



UNIVERSITY OF
TECHNOLOGY SYDNEY



**TRACE
EVIDENCE**
SYMPOSIUM

AUGUST 8-11, 2011
Kansas City, MO

UTS

THINK.CHANGE.DO

More Reliable and Efficient Trace Evidence through a Stronger Forensic Science Culture

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Australian & NZ Forensic Science Society Symposium, Sydney, Sept 2010



- Forensic Science on Trial:
 - Foundations of forensic science
 - Reflections on NAS report
 - Professionalization of forensic science
 - Effectiveness of forensic science
 - Contextual bias
- Emerging common theme:
 - Forensic science must take ownership of its own discipline!



The Problem is more fundamental than a deficient system to fix by normative procedures

- Apparent lack of unifying paradigm
- Roles badly understood
- Object of study de-focused
- Needs often misidentified



"I suppose the only way we could find out exactly who collected these DNA samples would be to fingerprint everyone."



Definition Issue

- Wikipedia definition for Analytical Chemistry:
 - Analytical chemistry is the study of the separation, identification, and quantification of the chemical components of natural and artificial materials. Qualitative analysis gives an indication of the identity of the chemical species in the sample and quantitative analysis determines the amount of one or more of these components. The separation of components is often performed prior to analysis.



Definition Issue

- Wikipedia definition for Forensic Science:
 - Forensic science (often shortened to forensics) is the application of a broad spectrum of sciences to answer questions of interest to a legal system. This may be in relation to a crime or a civil action. The word forensic comes from the Latin adjective forensis, meaning "of or before the forum."
- Compared to analytical chemistry, the definition is somewhat vague...



Back to the Future

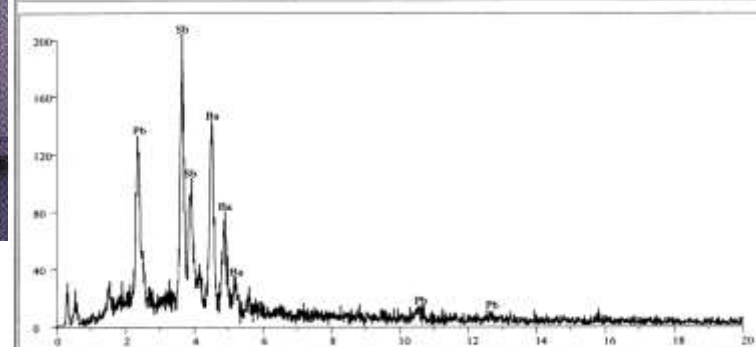
- Old case study (16 years approx.):
- Sexual assault in Switzerland:
 - Suspect's thumb and index finger were swabbed in order to detect biological evidence.
 - The suspect confessed his sexual crime.
 - Witness deposition - The suspect could have fired a gun and attempted to kill the victim.



