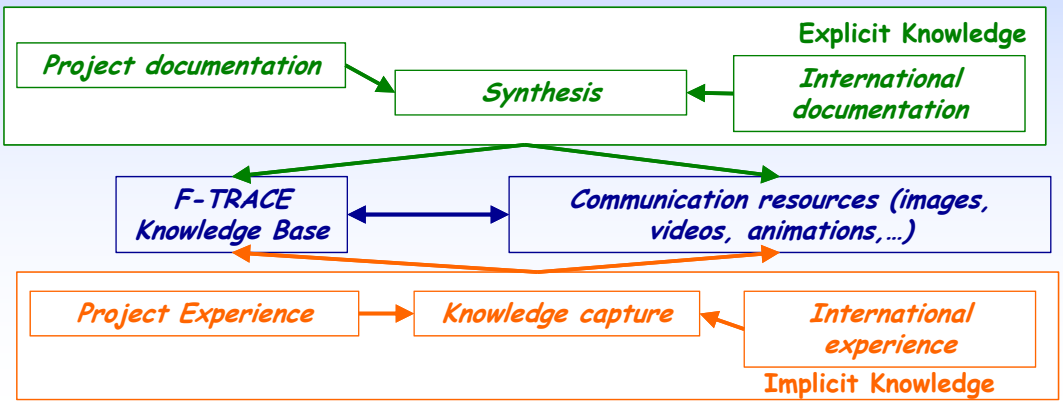
Integrated Knowledge Base (KB)

- From the beginning, an integrated KB should be developed using modern Knowledge Management tools (already well established in JAEA)
  - Needs to incorporate both conventional documentation and captured experience ("implicit" or "tacit" knowledge)
  - Requires rapid effort to establish standardised protocols, data reporting formats, technical QA,...
  - To maximise flexibility, web-based with user-friendly interface



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KB development

- Requires easy input of all raw & interpreted data plus supporting information into a centralised database:
  - Wherever possible input automatically by use of smart data-loggers in both the field and the laboratory
  - Facilitate linking samples with analyses (e.g. use of bar codes)
  - Data access using smart search engines
  - Database security is a key issue to be addressed from the start
- In order to integrate information from different sources:
  - Established sampling analysis protocols must be strictly adhered to
  - Full assessment of all uncertainties & propagated errors
  - Rigorous process of QA (references, blanks, backgrounds, etc.)
- Has to also integrate all synthesis and interpretation – wherever possible incorporated within a system model

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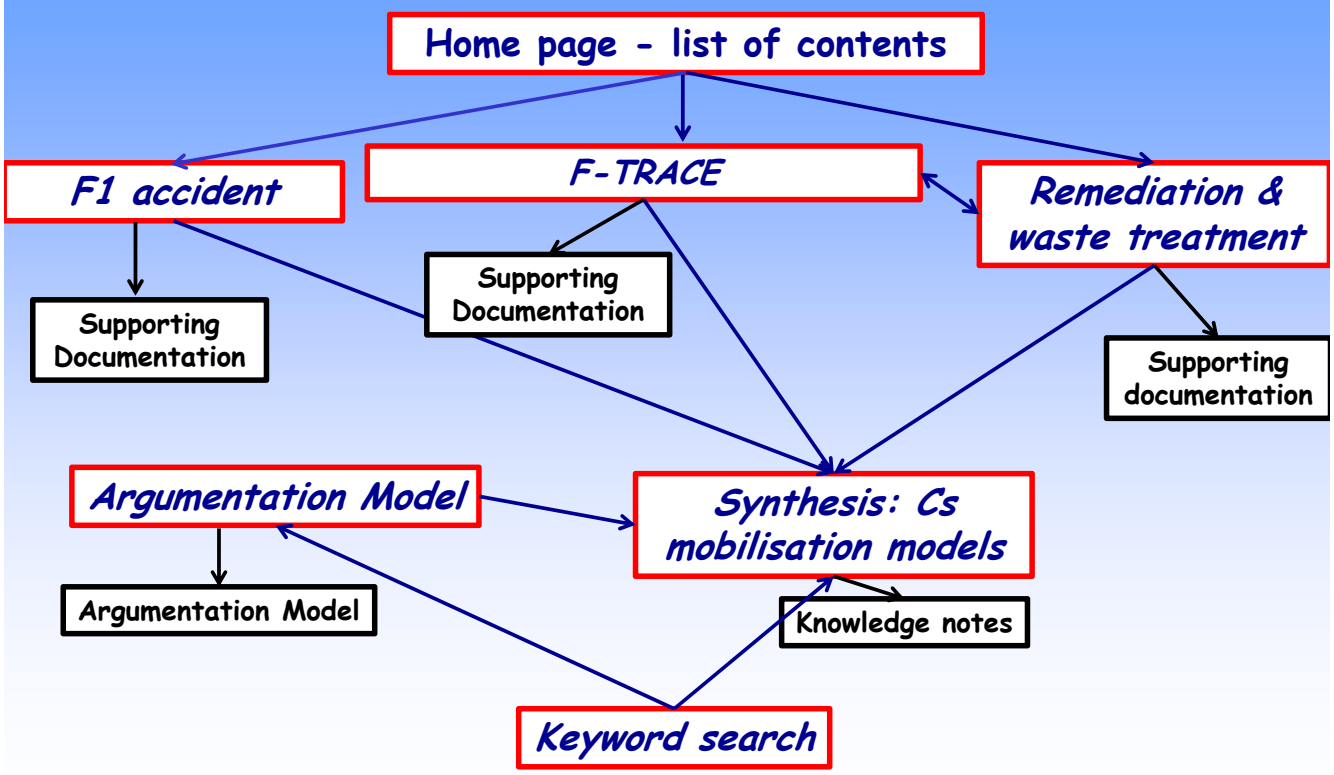
KB structure (web-based)



