



TRAMEX

Building Diagnostics using the Tramex MOISTURE ENCOUNTER PLUS

The IBS team has been conducting building diagnostics inspections for than 15 years. Throughout this time, the Tramex range of products has never been far away.

Here, they outline some thoughts on why their longest serving moisture detection “associate” is the MEP!

If you touch buildings, YOU can benefit from the MEP



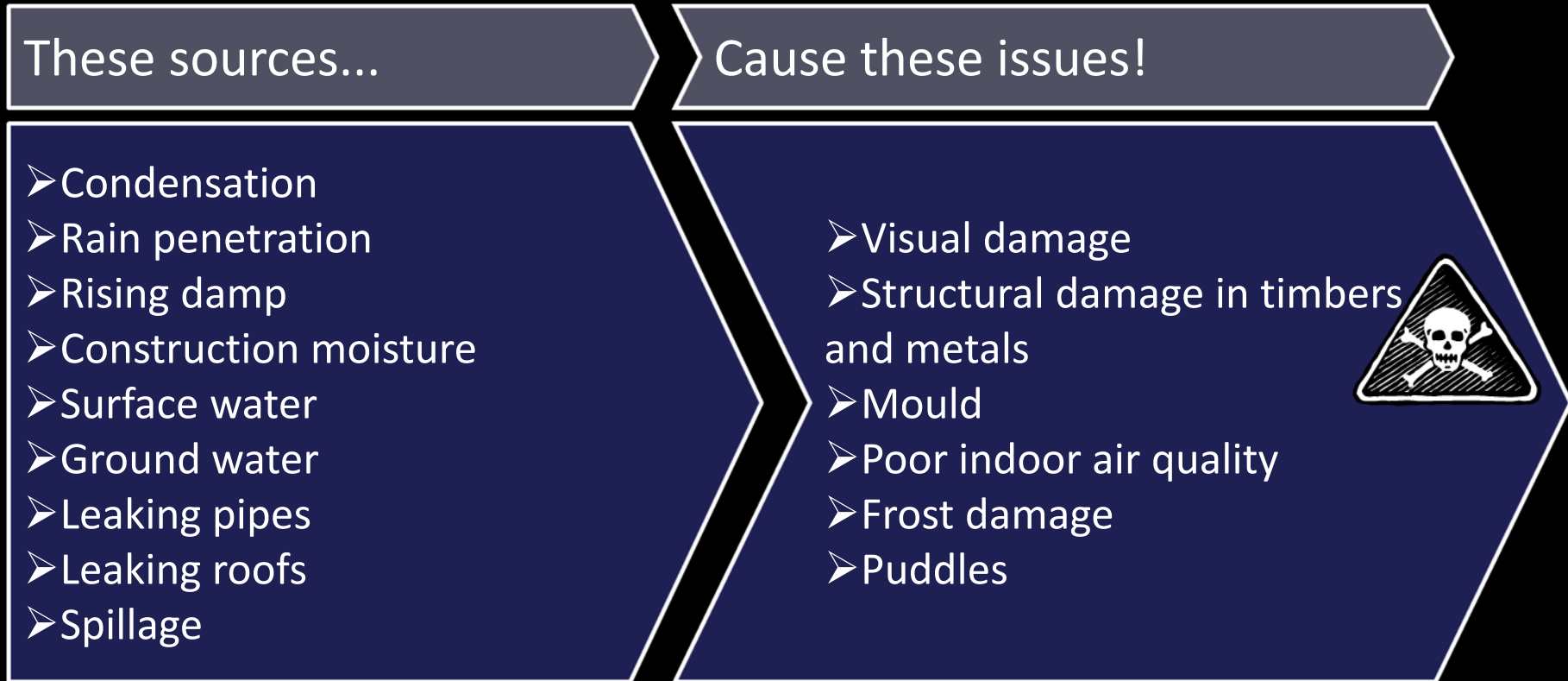
- In our experience, whatever it is you are doing working on buildings, at some time you have to deal with moisture

Surveying, roofing, leak detection, pest control, indoor air quality, thermography, building maintenance, restorative drying, EIFS/SIPS, wood, solar installation, plumbing, flooring, home inspection....