Analysis



Comments: 26A - Particle 588

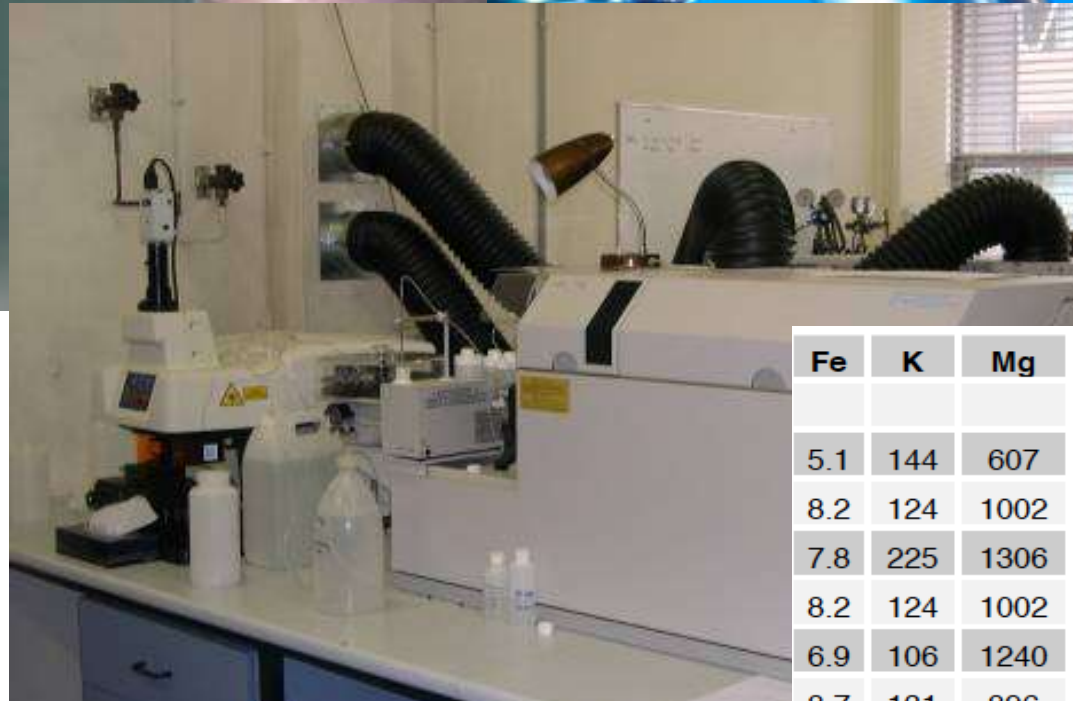


Analyst Name : S. BULL.

Signature : *S. Bull*



Analysis



Fe	K	Mg	Na	P	S	Ti	W	Zn
5.1	144	607	241	50	3150	2.2	53	1680
8.2	124	1002	267	81	4690	2.6	62	3130
7.8	225	1306	329	90	4940	2.00	64	3200
8.2	124	1002	267	81	4690	2.6	62	3130
6.9	106	1240	572	269	5170	2.9	85	4600
8.7	131	896	569	243	5480	2.3	88	4760
55.1	238	1022	550	165	4950	2.7	0	1310
0	143	1006	453	153	4690	5.9	0	1240
4.5	255	1524	658	191	6660	6.1	48	2480
5.2	271	1871	655	211	6800	1.9	47	2460
0	186	1421	717	232	5720	1.7	0	2110
0	233	1307	665	199	5840	3	45	2120
26.2	128	50	470	116	5240	3.7	54	2690
0	268	50	519	119	5460	2.6	54	2710



Results

Sample	Sb [ng]	Ba [ng]	Pb [ng]
Suspect right hand	45	2426	7736
Suspect left hand	14	1761	9823
Di Maio's threshold	35	150	800
Krishnan's hand blank levels	10	100	-



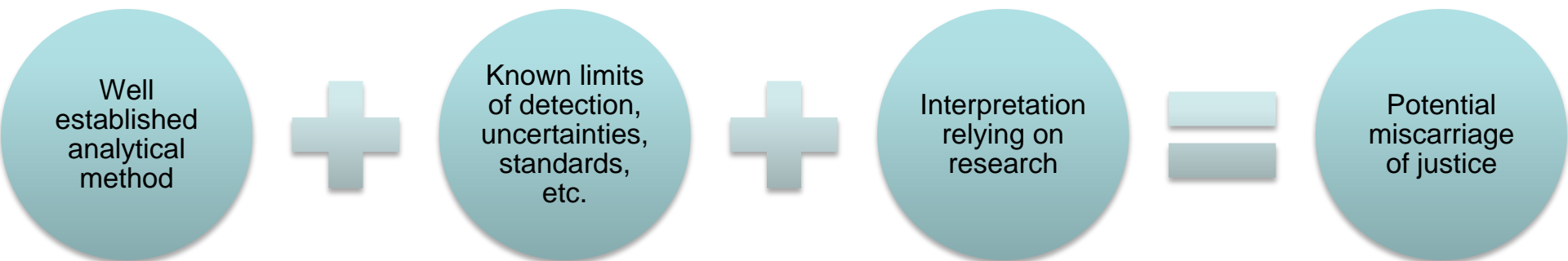
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Di Maio's threshold	35	150	800
Krishnan's hand blank levels	10	100	-
Car (front)	106	1338	Saturation
Car (back)	200	4485	Saturation
Registration plate	566	6130	Saturation



“Near Missed”

- ?????????????????????????????????