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Full KB integration

- Ideally should also integrate all related work by other Japanese and international groups
- Maybe difficult to implement in Japan due to:
  - Sub-division of responsibilities at a government level
  - Very large number of independent organisations working on related projects
  - History of lack of integration of key components (e.g. waste management)
- Requires integration of national and international experience, which is limited by:
  - The language barrier
  - General lack of understanding of Japanese conditions by foreign "experts"

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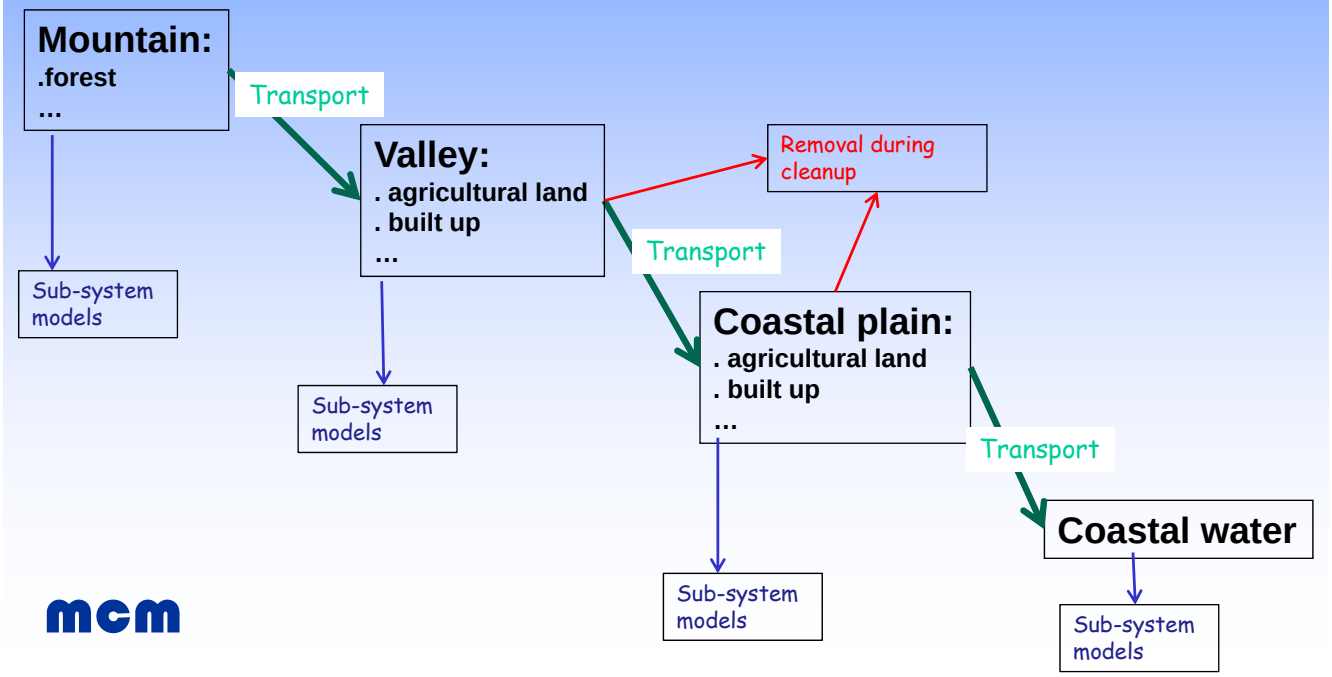
Capture of understanding in models