Goal of Moisture Detection

- A goal of moisture detection is to identify and document abnormally wet areas/locations which can cause potential damage of a building/structure so that the environment can be reoccupied or brought back to the (dry) condition before the intrusion/occurrence occurred, and do it in the most economical and efficient means possible.
- The process begins by identifying all of the affected materials. Water must be tracked from its initial source and diligently followed in every direction it migrated to establish an accurate picture of the extent of the damage.

Moisture Problems we Encounter



Systematic measurement of moisture content can provide vital clues of hidden dampness – we believe the MEP is ***the best non-destructive tool*** for revealing sudden changes in moisture in almost any material

Moisture Problems in Buildings

- Even without an unwelcome intrusion of water into a building, many buildings will have moisture problems. Moisture in buildings has been a source of concern for the construction and architectural industry for a number of years.
- In recent years, other industries such as the restoration industry and industries that address indoor air quality have begun to study this science to better understand how moisture moves within a building.
- Understanding the concepts of moisture movement and surroundings in a building is crucial to increasing the quality of work performed by restorative drying contractors.
- Without a water damage situation, normal moisture problems can range from simple nuisances to serious problems that can affect the structural integrity of a building and can seriously threaten human comfort and health if the problem gets out of control.
- The MEP moisture meter allows you to rapidly evaluate where moisture is a problem without penetrating the material's surface. Non-penetrating meters are very effective for initial troubleshooting and inspection, because they give a quick indication of where the moisture source is located, or where the material contains "abnormal" moisture.
- In a few seconds, they can detect moisture not visible from the surface, and they leave no trace of their use.

Which materials can be measured?

- Many typical building and finishing materials can be measured for moisture content with the MEP including:
 - Wood – Solid and Engineered
 - Plywood/Particle board/OSB/Engineered
 - Tile – Marble – Porcelain or Ceramic
 - Vinyl/Lino/VCT
 - Drywall/Plaster/Gypsum
 - Roofing material
 - Masonry
 - Cabinets
 - Sub-flooring
 - Concrete
 - Structural Insulating Board
 - Block Wall

- A hygroscopic material is one that readily takes up and retains moisture until it attains vapor equilibrium with the environment. Materials that are labeled hygroscopic, absorb moisture easily, whether from direct contact with water or from exposure to high humidity. Such materials gain and lose moisture continually in an effort to equalize with the water content in the surrounding air mass. Most materials in buildings are hygroscopic, which means they naturally take on and gives off water to achieve equilibrium with the surrounding environment. The more hygroscopic the material, the faster it will collect water vapour.



Identifying Damp

- Visible – Initial inspection procedures begins with identifying and stopping the source of water intrusion. Forms of visual damage, condensation, rain penetration, rising damp, frost, construction moisture, leaking pipes and building envelop leaks. While condensation in itself may not give rise to more than a temporary nuisance, the mould growth which often accompanies persistent condensation is much more likely to give rise to serious complaint.
- Hidden - Is often the hardest to find. The process begins by identifying all of the affected materials. Water must be tracked from its initial source and diligently followed in every direction it migrated to establish an accurate picture of the extent of the damage. Investigation is required to provide recommendation and resolution of the problem. Often there are several reasons for a problem, and therefore several remedies. Dampness can seriously affect parts of the building that are not immediately visible. Hidden dampness must be discovered because it can also lead to severe deterioration in building products, and can result in structural problems.
- Knowledge of what's wet and what's dry, and the extent is vital to Restoration and Building Diagnostics . We must understand what “wet” is and what “dry” is when comparing to a “Dry Standard”. This is established by obtaining a moisture reading using a known unaffected material.
- In many situations the professional investigating the dampness will need an indication of the actual level of moisture within the structure, which is where the MEP comes in.

How does moisture move?