The Lessons

- Situation and context take precedence over lab processes.
- The uncertainty is primarily related to the situation caused by the crime itself and by the actions at the crime scene, and rarely from the analytical methods.
- **Most discussions in recent years focused on laboratory processes and error rate in methods...**



The Lessons

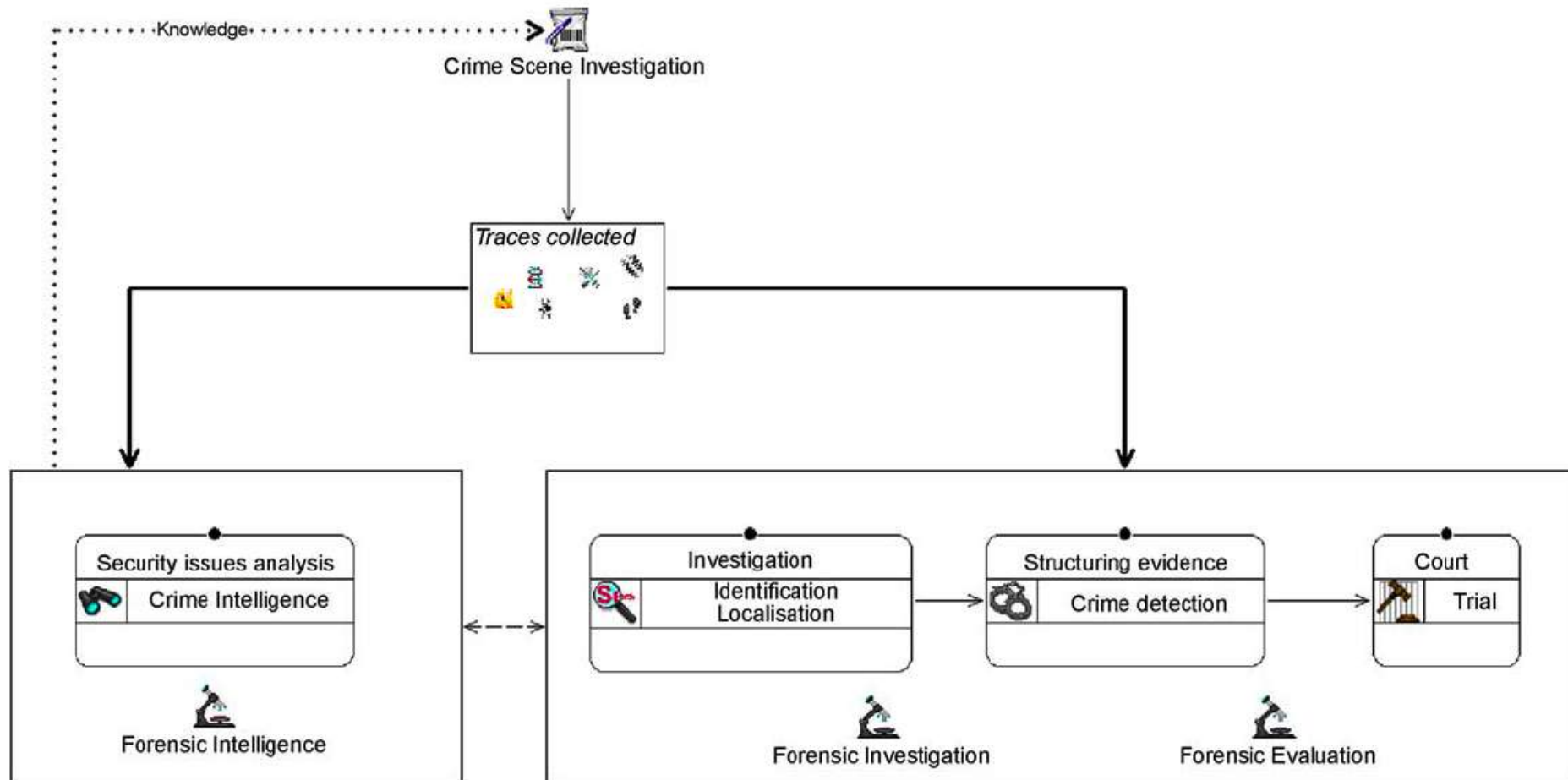
- We got it right because:
 - Ability of two forensic scientists to discuss the case freely and integrate relevant contextual information to assess objective observations against various hypotheses.
 - **A lot of discussion in recent years focused on shielding forensic scientists from any contextual information otherwise their approach and judgment may be biased...**
- This is forensic science (as opposed to analytical chemistry in this case)!