- Nested set of models to completely represent regional flux of radio-Cs
- Sub-models capture local process understanding
- Can also capture remediation processes and counter-measures to reduce mobility



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Technical QA

- Technical QA is not covered by ISO 9001 type certification!
  - ISO 9001 relates to project management: can be useful, but not sufficient
- QA: operational definitions

Quality = demonstrable ethical & scientific rigour

Demonstrable = clearly & openly communicated

Ethical rigour = honesty & openness

Scientific rigour = application of best practice by well-qualified and experienced staff

The QMS facilitates quality and checks to assure that levels are maintained (continual, active process)

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Technical QMS

- Because of work loads involved, implement QA only as, when and to the level required. Ensure the quality level is always recorded along with any information in KB
- Utilise tools to ease working to a high level of quality
  - Use-friendly protocols & guidelines (e.g. accessible on tablet or smartphone)
  - Automatic data logging to the maximum extent possible
  - Standardised spreadsheets / codes for data manipulation operations
- Ensure all those involved (from top management down) are committed to assuring technical quality
- Use independent technical reviews as needed, ideally integrated within the project documentation process

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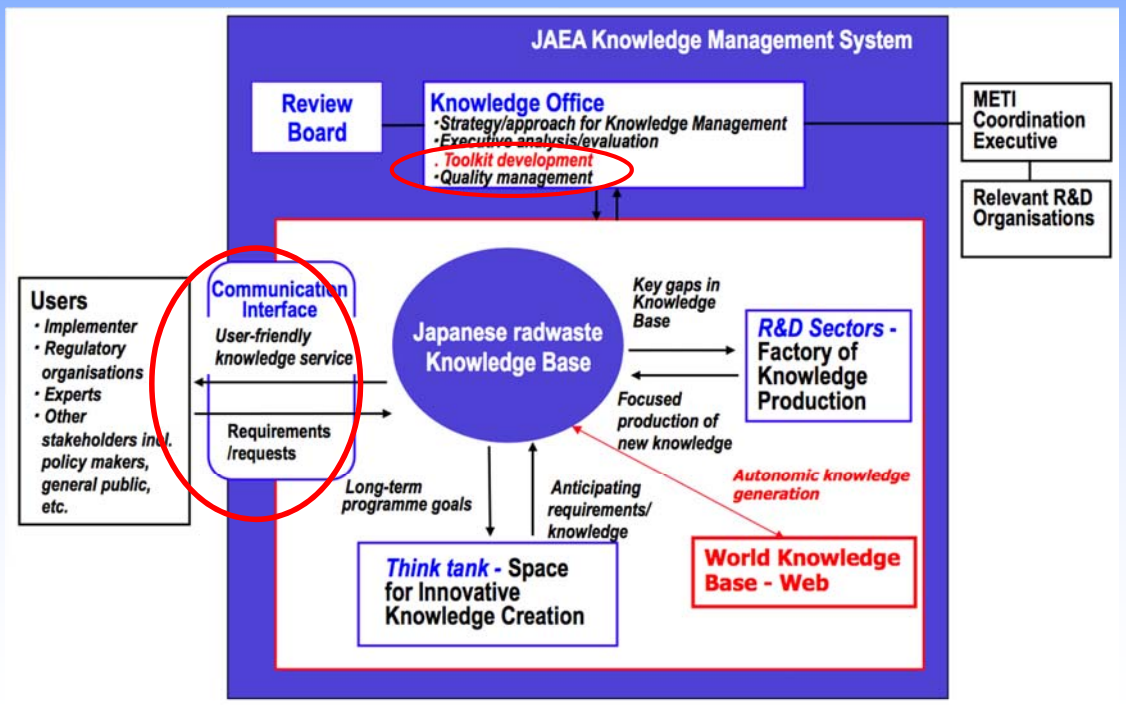
Use of advanced KM tools

- Relatively well established in Japan due to JAEA project supporting geological disposal



KM toolkit

- Knowledge capture:
  - Argumentation modelling
  - Expert systems
  - Data mining systems
  - Think Tank
- Innovative problem solving
  - TIPS – requirements conflict resolution workshops
- Knowledge communication
  - Coolrep platform
  - Knowledge archive / smart search engines
  - Use of modern media (video, internet, smartphone,…)

Communication

- It is well established that fear of nuclear contamination can cause significant health effects, even when no radiological risk
- Regional, national and international communication has been very poor in the past
- Project should have open communication as a key goal
  - Primary focus local communities
  - Secondary focus all Japanese stakeholders
  - Tertiary focus international community

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Fear and Fukushima

03 September 2013

International radiation protection experts have written messages to the Japanese people to explain the health impacts of the Fukushima accident.