- It is important to understand how moisture moves to be able to properly trace the source of the water leaks. Water intrusion is the passage of water through the envelope of a structure resulting in leaks and eventually wet rot, mould, dry rot and deterioration of building components.
- You must identify and solve the moisture intrusion problems first. Sources of water intrusion can vary from failures in fixtures and other plumbing, weather events, flooding, and building defects. Identify the source and correcting the problem in order to prevent additional water intrusion or future damage to the structure and its components.
- Liquid Flow
 - Put simply, water always goes wherever it wants to go and gravity plays a significant role in where it goes.
- Capillary Action
 - This is the ability of liquid to flow upwards spontaneously rising in a narrow space or in porous materials. This effect can cause liquids to flow against the force of gravity and occurs because of inter-molecular attractive forces between the liquid and solid surrounding surfaces.
- Air Movement
 - Air movement has a significant role in the movement of moisture. When air is moved across the surface of a material that contains moisture, as long as the ambient conditions are drier than the air in the “boundary layer”, this drier air will help accommodate evaporation. Air movement across will also create a “suction” effect that will help pull liquid moisture from porous materials or across other surfaces.
- Vapor Diffusion
 - Moisture vapour will always move from wet to dry and will move through materials. This is a function of the permeability of the material as well as the vapour pressure differential.

Establishing Extent and Severity

- Investigate
 - Identify the existence, location, path and source of the damp problem, this may require internal and external non-destructive measurement with the MEP along with other destructive types of investigations.
- Document
 - When water intrusion/damage occurs the single most critical factor in defining the amount of potential damage is by the use of moisture detection and evaluation, moisture mapping can help in documenting the extent and locations of the damage. Moisture meters will quantify the moisture, on either a relative or absolute scale. This numerical value can then be documented and communicated to interested parties in a much easier way.
- Damage assessment
 - Primary – Look for where the water has entered and locate the source
 - Secondary – Leak tracing allows you to verify where the extent of the damage has spread
 - GYR ratings – Is a system for marking areas that are wet and dry by a colour code system
 - Green = Normally/Safe
 - Yellow = Abnormally High Moisture content
 - Red = Extremely High Moisture content
- What to look for
 - Wood surface fungi is typically not supported on wood with a moisture content below 16%
 - Moisture content greater than 20% can support the growth of dry rot fungus. If allowed to remain above 20% moisture content, wood can lose structural integrity
 - Fiber saturation point for most structural wood is about 30%
 - Many basic building materials are not uniform in quality, weight and flexibility

Moisture mapping

- Moisture mapping is a useful method for identifying the location and actual size of the affected area, and provides a reference for the locations where the instrument has been/will be used.
- Moisture maps are drawings of affected rooms or areas with corresponding moisture levels for the structural materials in each location or room.
- Using moisture mapping is a formatted way to include the conditions from the first inspection, to any follow up inspections to document the amount of change between each.

How to operate the MEP

- The MEP has two rubber electrodes which are spaced apart to give stable readings and a deep penetrating signal which can easily read through tiles, vinyl, roofing, wood surfaces etc.
- First , switch the unit on. If the unit does not come on, check the battery.
- Then, you must select the scale relevant to the materials being tested
 - #1 for Wood/Timber for a quantitative measurement using a percentage of moisture content
 - #2 using a dry standard for comparative/qualitative moisture levels in Drywall/Roofing
 - #3 again using a dry standard for comparative/qualitative moisture levels in Plaster/Brick)
- Hold the Moisture Encounter directly on to the material being tested ensuring the soft rubber pads are in firm contact with the surface. No cutting or penetrating of the material being tested is necessary.
- For wood, read the moisture content off the upper scale in percentage moisture by weight.
- For drywall, plaster, brick and felt roofing use the relative scale.
- Battery check. When the Moisture Encounter is switched on, the LED will commence to flash. This is a reminder to avoid storing the unit while it is on thereby draining the battery. If the light does not flash when switched on, the battery needs replacing.



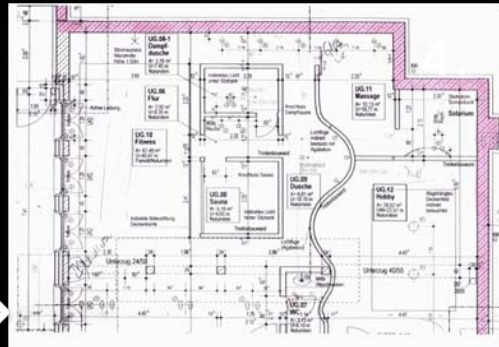
IBS CASE STUDY: WATER DAMAGE TO RESIDENTIAL BASEMENT WALL

Objective and Background

- IBS were selected to assist in resolution of ongoing water intrusion into the finished basement of a high end residence - specifically the exterior basement wall areas below patio.
- Internal water sources have been discounted.
- Some attempts were made to dry out as well as repair the exterior areas. None of these have been successful.
- Constant internal repair and redecoration required.