THE Trace – Back to Basics

- Fundamental piece of information about the crime itself.
- Generally unwilling, incomplete, or at least not representative in the statistical sense;
- Cannot be reproduced in the scientific sense;
- Must be detected, sometimes imagined, amongst a heavy noise;
- Objective and present, while containing information about the past;
- When absent, it has an effect on the investigation – but difficult to measure this. **UTS:** Centre for Forensic Science

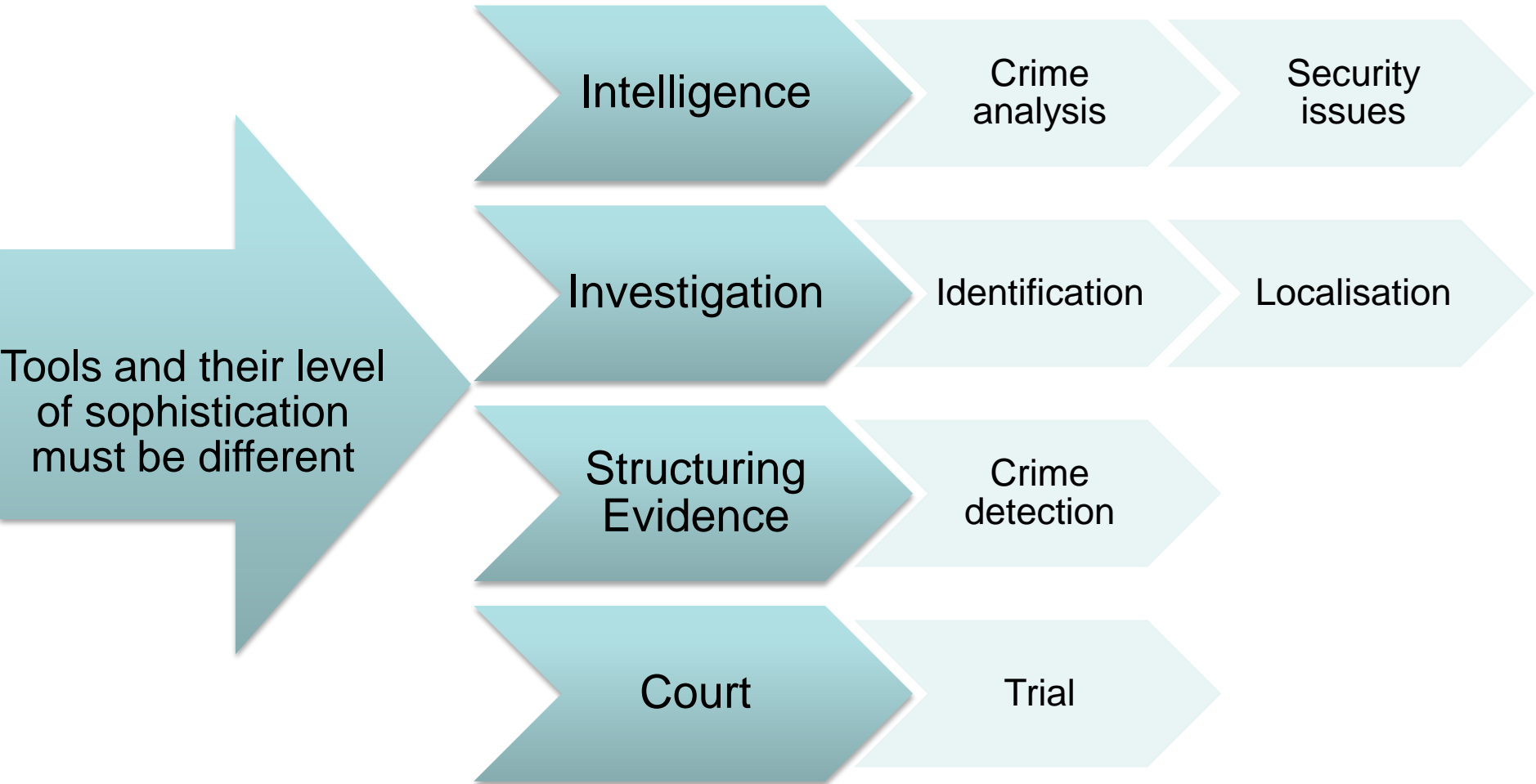
Four Dimensions of Forensic Science



Ribaux O., Baylon A., Roux C., Delémont, O., Lock E., Zingg C., Margot P. Intelligence-led crime scene processing. Part I: Forensic intelligence. *Forensic Science International*, 195 (1-3), 2010, 10-16.