The letters were published on the website of prime minister Shinzo Abe and his cabinet and explain what is known about the effects of radiation on the human body. As individual comments to the government's 'Nuclear Disaster Expert Group' submitted between late July and the end of August, they collectively underline that the potential effects of radiation exposure are minimal compared to the observable effects of stress and stigmatisation on Fukushima residents.

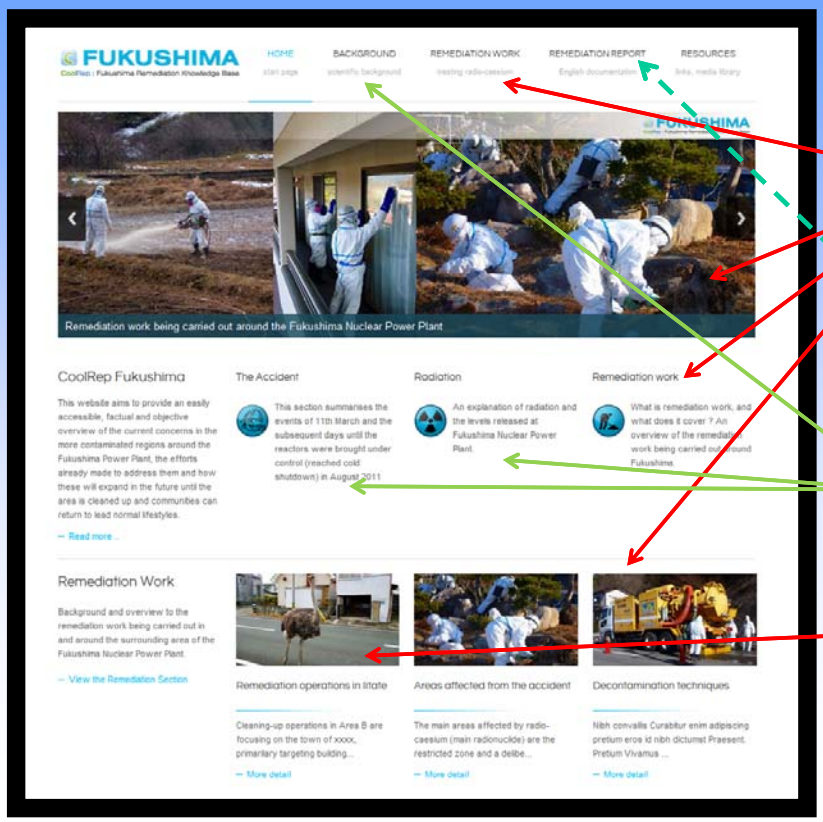
Werner Burkart, a professor of radiation biology Munich's Ludwig Maximilians University began his letter, "Nearly two and a half years since the earthquake and tsunami event of March 2011, it is time to reflect on the suffering but also on the resilience of the affected and Japan as a whole, and to develop visions for a future without fears and restrictions."

"It is important to understand that the risk to health from radiation from Fukushima is negligible, and that undue concern over any possible health effects could be much worse than the radiation itself"