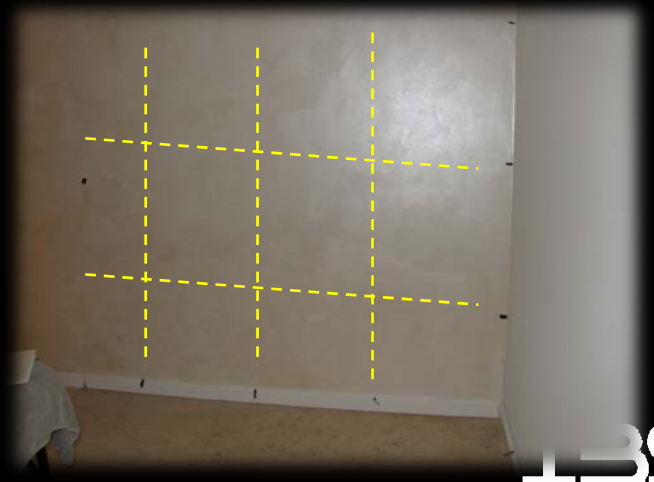
Approach Used by IBS



1. Establish baseline moisture level across problem areas using MEP and document on a moisture map.
2. Water testing to the exterior.
3. Monitor moisture levels of internal subject wall over a 24 hour period.
4. Identify likely water ingress points based on MEP readings and all other information available

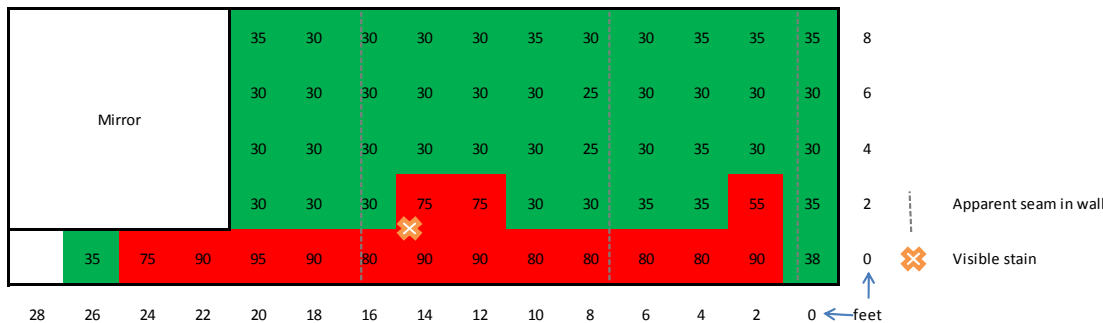
Preparing the Grid for Mapping

- Decide on a practical grid size for specific problem (e.g. 15cm/6" or 60cm/2ft) and mark out a "virtual grid" using non-marking tape along the 2 axes.
- On a wall, to save time, sometimes a tape measure can be laid on floor to provide horizontal axis.
- Mark the grid on squared paper to replicate wall or floor under survey.
- Make a note of the location of any visual information on the grid (e.g. spalling, staining or other defects) or construction detail (e.g. apertures, joints, fixings or features).

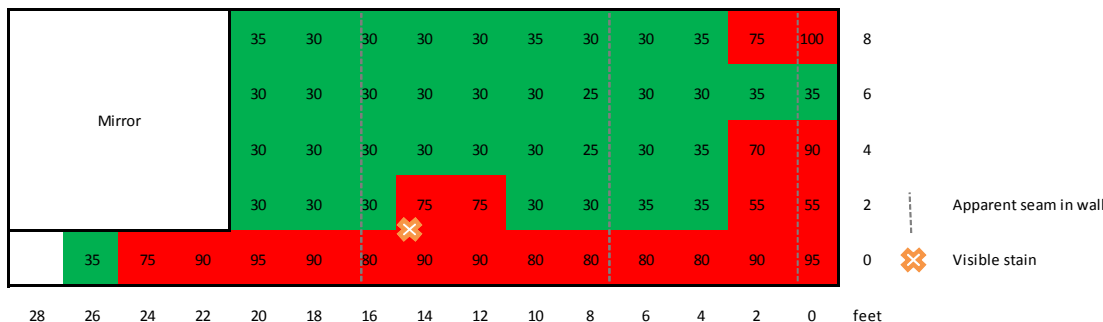


Before and After Water Test

West Wall - Baseline Measurement 17/11/2010 (Comparative measurement using MEP)