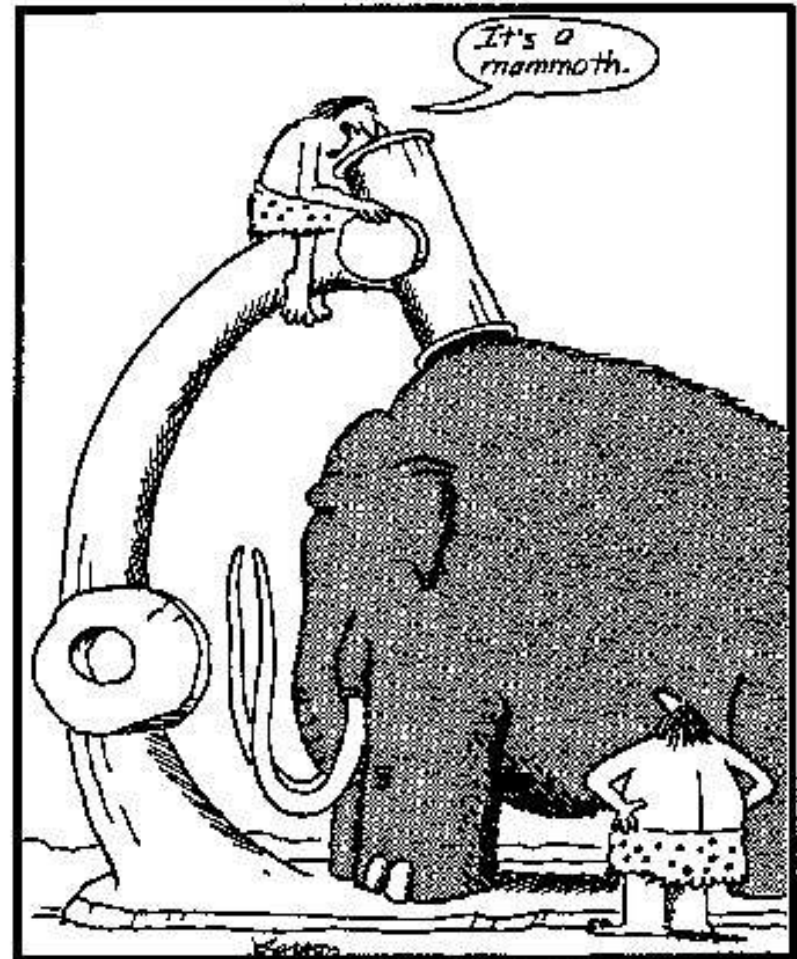


Implications



The Reality in Trace Evidence

- Potentially self destructing by creating an overhead-draining high-tech environment and increasingly complex normative processes regardless of the dimension it is being used and without a concomitant assessment with regards to the justice and security questions we are supposed to solve!



Early microscope



Where to from here?

- Normative procedures, by themselves, will not address the fundamental criticisms.
 - “*By over-inflating the complexity of what are essentially laboratory processes, do we really hit the nail on the head?*” [Roux C., Forensic science – A teenager in identity crisis?, Australian Journal of Forensic Sciences, 2011, 43:2-3, 79-83]
- Efficiency of forensic science, and especially trace evidence, and its value to investigators and victims should be better captured.
- Expanding role in other dimensions than Court.



Where to from here?

- Paramount to develop and foster a forensic science culture with crime and its traces as the central object.
 - *“Until we go back to these fundamental and basic issues, forensic science will remain in the firing line dictated by others.”* [Margot, P., Forensic science on trial - What is the law of the land?, Australian Journal of Forensic Sciences, 2011, 43:2-3, 89-103]
 - Major role for education and training, fed by research and casework experience.

Selected Recent References

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CONVICTS TO CRIMINALISTICS: PAST, PRESENT AND FUTURE



INVITATION TO ATTEND

The Australian and New Zealand Forensic Science Society invite you to attend the 21st International Symposium on the Forensic Sciences in Hobart from 23 to 27 September 2012.

Join us in the picturesque island state of Tasmania to hear national and international leaders in forensic science speak on a diverse range of topics, to participate in an exciting social program and to enjoy the best in fine Tasmanian food and wine.

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