Gerry Thomas Imperial College, London

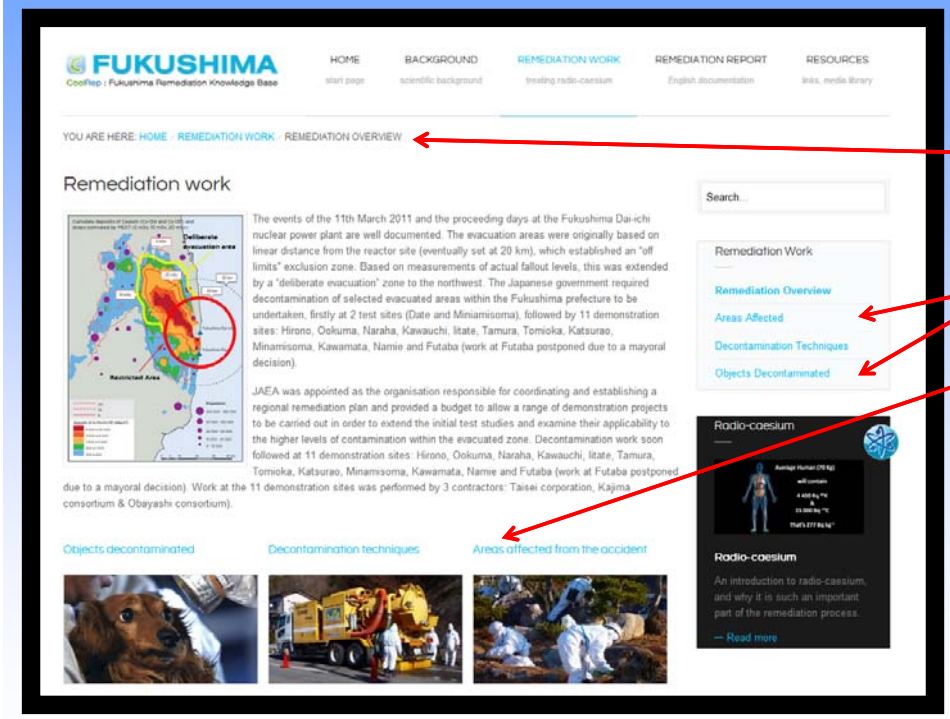
Abel Gonzalez of Argentina has served for many years on the UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). He explained its conclusion that, "No discernible increased incidence of radiation-related health effects are expected among exposed members of the public and their descendants." The American representative of UNSCEAR, Fred Mettler, noted that fear of effects on future generations were unfounded: "You should be assured that many scientific studies have shown that this does not appear to happen in humans."

Web-based platform concept



- Remediation work being carried out
- Remediation report (J & E)
- Background Info
- Engaging news stories

Structured knowledge presentation



- Overview of remediation work
- The interested reader can go into more detail whilst the less interested or less technical reader can drop out at any stage

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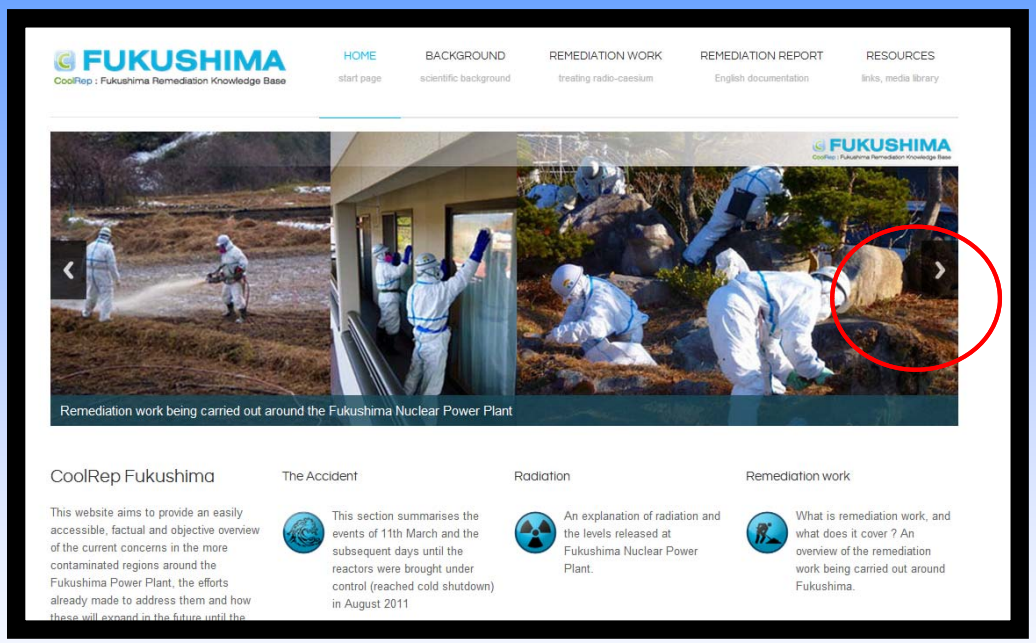
Multimedia Content



- Picture slider featuring different stories that automatically shuffles or
- Can be used interactively

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CoolFtrace implementation

- Prototype "CFF" exists in Japanese & English: could be readily extended to incorporate F-TRACE and all other relevant ongoing work
- Could be used as an interface to the entire project knowledge base (fundamentals already demonstrated in CoolRepH22 project)
- Can also include full QA records (concept also demonstrated for H22)
- Completely flexible with regard to expansion over coming decades
- Main concerns to be addressed involve security

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Messages

- A more structured approach to project integration will be very beneficial for such a long-term, complex, multi-disciplinary project
- It should make use of tools already developed in JAEA (for geological disposal projects – which have similar problems and constraints)
  - Integrated Knowledge Base
  - Synthetic system models
- Both internal and external communication are critical and should be explicitly considered during all planning
- Workshops like this are a good starting point for such integration!

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