West Wall - Measurement 20 hours After Flooding 18/11/2010 (Comparative measurement using MEP)



- Comparative moisture readings were taken before and after water testing and documented with high readings noted as RED areas on the grid.
- This approach provided:
 - Baseline
 - Comparison
 - Finding the extent of damage
 - Leak tracing information
 - Documentation
 - Communication – process –progress–determination–results

Moisture mapping with the MEP helped reach these conclusions:

1. Ongoing ground water intrusion to base of basement wall via defective sealing of junction with floor slab
2. Rainwater intrusion to top RHS corner of room via defective drip tray sealing
3. No intrusion via vertical joints in wall slabs





IBS Tips to Avoid “False Positives”

- “False positives” can always be a concern. Typical triggers of false positives include hidden services and features such as:
 - Steel studs
 - Nails/Screws
 - Corner beads
 - Lead or heavy metal paints
 - Foil backed Insulation and wall paper
 - HVAC Ducting
 - Plumbing
 - Electrical wiring, conduits and boxes
- In order to avoid incorrect conclusions:
 - Like any instrument, you should not use the MEP blindly: always use your eyes (and ears) !
 - Try turning the MEP through 90° - metal objects across both pads will cause a high reading and avoiding both pads will remove the problem
 - Step back and search for obvious clues (sockets, switches, fixings, visible features etc)
 - Use any other sources of information – drawings, other peoples knowledge of the building
 - If you suspect you are getting a false reading, move the meter around the location, look for patterns, test in various areas for a better reading

General Tips and Hints

- Carry extra batteries
- Always test the equipment before going to the inspection
- Make sure that the surface you are testing is dry with no liquid moisture
- Use secondary means of verification
- Use a camera to document findings

Typical Moisture Related Roofing Issues

- *Leaks at roofing features and abutments:* blocked valley gutters and downpipes can cause rainwater to pond and overspill the flashings. Parapets and chimneys can become extremely wet and, in the absence of effective damp-proofing, water will drain downwards to other parts of the building, showing as damp patches in rooms below.
- All building components have a limited lifespan. Elements wear out, erode, become worn or decayed, and generally fail with time. They can be constructed incorrectly, by having wrong the construction detail or the wrong components being installed. All can cause construction related damp problems. These can manifest themselves in a building in many ways – Damp to the interior/exterior of a building or water ingress or penetration.

Typical Restoration Issues

- Damage assessment – visual vs. hidden
- Inspect for Primary and secondary damage
- In restorative drying, moisture monitoring and documentation from start to finish is vital and part of the Industry Standard
- Knowledge of what's wet and the extent is vital to Restoration and Building Diagnostics
- Decisions must be made on a case-by-case basis, founded on proper diagnosis for each structure and its components; the good news is that moisture meters will provide us with the ability to make those decisions
- Understand what is “wet” and what is “dry” when comparing building materials. This is established by obtaining a moisture reading using an unaffected material as referenced in the Industry Standard documents IICRC S-500 & S-520

Hints to Maximising your Return on Investment

- Time saving – using the MEP means inspections are faster, more accurate, more professional – it is the best measurement tool for moisture, damage management, improving business performance.
- First Impressions – establish a positive image to your customers – convincing level of professionalism (appearance, tools used, knowledge).
- The MEP helps you:
 - In developing the scope of damage.
 - In developing the costing of the damage.
 - With credibility – justification – better decisions – problem solving.
 - Out service the competition

Standards

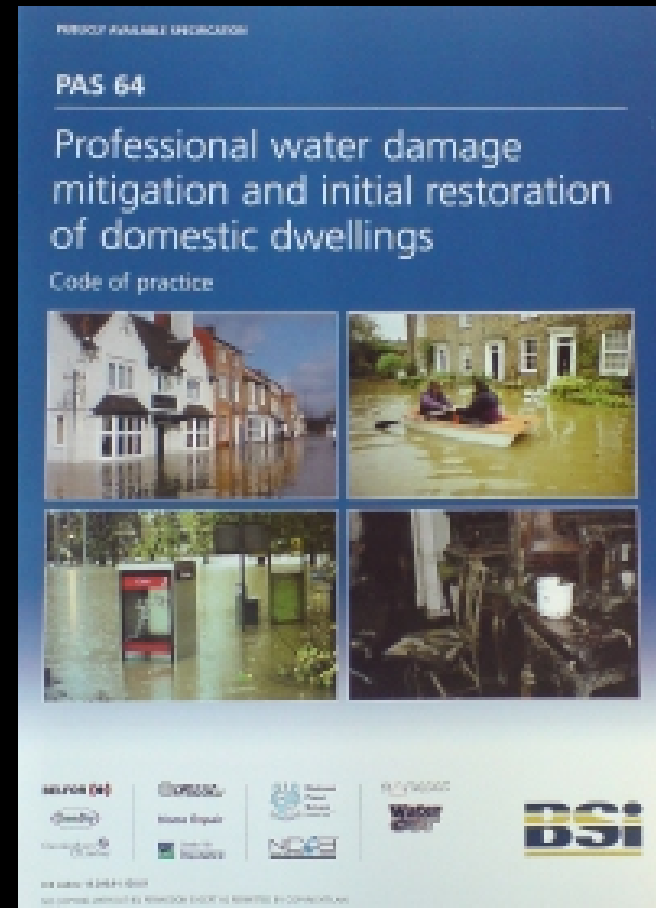


- IICRC (Institute of Inspection Cleaning and Restoration Certification)
www.iicrc.org
- S-500 - Standard and Reference Guide for Professional Water Damage Restoration
- S-520 - Standard and Reference Guide for Professional Mold Remediation
- These are procedural standards, they are based upon reliable restoration principles, review of available scientific and industry literature and information and practical experience
- These standards were written for use by those involved in the water damage restoration industry, and for others who investigate or assess abnormal water intrusion related problems

Standards

BSI PAS 64: Professional water damage mitigation and initial restoration of domestic dwellings code of practice

- The PAS 64 is the only British code of practice for professional water damage mitigation and restoration.
- This standard is the result of close collaboration between the British Standards Institute, the National Flood School and a mix of industry associations, restoration companies, manufacturers, insurance groups and professional builders.
- The PAS 64 is a vital document for both consumers and technicians affected by water damage mitigation.



Continuous Development

- This information was brought to you by Tramex Ltd and Infrared Building Solutions Limited
- Further training is available from Infrared Building Solutions Limited in a range of Building Diagnostic related subjects
- Training is available via e-learning, hands-on classroom courses and webinars through IBS
- Please visit:

www.i-b-s-group.com

and

www.tramex.ie

About IBS

TRAINING

- IBS is a leading provider of specialised training and consultancy in the application and use of moisture detection equipment and infrared thermal imaging technology within the European building and construction industry
- We offer a unique flexible training approach which provides current, new and potential users a practical and application focused programs
- Delivered via traditional hands-on classroom training, via our unique e-learning modules and via webinars which run from 45 to 90 minutes
- Customised in-house training for your staff or clients

CONSULTANCY

- The IBS team has wide experience of delivering B2B and B2C marketing and business development projects to “blue chip” clients across different technical markets
- Broad and deep expertise in the European building market

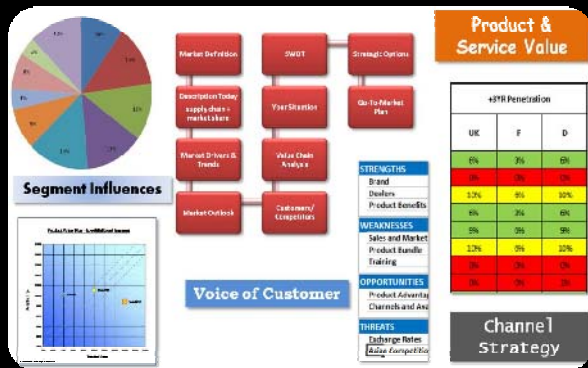
Primary IBS Services



**E-learning
Training**



**Classroom
Training**



Consultancy



**In-house/ Custom
Training**

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